# GREEN ISSAQUAH PARTNERSHIP

## A 20-YEAR IMPLEMENTATION GUIDE

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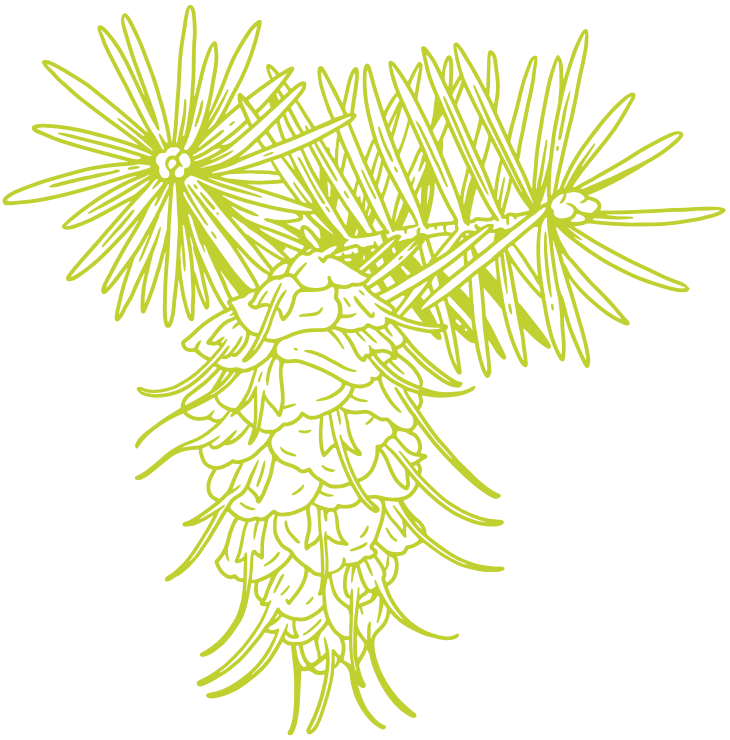
**Guidelines for Restoring and Maintaining Issaquah's Public Forested Parks and Natural Areas**



This project funded with a grant from King Conservation District

PHOTO BY SHUBHA TIRUMALE PHOTOGRAPHY

# ACKNOWLEDGMENTS

With funding from the City of Issaquah and King Conservation District, the **City of Issaquah** and **Forterra** formed a partnership in 2019 to evaluate the health and condition of Issaquah's forested parks and natural areas, and develop a program to protect, enhance, and sustain those resources during the next 20 years as a legacy for future generations. With this funding, Issaquah joins Burien, Des Moines, Everett, Kent, Kirkland, Puyallup, Redmond, Seattle, SeaTac, Shoreline, Snoqualmie, Tacoma, and Tukwila as a member of the **Green Cities Network**. These 14 Green Cities in the Puget Sound region span three counties (King, Pierce, and Snohomish), collectively serve a population of more than 1.7 million, and aim to restore and steward more than 13,000 acres of parkland. As part of this robust network of resources and expertise, the **Green Issaquah Partnership** will help ensure a livable and healthy region for all.

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A special thank-you to our community partners and review team, who took the time to provide comments to ensure this document reflects the community's interest in our urban forests

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FORTERRA LAND FOR GOOD

AMERICAN FOREST MANAGEMENT

GREEN ISSAQUAH PARTNERSHIP

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# EXECUTIVE SUMMARY

The City of Issaquah and Forterra teamed up in 2019 to evaluate the general health and condition of Issaquah's forested parks and natural areas, and establish the Green Issaquah Partnership: a program to protect, enhance, and sustain Issaquah's forested parks, natural areas, and scenic resources. This Partnership brings Issaquah into the growing list of 14 Green City Partnerships throughout the Puget Sound region.

The Green Issaquah Partnership is an important step toward meeting the guiding principles and goals of environmental stewardship identified in the City of Issaquah's Citywide Strategic Plan, adopted in 2019. The city's 2018 Parks Strategic Plan also identifies initiating a Green Issaquah program as an operational strategic project. The intent of the Green Issaquah Partnership 20-Year Implementation Guide (henceforth called the 20-Year Guide) is to:

- Describe the challenges facing today's urban forests, the benefits of restoring and enhancing those forests, and how the City of Issaquah's investments in restoration to date have laid the foundation for the Green Issaquah Partnership.
- Share results of the health assessment of Issaquah's forested parks and natural areas.
- Set goals and objectives to restore and care for Issaquah's forested parks and natural areas.
- Recommend actions and benchmarks to reach those goals and objectives and provide healthy forest outcomes that benefit Issaquah's people and ecosystem.

### *What Is the Green Issaquah Partnership?*

*The Green Issaquah Partnership is focused on restoring and maintaining city-owned forested parks and natural areas that support a healthy urban forest throughout the City of Issaquah. It is a direct initiative that will help meet several goals, policies, strategies, and actions called out in the City of Issaquah's Comprehensive Plan (amended in 2019), Citywide Strategic Plan (2019), and Parks Strategic Plan (2018).*

## URBAN FOREST BENEFITS AND CHALLENGES

Urban forests play a vital role in Issaquah's environmental, economic, and public health by providing services to its residents and the surrounding ecosystem. These resources have economic value because of their contributions to stormwater management, ambient-temperature reduction, reduction of air pollution, mitigation of the harmful impacts of climate change, and their ability to create social connections within communities, among other benefits.

Issaquah's forests face the same kinds of pressures and problems as many urban forests: climate change, canopy-cover decline and loss, fragmentation, an influx of invasive species, declining tree health due to age, and resource limitations on management and maintenance. These pressures diminish the benefits provided by the urban forest, thereby diminishing quality of life for Issaquah residents.

The City of Issaquah has a 51% canopy cover, one of the highest canopy-cover rates among King County cities. Protecting, enhancing, and maintaining the trees that comprise Issaquah's urban forest — in neighborhoods, urban areas, and parks — is critical to the health and welfare of the citizens of Issaquah.

## THE GREEN ISSAQUAH PARTNERSHIP'S VISION

The Green Issaquah Partnership focuses on the portion of the urban forest that the city has the most direct responsibility for — the forested areas found in city parks and natural areas. The Partnership envisions a city with healthy forested parks and natural areas, supported by an engaged community invested in its urban environment. This 20-Year Guide will help make the Partnership's vision a reality.

The Green Issaquah Partnership builds upon the city's long history of stewardship and work already underway to enhance its public forested parks and natural areas. Issaquah will continue this work through partnerships with the Mountains to Sound Greenway Trust, Issaquah Alps Trails Club, Washington Conservation Corps, and others. The Partnership will expand restoration work and bring all of these efforts under one roof, offering a one-stop shop for volunteers to engage in restoring these spaces. Streamlining partner efforts will also offer more tangible opportunities for funding and community engagement.

### *Who Are the Partners?*

*Initially, the City of Issaquah Parks and Community Services Department will work with Forterra, Mountains to Sound Greenway Trust, and others to create a Green Issaquah Partnership Management Team to support and guide the program. As the program develops, the Partnership will grow to include volunteers, schools, businesses, and additional community organizations and nonprofits.*

## CURRENT CONDITIONS IN THE CITY OF ISSAQUAH'S FORESTED PARKS AND NATURAL AREAS

Forterra's forestry consultant, American Forest Management, collected baseline ecological data during the early fall of 2019 using a rapid-assessment data-collection protocol called the Forest Landscape Assessment Tool (FLAT). This tool identifies the quality of habitat composition, amount of invasive plant coverage, and the balance between conifers and deciduous trees. It also tells us about the dominant species found in the forest, general age class of forest stands, and species composition and regeneration, and identifies possible areas for planting.

Out of 1,680 acres of land in the parks system owned and managed by the City of Issaquah, the forest assessment focused on the 1,540 acres of forested parkland and natural areas. Other city properties that are part of the park system, such as developed parks and playgrounds, were not included in the assessment for the Green Issaquah program. The parcels included in the Partnership's scope were those that currently support, or have the potential to support: (1) native lowland-forest communities with tree-canopy cover greater than 25% and (2) forested and shrub-dominated wetlands or emergent wetlands that cannot support a full tree canopy.

The 2019 FLAT results show that approximately a third of the Green Issaquah Partnership project area is in exceptional condition, with high-value habitat and low invasive-cover threat. Just over half of the lands surveyed have an overstory dominated by coniferous or evergreen trees, while deciduous trees dominate 44% of lands. This is important because coniferous trees often live longer than deciduous species, providing numerous year-round ecological services longer into the future. Conifers also sequester larger amounts of carbon than deciduous trees and lessen stormwater management issues.

Compared to other Green Cities, Issaquah has a significantly lower percentage of acres with high levels of invasive plant species. However, Issaquah also has more acres of parkland than other cities of its size — its 359 acres with high and medium invasive cover will require a significant restoration effort, with additional acres in need of planting and maintenance. But there is great potential and opportunity to restore and maintain these areas now, before the problem gets significantly worse and more expensive to solve.

## IMPLEMENTATION OF THE 20-YEAR GUIDE

Enrolling Issaquah's 1,540 acres of forested parkland and natural areas in active restoration and maintenance within the next 20 years is an ambitious goal. This 20-Year Guide lays out implementation strategies into three categories: field, community, and resources.

### Field

This plan creates a structure for prioritizing restoration projects for both volunteers and professional crews. A top priority will be to maintain existing and past restoration projects. For new projects, the 20-Year Guide recommends combining community input and interest with forest assessment results and habitat values to set restoration priorities that provide opportunities to enhance or maintain forest-health benefits geographically across the city. Restoration projects will utilize the best available science and best practices for urban forest restoration and maintenance, in order to maximize forest health and the essential benefits forests provide.

### Community

This plan provides the structure for a centralized volunteer system to make it easy and satisfying for the community to get involved. Maintaining an inclusive and successful volunteer program will encourage participation from a diverse network of individuals, families, schools, businesses, and nonprofits, while providing a variety of opportunities for people to engage across all neighborhoods. Additionally, individuals can become Forest Stewards dedicated to a particular park. The Partnership will provide Forest Stewards with training, support, tools, and resources to manage their restoration project and lead other volunteers at events. The Partnership will also provide educational resources and trainings that encourage private property owners and residents to be good stewards of the forest and nurture their property. These Partnership accomplishments will be tracked, reported, and celebrated each year.

### *What is a Forest Steward?*

*Forest Stewards are trained volunteers working individually or in small teams to organize and implement restoration projects in a particular park. Forest Stewards lead volunteer events and work in coordination with Green Issaquah Partnership staff.*

## Resources

This guide outlines a 20-year commitment to actively restore and maintain Issaquah's forested parks and natural areas through volunteer initiatives supported by a team of city staff, partner organizations, consultants, and professional restoration crews. In order to better determine what resources would be necessary, Forterra conducted a cost analysis using the existing Green Cities cost model. This analysis determined the total cost of a forested park and natural area enhancement program for Issaquah to be $17.6 million (in 2020 dollars). Securing stable, sustainable funding will ensure that the program has resources to accomplish its long-term forest-health, community-development, and program-administration goals. Though this is a significant investment, the cost of effectively managing these lands without volunteer involvement and solely using skilled field crews is estimated to be more expensive — and does not guarantee long-term success or community ownership. The 20-Year Guide forecasts volunteers to contribute and leverage up to an additional $3.2 million in value for the City of Issaquah.

## Future Efforts Beyond Parks

As Green Issaquah Partnership forest-restoration efforts gain traction in the community, the Partnership will increase public awareness and education around the value of healthy forests, and expand its reach to enhance Issaquah's urban forest beyond its park and open-space boundaries. This awareness could occur through a tree-giveaway program for Issaquah residents, engaging schools in restoration on private lands, or caring for and planting street trees. Future program expansion is dependent on the success of the Partnership's initial efforts and on community involvement.

PHOTO BY NICK KRITTAWAT

# CHAPTER 1: INTRODUCTION

From the shores of Lake Sammamish to the forested foothills of the Cascade Mountains, the city's protected natural areas, forest, creeks, and trails make connections and access to nature a way of life in Issaquah. Located within the Mountains to Sound Greenway National Heritage Area, Issaquah is surrounded by approximately 25,000 acres of public forest and trails across Cougar, Squak, Tiger, and Taylor Mountains, and Grand Ridge, together known as the Issaquah Alps. The city celebrates this connection to nature annually with the homecoming of salmon returning to spawn, recognizing Issaquah's history of coexisting with local wildlife and stewarding the creeks and natural areas throughout the city.

### *What Is the City of Issaquah's Parks Strategic Plan Vision?*

*As outlined in its 2018 Parks Strategic Plan, Issaquah's Parks & Community Services vision is to "connect residents and visitors to nature and each other through a vibrant parks and trails system within the city, neighborhoods, and regional lands that provide recreation and outdoor activities for a balanced, healthy, and inclusive mountain, lake, and valley community."*

Issaquah is known for its forested beauty and wealth of trees, in both parks and neighborhoods. Trees define the city's unique character and play a vital role in its environmental, economic, and public health. An Urban Tree Canopy Assessment for the City of Issaquah reports a healthy canopy cover of 51%[1] — an enormous asset that supports a high quality of life. With such a large resource, Issaquah's urban forest needs active management in order to thrive. By enhancing the urban forest, we can preserve Issaquah's iconic beauty and increase the forest's benefits for the people who live, work, and play here.

Scientists and municipalities have also begun to recognize the many benefits of having more trees within the city landscape. Issaquah's urban forest — including its areas of dense forest, shoreline, open space, and wetland — provides numerous services that benefit all areas of the city. These services include absorbing stormwater runoff, returning oxygen back to the air, sequestering carbon, stabilizing shorelines and steep slopes, reducing flooding and erosion, filtering fine and ultrafine particulates from the air, reducing noise pollution, and more (USDA Forest Service 2018). Areas with increased vegetation, leaves specifically, capture more particulates in the tree canopy and clean the air; they also have healthier soils, which clean the water by filtering polluted runoff. As well, the urban forest enhances the livability of neighborhoods, makes Issaquah more beautiful, helps screen out traffic and development noise, offers shade on the hottest days, and provides habitat for local wildlife. Finally, in addition to cleaner and cooler air and improved water quality, the urban forest provides people with access to nature, recreation, and opportunities for community connections, along with physical and mental health benefits.

According to the U.S. Census Bureau, as of 2010, 80% of the U.S. population lives in urban areas, and those residents rely heavily on the natural resources found in the urbanized centers. Historically, development has been the largest threat to both natural areas and tree density in the Puget Sound region's urban and suburban centers. Our cities were once predominantly forested lands. As the region became urbanized, public agencies and land trusts have worked together to purchase and conserve pockets of dense forest, vital wetlands, farmland, and other important lands. Conserving these green spaces is an important first step in preserving the region's natural resources in the face of urbanization.

In the past, our region's urban natural areas were often left unmanaged due to a belief that these areas would take care of themselves and that it was advantageous to keep human impact at a minimum. By studying the urban system, however, we have learned that urban forests face unique pressures and need more care than we once believed. Changes in land use, natural and human disturbances (such as landslides, fires, and soil compaction by heavy machinery), invasive species, litter, pollution, the redirection of creeks, the diversion of stormwater, and the isolation of dense pockets of plants (such as in parks) reduce the forest's natural ability to thrive within cities and suburban areas. Development also increases forest fragmentation and creates pressure on the forest edges. When we lose urban forests, we lose the services they provide.

We now know that we must actively manage the urban forest. For example, natural areas need our help to remove invasive species, plant and regenerate young trees, monitor for and respond to pests, water young trees during times of drought, perform maintenance, and more. Many studies have proven

1 The Urban Tree Canopy Assessment was prepared by PlanIT Geo, LLC for the City of Issaquah in November 2019. The figure of 51% is based on 2017 data.

that educating and engaging residents and securing a strong commitment of care can quickly change the health of a city's forest (USDA Forest Service 2018).

Investing in forested parks and natural areas is not new to Issaquah. Issaquah has a long and successful history of acquiring land for open space and habitat conservation. Its existing system of parks and open space was built upon the efforts of prior city leaders who recognized the value of Issaquah's ecological infrastructure. Over many decades, the Issaquah community has prioritized acquisition of forested hillsides and streamside properties. Today, the city manages more than 1,680 acres of parkland and facilities, with the vast majority of land classified as natural open space.

Over the last several decades, the city and its community members and nonprofit partners (Mountains to Sound Greenway Trust, Issaquah Alps Trails Club, and others) have made significant contributions toward the preservation, protection, and restoration of forested parks and natural areas. The City of Issaquah has initiated several past projects, and others are currently underway. Confluence Park and Salmon Run Nature Park are two signature restoration efforts that combine water management, salmon habitat improvements, and revegetation. Other restoration sites include Lewis Creek Natural Area, Issaquah Creek Natural Area, Tibbetts Valley Park, Tibbetts Creek Natural Area, Park Pointe, Tradition Lake, Park Hill, South Issaquah Creek Greenway, Pickering Reach, Squak Valley Park, and Sammamish Cove Park.

### *Issaquah's Commitment to Healthy Habitat*

*"The City of Issaquah has a strong history and track record of ecological restoration, dedicating time, money, and staff to the health of their forests and streams and the recovery of threatened salmon." – Tor Bell, Field Program Director, Mountains to Sound Greenway Trust*

The Green Issaquah Partnership 20-Year Guide specifically addresses the need to restore and care for the existing canopy cover in Issaquah's parks and natural areas. Though many in the community have dedicated themselves to preserving and protecting the health of the forest, the need is ongoing. For example, the dominance of non-native plant species is a major cause of the loss of biodiversity and the degradation of urban forests (Pimentel et al. 2000; Soulé 1991). These invasive weeds lack natural control (e.g., predators, diseases) and are capable of rapid reproduction — they can quickly blanket the ground and prevent native plants from reseeding (Boersma et al. 2006). At the same time, invasive vines such as English ivy climb into treetops, where they can block light from reaching a tree's leaves, thus preventing the trees from making food until, eventually, the trees die. This problem is exacerbated by the fact that a significant portion of the Puget Sound region's forest canopy is now composed of relatively short-lived mature deciduous trees, such as maples, that are coming to the end of their life spans. As these trees die, new seedlings are not present to replace them, resulting in a loss of forests over time. To address the declining health of Issaquah's forested parks and natural areas, the city has established the Green Issaquah Partnership.


**Figure 1: Artist's rendering of the urban forest**

### *What Is an Urban Forest?*

*An urban forest encompasses all the trees in a defined urban area, such as a city. Urban forests broadly include the trees in urban parks; on city streets; in residential areas, including private yards and shared residential spaces; trees in community spaces (such as libraries and public gardens) and in greenways, river corridors, wetlands, nature preserves, and natural areas; shelter belts of trees; and working trees at industrial brownfield sites, among others.*

### *What Is Canopy Cover?*

*Imagine you are a bird flying over a city (or a human in an airplane) in the summer months. As you look down on your city, what percentage of the ground is covered (obscured from view) by trees? That amount is called the canopy cover of an area. In 2017, the City of Issaquah had a canopy cover of 51%.*

## THE NEED FOR A GREEN ISSAQUAH PARTNERSHIP

**Issaquah can benefit significantly from ramping up restoration and maintenance of its forested parks and natural areas.** In 2019, with funding from the City of Issaquah and King Conservation District, Forterra and the city created the Green Issaquah Partnership, a coordinated effort to restore and maintain the city's forested parks and natural areas. The Green Issaquah Partnership 20-Year Guide determines city capacity, promotes community participation, and establishes the long-term planning needed to support the Partnership's vision and goals. It also sets out a framework for implementing stewardship projects throughout the city with input from the community. The Partnership primarily achieves these goals through community engagement and the volunteerism of residents.

Establishing a dedicated program supports several stewardship, maintenance, and partnership goals, policies, objectives, and actions called out in the City of Issaquah Comprehensive Plan Vol. 1. (2019) and Citywide Strategic Plan (2019). The Parks Strategic Plan (2018) specifically calls out the Green Issaquah Partnership as an operational strategic project supporting many of the policies and actions listed in the plan.

### *Supporting Environmental Stewardship*

*The City of Issaquah's 2019 Strategic Plan lists environmental stewardship as one of its six goals: "Environmental resources are proactively enhanced, protected, and stewarded." The Green Issaquah Partnership directly supports this goal and specifically meets the objective that "community members are active partners in the stewardship of Issaquah's environment."*

In 2005, Forterra launched the Cascade Agenda, a 100-year vision for conservation and economic growth in the Pacific Northwest, with a focus on building sustainable and livable communities. In 2008, Issaquah signed on as a Cascade Agenda City, committed to this shared vision. **Establishing the Green Issaquah Partnership plays a key role in further supporting a sustainable region.**

Recognizing the strong connection between access to healthy urban forest and sustainable, livable communities, Forterra established the Green City Partnerships to support this Cascade Agenda vision. The Green City Partnerships share three common goals:

- Improve quality of life, connections to nature, and enhance forest benefits in cities by restoring 13,000 acres (as of 2020) of forested parks and natural areas.
- Galvanize an informed and active community to support healthy urban forests.
- Ensure long-term sustainable funding and community support.

In 2019, the Green Cities Partnerships, including Issaquah, is 14 cities strong and making ecosystem-wide, regional change. The Partnerships in Seattle, Tacoma, Kirkland, Redmond, Kent, Everett, Tukwila, Puyallup, and elsewhere have already seen success, and Snohomish County has become the first county to make a commitment to apply the Green Cities model to its forested parks (see Appendix B for a map of the Green Cities Network). **Together, these partnerships are establishing one of the largest urban forest restoration networks in the nation.** Forterra supports this network of municipalities by hosting annual summits and quarterly meetings to exchange ideas and offer solutions. The City of Issaquah joins this innovative network of cities contributing to the health and livability of the entire Puget Sound region.

*A conifer can remove 50 pounds of particulates from the air per year (Dwyer et al. 1992).*

*Just 20 minutes in nature can significantly lower stress hormones such as cortisol (Hunter et al. 2019).*

*Air filtration alone by urban trees in Washington State is valued at $261 million (American Forests 1998; figure adjusted for inflation)*

*Nationwide, urban trees prevent 670,000 cases of acute respiratory conditions annually (Nowak et al. 2018).*

*Every 1% increase in a city's usable or total green space results in a 4% lower rate of anxiety/mood disorder treatment (Nutsford et al. 2013).*

*Buffers of trees and shrubs can reduce 50% of noise detectable by the human ear (USDA Forest Service 1998), including high-frequency noise, which is the most distressing to people (McPherson et al. 2001).*

## URBAN FORESTS HAVE MANY BENEFITS

The benefits of caring for Issaquah's urban forest are myriad, and they affect all aspects of the community. Research indicates that urban forests give people a higher quality of life (Roeland et al. 2019; Zank et al. 2016; Jansson 2013), provide ecosystem services such as flood prevention, create opportunities to improve physical and mental health, reduce crime, and allow residents to enjoy nearby nature. They help keep the air and water cleaner, provide habitat for native wildlife, and make communities more livable and beautiful (see Table 1).

### TABLE 1: BENEFITS OF URBAN FORESTS

| | |
|---|---|
| **Reduce Stormwater Runoff** | Urban forests can reduce annual stormwater runoff by 2% to 7%, and a mature tree can store 50 to 100 gallons of water during large storms (Fazio 2010). Green streets, rain barrels, and tree planting are estimated to be three to six times more effective in managing stormwater per $1,000 invested than conventional methods (Foster et al. 2011). |
| **Improve Water Quality** | Plant roots absorb water, much of which is full of pollutants in an urban environment. Some pollutants are filtered and transformed by bacteria and other microorganisms in the soil (Prince George's County 2007); others are transformed by plants through metabolism or trapped in woody tissues and released when a tree decomposes. |
| **Reduce Erosion** | As the tree canopy slows the speed of rain falling on the earth, rainwater has less energy to displace soil particles. Soils under a canopy and the thick layer of leaf litter are protected from the erosive energy of rainwater (Li et al. 2014; Xiao et al. 1998). |
| **Improve Air Quality** | Plant leaves absorb carbon dioxide and produce oxygen through photosynthesis. The surfaces of leaves trap airborne dust and soot (Ram et al. 2012; McPherson et al. 1994), removing millions of pounds of air pollutants annually from the air in a city (American Forests 2001). |
| **Provide Wildlife Habitat** | Native wildlife has unique requirements for food and shelter. Healthy urban forests under restoration have been demonstrated to increase species diversity (Ruiz-Jaén and Aide 2006). |
| **Reduce Energy Use and Combat Climate Change** | A 25-foot tree reduces annual heating and cooling costs of a typical residence by an average of 8% to 12% (Wolf 1998). Urban forests also can lower ambient temperatures of nearby urban areas (Nowak and Heisler 2010), which lowers energy consumption. Trees absorb carbon dioxide and store the carbon in woody tissues, reducing the amount of carbon dioxide in the atmosphere. Each year, an acre of trees absorbs the amount of carbon produced by driving a car for 26,000 miles (Nowak 2011). |
| **Buffer Noise** | Tree canopies dampen sound by intercepting sound waves (Fang and Ling 2003). Noise buffers composed of trees and shrubs can reduce 50% of noise detectable by the human ear (USDA Forest Service 1998), including high-frequency noise, which is the most distressing to people (McPherson et al. 2001). Trees also decrease the negative psychological effects of noise in urban areas, resulting in a perception that urban environments are quieter and calmer when trees are present (Dzhambov and Dimitrova 2014). |

## TABLE 1: BENEFITS OF URBAN FORESTS (CONT.)

| | |
|---|---|
| **Boost Local and Regional Economies** | Urban forestry supports job creation and retention, resulting in added individual income and increased local, state, and federal taxes (California Department of Forestry and Fire Protection 2011). Homes that border urban forests are often valued at up to 5% more than comparable homes farther from parks (Panduro and Veie 2013; Tyrväinen and Miettinen 2000), and street trees add value to homes as well (Donovan and Butry 2010). |
| **Build Community** | Physical features, particularly natural ones, play an important role in creating vital neighborhood spaces (Sullivan et al. 2004). Urban green spaces and parks provide gathering places for people of different backgrounds to integrate and connect with each other. Greener neighborhoods can encourage social bonding between neighbors and improve social connections. Residents who are more attached to their community have higher levels of social cohesion and social control, and less fear of crime, and their neighborhoods display more signs of physical revitalization (Brown et al. 2003). |
| **Sustain Scenic Resources and Make Communities More Attractive** | Urban forests improve the scenic and visual quality of our cities. Trees are the most important factor in influencing the perception of a community's aesthetic value (Schroeder 1989). Trees and natural landscapes are associated with reduced aggression and violence (Kuo and Sullivan 2001b) and less graffiti, vandalism, and littering (Brunson 1999), and they have the greatest restorative effect on people (Hoyle et al. 2017). |
| **Foster Physical Wellness and Fitness** | People in communities with high levels of greenery or green space are more likely to be physically active (Maas et al. 2006; Ellaway et al. 2005). In fact, people who use parks and open spaces are three times more likely to achieve recommended levels of physical activity than nonusers (Giles-Corti et al. 2005). |
| **Improve Mental Health and Function** | The experience of being in nature helps restore the mind after the mental fatigue of work or studies, improving productivity and creativity (Bratman et al. 2015; Berto 2014). A recent study found that just 20 minutes of walking in nature significantly lowers stress hormones (Hunter et al. 2019). |
| **Help Children Develop** | Experience with nature helps children develop cognitively, emotionally, and behaviorally by connecting them to environments that encourage intellectual development, imagination, and social relationships (Isenberg and Quisenberry 2002; Heerwagen and Orians 2002). Regular play in green spaces can also result in milder symptoms of Attention Deficit Hyperactivities Disorder in children (Taylor and Kuo 2014). |
| **Stewardship Activities Benefit Health and Wellness** | Volunteer stewards of all ages who regularly remove invasive species, plant trees, and perform other stewardship activities are likely to gain health benefits from physical exertion. In one hour, a 150-pound person can burn 440 calories from digging, gardening, and mulching, and 330 calories from light gardening such as planting trees (choosemyplate.gov). Strong community relationships are built from sharing personal stories, exchanging information, and working together to achieve common goals (e.g., community forest improvements). |

## Economic Benefits

The Puget Sound region's forests provide measurable, valuable services that affect us every day. In 1998, American Forests, a nonprofit citizens' conservation organization, analyzed Washington State's urban forests. Its study revealed that these trees removed 38,990 tons of air pollution — a service valued at $261.6 million in 2019. The study also showed that the trees created a 2.9 billion-cubic-foot reduction in runoff, a service valued at $9.2 billion, adjusted for inflation (American Forests 1998). Were these forests to be lost, these dollar values become the costs associated with building new infrastructure to carry out equivalent functions.

## Water Quality Improvement

The Washington Department of Ecology has determined that stormwater runoff is the number one pollution problem in urban areas (Howard 2019). Neighborhoods with fewer trees and more impervious surfaces have the potential for increased stormwater, pollutants, and chemicals flowing into their water supply and systems, resulting in flood damage, health risks, and increased taxpayer dollars to treat the water (Seitz and Escobedo 2008). Runoff washes chemicals (e.g., oil, gasoline, road salts) into local urban streams, where they cause lethal and sublethal toxicity in juvenile salmon and their prey (McIntyre et al. 2015). Maintaining healthy trees means healthier soils, which increase stormwater interception, increase infiltration, and improve water quality. The Green Issaquah Partnership understands the important role trees play in improving water quality and will work interdepartmentally with city staff to be innovative and creative with forest restoration and tree-planting efforts in order to improve water quality.

## Air Quality Improvement

A city with abundant and healthy vegetation enjoys significantly higher air quality. Conifers, specifically, can remove 50 pounds of particulate pollutants from the air per year (Nowak et al. 2013; Dwyer et al. 1992), which is correlated in studies with a reduced incidence of asthma in children and other related respiratory health issues in people of all ages (Lovasi et al. 2008). Trees remove soot and other pollutants through their leaves and branches, and evergreen trees do this work year-round. More recent studies have found that conifers, in particular, are natural filters of ultra-fine particle pollutants, and they actually remediate or decontaminate both air and water in a process called phytoremediation. One study likened trees as the "green liver and lungs" of urban areas (Abd ElAziz et al. 2015). In 2006, the total amount of air pollution removed by urban trees annually within the U.S. was estimated to be 711,000 metric tons (Nowak et al. 2006).

## Creation of Wildlife Habitat

Healthy forests with diverse native tree and plant species offer habitat for wildlife by providing areas to nest, forage for food, and seek shelter. In an urban context, restoration of degraded urban forests has been demonstrated to increase species diversity (Ruiz-Jaén and Aide 2006), and areas with high concentrations of trees can act as wildlife corridors between larger forested areas (Fernandez-Juricic 2000).

Healthy forests along rivers and creeks are especially important for salmon habitat (Beechie et al. 2005). For the duration of their lives, trees adjacent to rivers provide many benefits to salmon, such as stabilizing sediment, shading and cooling water, and providing a source of terrestrial invertebrates that fall from overhanging trees — a major source of food for juvenile salmon.

Once they reach the end of their life span, trees provide the secondary function of adding large wood to rivers. This wood is critical for salmon habitat, as many studies have shown that salmon abundance increases with an increase in woody debris (Whiteway et al. 2010; Naiman et al. 2002). The presence of large wood in streams can change the shape of channels and create habitat for salmon at different life stages. By modifying the movement and energy of water flow, large wood can also sort stream sediments, form gravel beds that are preferred for spawning (Bisson et al. 1987; House and Boehne 1986) and cause scouring that creates pools and off-channel habitat, providing an essential rearing refuge from fast-moving water. The slower water also makes it easier for juvenile salmon to capture food (Fausch and Northcote 1992; Bisson et al. 1987).

As well, wood in rivers and streams also provides cover from predators, traps sediments, and increases food availability (Naiman et al. 2002; Bilby and Bisson 1998). By focusing restoration efforts on planting native conifers and increasing riparian buffers, Issaquah's salmon habitat could be greatly improved.

### *Healthy Forests Support Healthy Salmon*

*Urban stormwater runoff washes chemicals (e.g., oil, gasoline, road salts) from roadways and parking lots into streams, wetlands, and rivers, causing lethal contamination to salmon populations. The National Tree Benefit Calculator (treebenefits.com) estimates that a single Douglas fir in the Pacific Northwest can intercept 2,964 gallons of stormwater runoff a year, filtering out pollutants before they reach waterways.*

## Climate-Change Mitigation: Carbon and Heat

Urban forests also help combat climate change and the effects of air pollution through carbon capture. As they grow, trees capture carbon dioxide through the process of photosynthesis. They store the carbon from absorbed carbon dioxide in the woody mass of their branches and trunks, and release oxygen into the air. It is estimated that Washington State's urban trees are responsible for the sequestration of more than 500,000 tons of carbon per year (Nowak and Crane 2002). Each acre of healthy, mature, dense Western Washington forest could be responsible for the storage of more than 300 tons of carbon, which translates to the removal of more than 1,100 tons of carbon dioxide from the atmosphere (Smithwick et al. 2002). For example, the average passenger vehicle emits about 4.6 metric tons — the equivalent of over 10,000 pounds — of carbon dioxide per year (Environmental Protection Agency 2018). According to the EPA, each acre of healthy forest can remove carbon dioxide emissions for approximately 2.4 vehicles per year. While invasive plants such as ivy and blackberry also carry out photosynthesis to sequester carbon and create oxygen, they are shorter lived and contain less biomass than mature conifers. This makes them less effective at removing carbon dioxide from the atmosphere and storing it.

Another way that urban trees mitigate climate change is by combating the "urban-heat-island effect" caused by paved surfaces absorbing and radiating heat from the sun. Trees produce shade, reflect sunlight well above the pavement, and convert sunlight through photosynthesis. Urban forests also create microclimates that move air and further cool their surroundings. They have been shown to significantly lower ambient temperatures, making hot days more comfortable and reducing energy consumption needed for artificial cooling (Akbari et al. 2001; Kurn et al. 1994). A single 25-foot tree reduces a typical residence's annual heating and cooling costs by an average of 8% to 12% (Wolf 1998).

### *Urban Forests Reduce Heat*

*Every 10% increase in overall urban tree canopy generates a 2°F reduction in ambient heat (Wolf 2008).*

Urban trees are particularly vital for reducing heat stress and decreasing the size and effect of the urban heat island (Zupancic et al. 2015). Trees have the unique ability to use evapotranspiration to provide micro-cooling. Zupancic also found that green spaces that are connected and closely spaced could improve the flow of cool air throughout an entire city.

## Mental Health Improvement

Higher percentages of neighborhood green space are associated with significantly lower levels of depression, anxiety, and stress, and one article found that "greening could be a mental health improvement strategy in the United States" (Beyer et al. 2014). It has also been shown that people living near parks and green space have less mental distress, are more physically active, and have extended life spans (USDA Forest Service 2018). Many of the health benefits of trees and green spaces come from their ability to improve the mood and mental health of the people who live around them. Immersion in natural settings is impactful, but even viewing trees through a window can reduce stress and improve outcomes for everyone from students in classrooms to patients in hospitals (USDA Forest Service 2018). Increasing this benefit is as simple as ensuring an equitable distribution of trees and green spaces that are accessible to residents and encouraging people to look or go outside. Restoring canopy cover, especially near where people live and work and children go to school, has the added benefit of increasing access to these mental health benefits.

## Increased Safety

Studies have shown that urban forest and healthy green spaces decrease crime (Kuo and Sullivan 2001a). Recently, the Chicago Region Trees Initiative (CRTI) has been mapping and studying this correlation between trees and reductions in crime. According to CRTI Director Lydia Scott, "Communities that have higher tree population have lower crime. (In) areas where trees are prevalent, people tend to be outside, mingling, enjoying their community" (Nolan 2017). The CRTI team used new technology to check that the correlation wasn't due to socioeconomic or other factors. Another study found that Philadelphia experienced an 18% to 27% reduction in reports of narcotics possession in areas with enhanced vegetation (Kondo et al. 2015). Restoration projects led by the community help reclaim such areas as positive public spaces that are welcoming for everyone, and they regularly bring more watchful attention to areas, increasing a sense of public ownership and responsibility.

In a separate investigation, Kuo and Sullivan studied 98 apartment buildings in an inner-city neighborhood of Chicago and found that regardless of the socioeconomics of the residents of an apartment building, "the greener a building's surroundings are, the fewer total crimes" (Kuo and Sullivan 2001b). Troy et al. (2012) found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. Expanding public awareness and building a robust volunteer program that has high ownership and valuation of urban forest, parks, neighborhoods, and public spaces are the main tenets of the Green Issaquah Partnership.

More research is needed to quantify the economic and ecosystem benefits of Issaquah's urban forest. That said, drawing from the wide body of knowledge and related studies outlined here, we know that the cost of doing nothing to maintain the health of the city's urban forest will be high and have negative effects on Issaquah's environmental, economic, and public health. As development throughout the region continues at a rapid pace, preserving and enhancing our remaining urban forest is now more important than ever.

# CHAPTER 2: THE CHALLENGE — A THREATENED URBAN FOREST

While urban forests provide myriad benefits, they also face unique challenges and pressures that require specific attention. This chapter outlines eight primary issues that prevent urban forests from sustaining themselves or pose risks to forests' current and future ecological health:

- Fragmentation and development
- Climate change
- Wildfires
- Invasive species: plants and insects
- Native trees struggling to regenerate
- Harmful use: intentional and unintentional
- Lack of homeowner education and resource allocation
- Resource limitations on urban forest management and maintenance on public lands

## FRAGMENTATION AND DEVELOPMENT

Habitat fragmentation is an inevitable threat to forests in urban environments. Fragmentation occurs when contiguous forested areas are divided by development or other disturbances, leaving smaller parcels of forest. This fragmentation decreases the forest's valuable internal habitat and increases edge effects because these areas receive more human interference, are more disturbed, and receive more sunlight than contiguous forest. As well, pollination can be challenging when fragmentation isolates populations of plants because plants that are farther from each other have less likelihood of sharing pollen by wind or insects. This can lead to seeds going unfertilized and a lack of tree regeneration. Fragmentation also disrupts the connecting corridors used as habitats by birds, amphibians, and mammals.

Urban forests exist in human-use areas; if the benefits of healthy forest are desired, planning and development must consider how and where to keep dense forest as uninterrupted as possible. Carefully considered urban planning of greenbelts, parks, tree-related municipal policies, and neighborhood-specific regulations and association agreements can reduce fragmentation and contribute to the health of the urban forest. These intact green corridors can serve as the "skeleton" of a city's green infrastructure, supported by individual trees or small groves of trees. Strategies to prevent fragmentation in Issaquah's urban forest can be found in city planning documents, including the Central Issaquah Plan and the Parks Strategic Plan, which call for systemwide corridors of green space and trails that connect neighborhoods to parks and uphold green infrastructure, tree canopy, and contiguous landscapes (habitats).

The Issaquah community largely identifies itself by the roughly 25,000 acres of forested hillsides that surround the city, referred to as the Issaquah Alps — Cougar, Squak, Tiger, and Taylor Mountains and Grand Ridge. Due to the hard work, dedication, and vision of Issaquah's leaders over the past several decades, there have been many success stories in efforts to protect the urban forest from fragmentation. However, as Issaquah grows, development pressures will continue to threaten this resource.

## CLIMATE CHANGE

The Pacific Northwest region faces climate-change impacts that include warmer winters, hotter and drier summers, and changes in precipitation (Littell et al. 2009). Climate change is expected to negatively impact the health and resilience of forests and natural areas by shifting the habitat conditions of native tree species that are common in Puget Sound lowland forests (Kim et al. 2012). Shifts in growing conditions, such as changes to summer and winter temperatures and soil moisture, can directly affect tree health and vigor, making trees more susceptible to mechanical or physical failure, insect infestations, and disease (Littell et al. 2010). Restoration and conservation of urban forests and natural areas therefore become increasingly important. The Green Issaquah Partnership's restoration efforts are essential to preserve forest and natural-area health, and ensure the critical ecosystem functions these resources provide, such as reducing urban-heat-island effects, sequestering carbon, and mitigating stormwater impacts from increased precipitation. To improve the ability of forests and natural areas to mitigate as well as adapt to climate-change stressors, Green Issaquah Partnership managers will need to integrate adaptation and resilience strategies into general management practices and park-specific stewardship plans.

## WILDFIRES

With drier summers comes a growing concern and risk of fires. Most of King County is classified at low risk of wildfires (King County Regional Hazard Mitigation Plan 2020–2025). However, increasing development in areas adjacent to or among heavy vegetation — called the wildland–urban interface — along with climate change, is creating new fire risk in King County.

## INVASIVE SPECIES: PLANTS AND INSECTS

When left unchecked, aggressive non-native plants cover the ground, preventing tree seedlings from establishing and other native plants from receiving sunlight and nutrients. English ivy is a vine that reaches into the treetops and can kill a healthy tree within 20 years by spreading up from the understory into the tree canopy. Ivy covers the tree branches and absorbs sunlight the tree needs to survive. Once ivy becomes established, an intense investment of time and resources is required to remove it. Where English ivy is in the early stages of blanketing forest floors and climbing trees in Issaquah, the opportunity exists to remove the existing growth, preventing further spread and a much bigger future cost of management.

Himalayan blackberry is the most dominant invasive plant species found in Issaquah's forested parks and natural areas (see detailed information about the forest health assessment in Chapter 5). Himalayan and evergreen blackberry bushes spread along the ground in large thickets, and birds disperse the seeds to new locations. Invasive blackberry grows densely, choking out native plants and destroying native habitat for wildlife species. Blackberry thickets are especially aggressive when established along creeks and gulches, where, in the long term, they can be detrimental to salmon. This impacts the ecosystem and can lead to a decline in the health of Puget Sound.

As invasive species begin to dominate the urban forest, the diversity of food and habitat available throughout the seasons is diminished. While some animals, such as rats, can live and even thrive in the dense monocultures of blackberry or ivy, quality habitat for most native wildlife is degraded by invasive species. As well, when creeks, wetlands, and other waterways are inundated with invasive plant species such as Himalayan blackberry, English ivy, reed canary grass, and knotweed, the loss of native vegetation results in significant impacts on stream temperature and water quality. These conditions negatively affect aquatic species, including threatened salmon. The City of Issaquah has prioritized the restoration of riparian areas, and the Partnership should continue to protect and prioritize these areas for their ecological benefit.

In addition, environmental benefits such as stormwater retention, erosion control, and carbon sequestration are greatly decreased when invasive plant species take over and replace complex communities of native vegetation that have grown together throughout this region's history. If the spread of invasive species is not prevented, the result is degraded habitat, loss of tree canopy, and decreased forest benefits (see Figure 2).

PHOTO BY NICOLE MARCOTTE

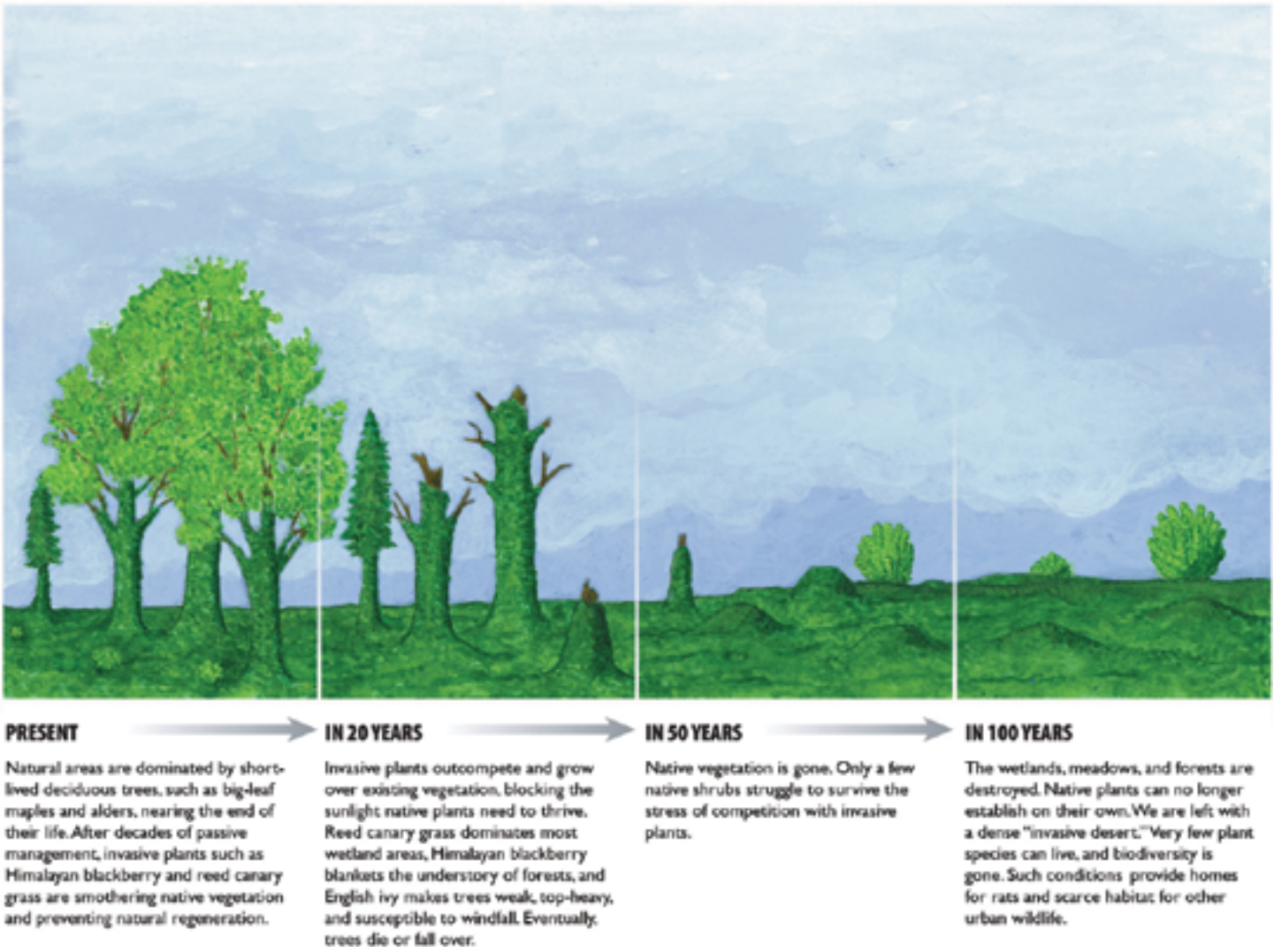



**Figure 2: Illustration of the forest's potential if it is not restored**

Non-native, invasive insects can also have catastrophic effects on a region's natural resources and do not contribute to the natural ecological processes found in healthy natural open spaces. Wood-boring beetles have been documented in the northeastern U.S. and California since 1996. The Asian long-horned beetle (*Anoplophora glabripennis*) and the citrus long-horned beetle, which arrive on wood pallets from Asia, are known to attack and kill maple trees and other deciduous hardwoods (Haack et al. 2010). These species arrived in our region in 2001, but have since been eradicated. Outbreaks of Asian and European gypsy moths have been documented here, though successful control efforts have prevented populations from establishing. In areas where full populations have established, such as in the northeastern and midwestern United States, gypsy moths — which forage by defoliating trees — have weakened trees and degraded wildlife habitat on millions of forested acres. Weakened trees then succumb to other pests or disease. In the Pacific Northwest, gypsy moths have been known to attack red alder, Douglas-fir, and western hemlock (Boersma et al. 2006).

To protect Issaquah's forested natural areas, the Green Issaquah Partnership will need to stay abreast of potential invasive-insect outbreaks in the region. Information is available to staff and volunteers through the Washington Invasive Species Council and U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service. The Green Cities Network is working with the Washington Invasive Species Council to develop protocols and monitoring procedures for Forest Stewards to help cities with invasive-species-outbreak detection, and this could be offered as a training for Green Issaquah stewards.

As the Green Issaquah Partnership implements its 20-Year Guide, insect pests and other forest-health threats should be monitored at each project site. To protect urban forests from devastating future pest and disease outbreaks, it is vital to plant a diversity of trees and shrubs (including pollinator plant species) throughout the project sites. A landscape dominated by just one or a few plant species is more vulnerable, as most pests and tree diseases attack only certain species. A diverse landscape of different plant species will not only combat invasive-plant establishment, but also be more resilient to all kinds of future uncertainties.

## NATIVE TREES STRUGGLING TO REGENERATE

Historically, Issaquah's lowland forests were dominated by conifer trees, but after the logging that occurred throughout the Puget Sound in both the 1800s and 1900s, early-colonizing deciduous tree species helped establish a forest in the disturbed areas. Red alder is especially competitive and has established itself in many stands that were once harvested for Douglas-fir (Grotta and Zobrist 2009). Deciduous bigleaf maples, cottonwoods, and alders now dominate an estimated 45% of the overstory found in Issaquah's forested parks and natural areas surveyed for the Green Issaquah Partnership. Within these areas dominated by deciduous trees, 75% (506 acres) have stands of trees nearing the end of their life span.

Under natural conditions, as deciduous trees begin to die off, they are typically replaced by longer-lived conifers; however, Issaquah's urban forest no longer grows under natural conditions. As they die, large gaps in the forest canopy allow more sunlight in, resulting in perfect growing conditions for aggressive, invasive plants to flourish and outcompete new trees and plants struggling to regenerate. Without human intervention — such as removing invasive species and planting young native trees to create the next generation of canopy — and proper management of the existing forest tree canopy, the 20-Year Guide's technical analysis projects that the natural death of these deciduous trees could lead to a great loss of Issaquah's forest overstory.

Additionally, in some forests, especially those that have experienced disturbances such as logging, native trees have regenerated in high density and are overcrowded. In stands where Douglas-fir dominated post-disturbance regeneration, densely packed trees grow taller, but are often spindly, with high height-to-diameter ratios. As a result of the forest's dense condition, these trees are stressed, unhealthy, and susceptible to blowdown or other threats, thus weakening the forest's structural integrity and ecological value. Relative stand density, which is a measure of how crowded trees are within a stand relative to the biological maximum a stand can support (Ciecko et al. 2016; Curtis 1982), would increase over time, resulting in poor forest health and rapidly increasing tree mortality (King County 2015).

## HARMFUL USE: INTENTIONAL AND UNINTENTIONAL

In addition to the indirect effects of human development, harmful and sometimes illegal activity, especially in parks, can have direct impacts on Issaquah's forested parks and natural areas. People misuse parks, which can harm trees and destroy spaces meant to benefit them. This is often unintentional and a byproduct of inequity or miseducation. Dogs running off leash outside of designated off-leash areas trample native trees and cause erosion. People also degrade native forest vegetation when walking, running, or biking off established trails. Dumped garbage and yard waste is a common problem in parks and natural areas — illegally dumped garbage can leach chemicals into the ground, attract rodents or other pests, and smother understory vegetation. Encroachments onto public land from adjoining private-property owners can lead to a number of problems for natural areas: primarily, the removal of native vegetation for the establishment of ornamental landscaping, lawns, structures, or personal views.

The Green Issaquah Partnership recognizes that homelessness is a social condition and not a crime. Homeless encampments, however, are prohibited inside City of Issaquah parks, and their removal must be dealt with sensitively. If encampments are encountered on project-area sites, the Partnership will work in ways consistent with City of Issaquah procedures and with sensitivity toward all involved. Drawing on the diverse experiences and knowledge of the Green Cities Network, the Partnership will first notify the city, and then employ best practices for the health and safety of volunteers, and the just and equitable treatment of the individuals experiencing homelessness and their belongings.

In addition, it is important to note that some users may perceive less developed parks, such as green spaces and natural areas, as refuges for illegal activities like drug use and crime. This is an unfortunate perception, as it is often untrue: well-managed green space doesn't encourage crime, but rather, it reduces it (USDA Forest Service 2018). The issue is that management is costly and challenges many communities, especially in an urban setting and with limited staff capacity. When illegal activity takes place, forested areas can become known more for the harmful pursuits they harbor than for the valuable benefits they provide. Reversing this perception takes a concerted effort, but simply bringing more attention and activity to these areas helps enormously. The Green Cities Partnership works with the community to assist in this management through community work parties and educational activities.

PHOTO BY JIM AVERY

## LACK OF HOMEOWNER EDUCATION AND RESOURCE ALLOCATION

Another threat to Issaquah's urban forest is that private-property owners lack resources relating to urban forest care, management, and maintenance. With 44% of Issaquah's canopy cover existing on private property, education and resources are imperative. Homeowners often inherit trees and landscapes from previous owners. Without resources and knowledge about tree care, many homeowners and landowners choose to remove healthy trees due to the potential maintenance expenses and risk associated with large aging trees. Those managing landscapes on private properties can help the forest by maintaining and retaining large healthy trees, and by removing and not planting invasive plants that can easily escape into nearby natural areas. While the Green Issaquah Partnership is focused on restoring public parks and natural areas, promoting good stewardship practices on private lands will help support healthy forests and stop the spread of invasive plants.

## RESOURCE LIMITATIONS ON URBAN FOREST MANAGEMENT AND MAINTENANCE ON PUBLIC LANDS

Historically, resources for tree and forest management and maintenance, such as in parks, have been limited in cities. In the past, it was widely believed that forests and natural areas, even in urban environments, could take care of themselves, which tended to discourage managers from allocating sufficient funds for the care of urban forests. Many parks and natural areas around the Puget Sound region were neglected under the wrong assumption that they were self-sustaining and therefore not susceptible to changing conditions and outside influence. This passive management directly led to declining health in unsupported urban forests and other natural areas. Unfortunately, the longer active management is postponed, the more expensive it becomes, as existing forest declines or is lost, invasive species spread prolifically, and threats compound.

Land managers and scientists studying these trends began to realize that urban forests needed more active management. Trees now are recognized as city and community assets — also known as "green infrastructure" — and need to be maintained as such with attendant planning, policy, and budgeting. Fortunately, the City of Issaquah already has a history that demonstrates its dedication to tree planting and forest restoration. To uphold this commitment, the Green Issaquah Partnership 20-Year Guide will invest in the active management of Issaquah's forested parks and natural areas. The Partnership will be creative in securing resources to support forest restoration and maintenance activities. With a more structured, collaborative effort, the Partnership seeks to leverage additional partner investment and volunteer engagement to meet this need. By working together as a community, we can help Issaquah's urban forest thrive.

### *What Is Active Management?*

*Urban forests work differently than other natural areas. Because of development, more light enters the forest in certain areas. People bring in seeds on their clothes and shoes. And because an urban forest exists in small islands, it may have issues with pollination and regeneration.*

*Meeting these needs and keeping these special forests healthy requires more human intervention than in other natural areas. Some examples include removing invasive plants, planting native plants, watering, mulching, stabilizing stream banks, removing garbage or yard waste, maintaining trails, or visiting to check for new problems that arise. We refer to these activities as "active management," thus acknowledging that caring for urban natural areas requires a dynamic, hands-on effort to counteract the unique pressures they face.*

# CHAPTER 3: ENGAGING THE COMMUNITY

The success of the Green Issaquah Partnership relies heavily on public participation and support, so it is important to create a program that aligns with the needs and interests of the local community. In creating this 20-Year Guide, the Partnership wanted community perspectives to inform program priorities and activities from the outset. This chapter describes the process and results of the research and community engagement we conducted.

## COMMUNITY ENGAGEMENT PROCESS

We first started by reviewing the results of some recent community surveys. The City of Issaquah conducted an extensive community survey in 2019[2] about life in Issaquah, using a tool designed to compare results with other cities across the nation. The results from the 3,200 households that completed the survey showed that the natural environment was one of the top three priorities for communities in Issaquah in the coming two years. The survey also concluded there was room for improvement to connect residents to volunteer opportunities and service in their communities.

For its 2018 Parks Strategic Plan, the City of Issaquah had already created a public survey and held several community workshops as a way for residents to provide input regarding what they would like to see prioritized for parks. Some of their recommendations and desires related to natural areas were:

- Balance developed trails and park space with maintenance of the existing natural environment
- Protect streamside areas and maintain tree canopy
- Add more parks with open space, trees, nature, and habitat for wildlife
- Provide environmental education
- Develop public/private partnerships
- Recruit and support volunteers

Forterra and the city also conducted outreach to solicit input specifically for the Green Issaquah Partnership. This included a meeting on June 24, 2019, with partners currently active in parks-related restoration, planning, and programming, including representatives from Forterra, Issaquah Parks and Community Services Department, Issaquah Planning Policy Commission, Issaquah Park Board, Issaquah Alps Trails Club, Woodland Park Zoo, Washington Trails Association, Mountains to Sound Greenway Trust and Friends of Lake Sammamish State Park. Attendees discussed opportunities to collaborate on the Green Issaquah Partnership. A survey was sent to various park supporters and active forest stewardship volunteers, and made available online to the public. In-person outreach about the Partnership and survey was conducted with restoration volunteers at a work party with Mountains to Sound Greenway on November 23, 2019.

### *Listening to Local Voices*

*"We need to keep our forestlands and add to them. The more tree canopy, the better. This is the number one reason I live in Issaquah." – Nate Smith, Issaquah resident*

The survey generated 58 responses. Some common themes from the outreach and survey were:

- The Green Issaquah Partnership is a great opportunity to get local businesses and corporations involved in the community.
- Promote volunteer events and activities through HOAs, the Nextdoor social-networking app, email lists, and community blogs.
- Work with the school district to engage students in restoration projects, both as in-school outdoor-classroom activities and for service hours outside of school hours.
- Collaborate with partners, organizations, and agencies to leverage resources and funding and cross-promote Partnership events and activities.
- Support a volunteer coordinator and website that more easily connects people to different volunteer opportunities across the city.
- Prioritize restoration areas for salmon habitat and other wildlife.

2 See https://www.issaquahwa.gov/1606/Citizen-Survey.

PHOTO BY LUCY SHIRLEY

- Provide educational materials and information to private-property owners on why and how to control the spread of invasive plants and support healthy forest in Issaquah.
- Volunteer opportunities should be family friendly, include a wide variety of times (evenings/weekdays/weekends) and durations to fit different schedules, offer projects for individuals or small teams to work on their own, and offer different volunteer activities for all physical abilities.

Under a Green Issaquah Partnership, these needs addressed by residents and volunteers will be directly met through the 20-Year Guide's community, field, and resource objectives (see Chapter 6). See Appendix L for a summary of responses to the Partnership survey.

# CHAPTER 4: MEETING THE CHALLENGE

The Green Issaquah Partnership is a collaborative effort designed to support, coordinate, and track the collective work of multiple entities to restore forested parks and natural areas across the city. As a partnership, it is important to have a common understanding of the purpose and focus of our work. This chapter describes the vision, goals, and outcomes for the Partnership and outlines the foreseen partners, roles, and management structure.

## MISSION AND VISION

The Partnership is a collaborative effort in which individuals, neighborhoods, nonprofits, businesses, and the City of Issaquah work together to protect, enhance, and sustain our forested parks and natural areas, and scenic resources. The Partnership envisions a city with healthy forested parks and natural areas, supported by an engaged community invested in the welfare of their natural environment. Healthy forested parklands and natural areas contain a multiaged canopy of trees throughout the city, where invasive plants pose a low threat and, where appropriate, a diverse assemblage of plants provides a multitude of benefits to the ecosystem (see Figure 3). The Partnership's mission and vision will serve directly as an adaptive management strategy to address the future impacts of growth and climate change.

## GOALS AND OUTCOMES

For the Green Issaquah Partnership's mission to succeed and to reach its long-term vision, certain goals and outcomes must be achieved during the next 20 years. The Partnership developed the following outcomes and goals, along with measurable benchmarks outlined in Table 8 and Appendix D, based on current forest conditions, input from community members and partners, current and forecasted capacity to support restoration efforts, and the experience of other partnerships in the Green Cities Network. Chapter 7, "Adaptive Management," describes the process of monitoring and tracking the program's success against these goals and outcomes in more detail.

1. **Forest Health Outcome:** Improved urban-forest health, species diversity, and canopy cover throughout the City of Issaquah's system of forested parks and natural areas.
   - GOAL: Restore 1,540 acres of the city's forested parks and natural areas by 2040.
   - GOAL: Remove invasive plants from the city's forested parks and natural areas, and restore them with diverse communities of native trees and understory plants appropriate for each site.
   - GOAL: As prioritized by the city and community, restore sites that provide important ecological, biological, and public benefit.
2. **Public Benefit Outcome:** Increased livability and quality of life for Issaquah residents and visitors by enhancing our urban forest and natural areas, which provide healthy air, recreational opportunities, and enjoyment of nature.
   - GOAL: Increase awareness of the benefits of a healthy urban forest.
   - GOAL: Foster healthy living through connections to nature, and enjoyment and appreciation of healthy forested parks and natural areas.
   - GOAL: Promote and provide resources for private-property owners to understand the value of healthy native vegetation and the importance of being good stewards of their land and the environment.
3. **Community Stewardship Outcome:** The Issaquah community is actively engaged in the management, restoration, and maintenance of the city's forested parks and natural areas, and actively participates in the Forest Steward program.
   - GOAL: Strengthen collaborative partnerships with government agencies, nonprofits, schools, and other partners.
   - GOAL: Create a sustainable Forest Steward program to lead ongoing restoration efforts in the city's forested parks and natural areas.
   - GOAL: Recruit, retain, and support volunteers, and build community capacity for long-term stewardship of our forested parks and natural areas.
   - GOAL: Host public volunteer restoration events to engage community members in restoration projects.
4. **Partnership Management and Resources Outcome:** Sustainable financial resources support the Green Issaquah Partnership's growth, management, restoration, and long-term maintenance goals.

- GOAL: Establish financial, paid labor, donation, and volunteer resources to successfully implement the 20-year forest stewardship program.
- GOAL: Track, report, and celebrate Partnership accomplishments.

## PARTNERS

### Partnership Roles and Responsibilities

Based on the experience of the other Green Cities, this section describes a management-structure model that has been modified for the Green Issaquah Partnership (see Figure 4). The structure is intended to support several thousand community volunteers, city and nonprofit staff, and skilled field crews, who will together implement the work needed to achieve Partnership goals.

In the Partnership's first two years of implementation, a primary task will be planning and prioritizing projects. The Partnership's leadership, or Management Team, will work to achieve the goals through guiding the program's planning and implementation; ensuring quality programming and fieldwork; and pursuing, securing, and allocating resources. Working collaboratively, Forterra and the city can strategically grow the leadership to include representatives from other stakeholder agencies and nonprofits. All three program areas (community, field, and resources) should be part of this team's scope, including tracking and reporting each area's progress. In the first five years, the focus is on building and supporting a volunteer base, spreading program awareness, and demonstrating restoration and planting results on the ground. As community support becomes established, staff time can be reallocated to the fieldwork component, especially for volunteer management and coordination of the work done by Forest Stewards and skilled field crews.

Support staff will help facilitate implementation work by coordinating resources and communication across the Partnership. There will also be a need to seek the necessary funding and resources to help meet program goals. The two-year start-up funding from the City of Issaquah and King Conservation District is intended to support the 2019 Partnership kickoff, 2019 forest assessment, and, in 2020, creation of the 20-Year Guide and establishment of a Forest Steward program. Beyond that time, the city will need to consider ways to fund the Partnership's work.

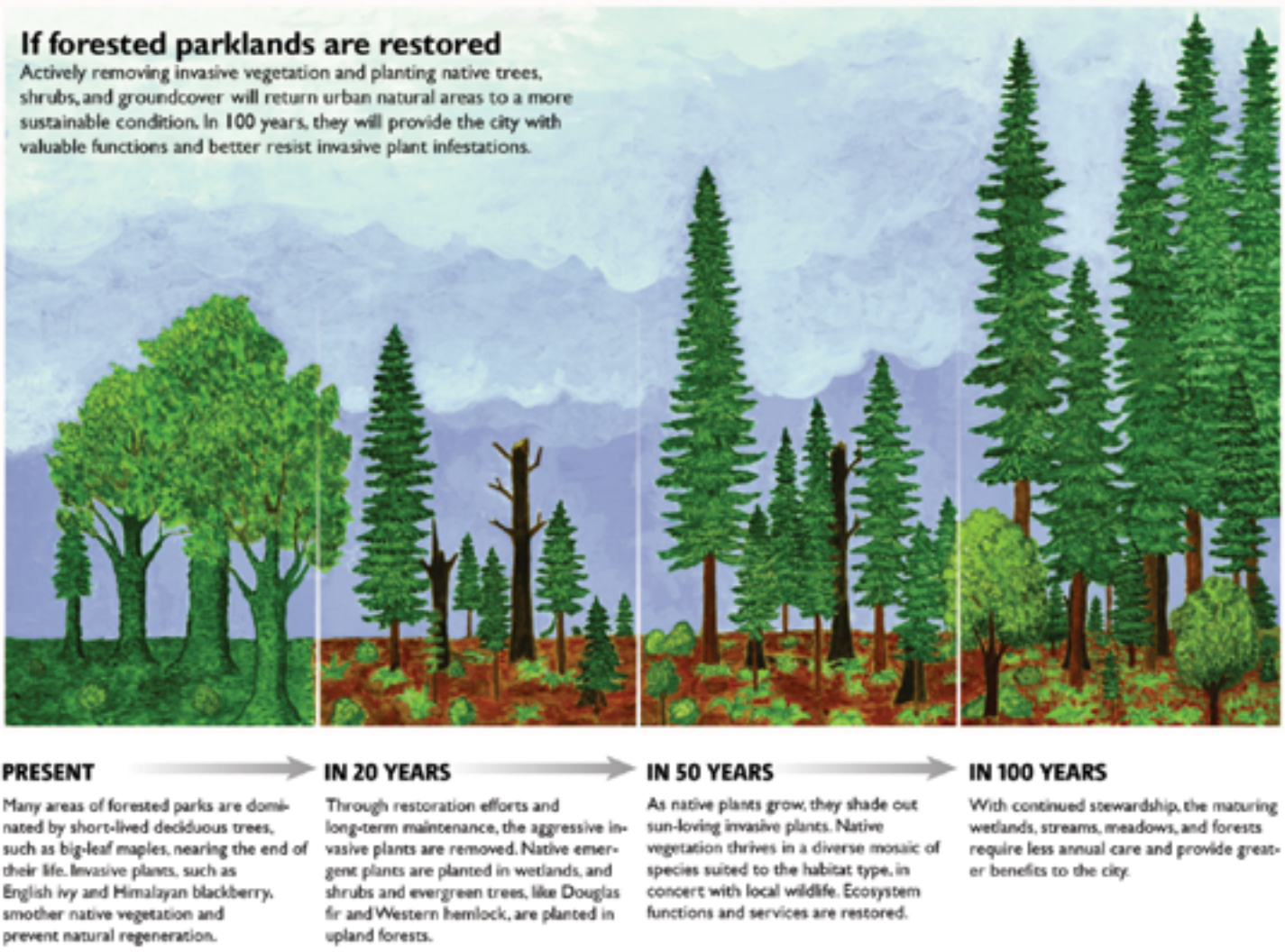



**Figure 3: Illustration of the forest if it is restored**

During these initial years, the Green Issaquah Partnership Management Team will provide guidance and oversight. If there is enough support from interested Issaquah residents, the Partnership may benefit from establishing a Community Advisory Committee, which should include community members and representatives from diverse backgrounds and interests. Potential organizations represented could include advocacy and neighborhood groups, the school district, and local corporate sponsors. Key roles of the committee could be to advance the Partnership's larger goals, provide guidance regarding budgets and funding, and garner community support. In the near term, as the program kicks off, the Issaquah Park Board will serve in this advisory role.

All of this is designed to provide resources to support and track on-the-ground fieldwork undertaken by volunteers and skilled field crews (city staff, nonprofits, and other professional contractors). Without advance planning and structure, the fieldwork will not be as successful, efficient, and organized as it should to achieve this guide's goals over the next 20 years.

### *City of Issaquah*

The city is the leading entity responsible for convening partners and supporting efforts behind the Green Issaquah Partnership. Its Parks and Community Services Department currently manages the majority of sites identified within the Green Issaquah project area. While the department currently is at capacity addressing its many duties, its staff will continue to promote additional Green Issaquah Partnership projects and events.

## CITY OF ISSAQUAH

Develops policy for larger Partnership goals and resource allocations

**PARK BOARD**
**and/or future Green Issaquah-specific Advisory Group**

Provides advisory guidance

## GREEN ISSAQUAH MANAGEMENT TEAM

**City staff, Forterra, and lead partner organizations (TBD)**

Implements Partnership goals, creates work plans, tracks accomplishments, and manages the Partnership's resource allocations. The Parks and Community Services Director provides program oversight and direction. The Management Team collaborates regularly with Parks Operations and Maintenance, coordinates restoration activities with Parks staff, and is responsible for enabling the work in three main program areas: Field, Community, and Resources.

### FIELD

Plans, oversees, and tracks fieldwork, best management practices, and restoration training for volunteer sites and professional crews. Coordinates requests for tools, materials, and assistance.

### COMMUNITY

Oversees outreach and marketing strategies for recruitment and retention of community volunteers and stewards.

### RESOURCES

Tracks budgets and contracts, explores and pursues grants and fundraising opportunities.

Plans and oversees Partnership, develops and implements data-management procedures, and compiles annual summary report.

## PARTNERS

### PUBLIC

- City of Issaquah (administration and staff)
- Other government agencies
- Skilled field crews
- Work-party-event volunteers
- Forest Stewards (volunteers)
- Schools

### NONPROFITS

- Forterra
- Mountains to Sound Greenway Trust
- Others

### PRIVATE

- Contractors and consultants
- Local business partners
- Property owners

**Figure 4: Green Issaquah Partnership management structure**

### *Forterra*

Forterra is a Washington-based nonprofit that enhances, supports, and stewards the region's most precious resources — its communities and its ecosystems. Forterra conserves and stewards land, develops innovative policies, and supports sustainable rural and urban development. In its 30-year history, Forterra has helped conserve more than 250,000 acres, with its work stretching from the farmlands and river canyons of Yakima to the estuaries and forests of Washington's coastline.

Forterra's Green Cities Department supports all Green City Partnerships and works to keep all Partnerships connected through the Green Cities Network. The Green Cities Network facilitates quarterly focus groups that are open to all Partnership staff; distributes training, grant, and other announcements via the Network listserv; and offers technical and general assistance to participating Green City Partnership agencies.

Forterra will continue to be a resource to the city to advance the Green Issaquah Partnership's goals. It will encourage volunteerism throughout the program, including such events as Green Issaquah Day. Forterra may also provide additional skilled field crews, program management, outreach, marketing, development, and greater coordination and connection to the regional Green Cities Network, if needed, through possible future grants or contract funding.

### *Mountains to Sound Greenway Trust*

The Mountains to Sound Greenway Trust leads and inspires action to conserve and enhance the landscape of the Mountains to Sound Greenway, ensuring a long-term balance between people and nature. The Mountains to Sound Greenway National Heritage Area is an iconic 1.5 million-acre landscape that connects Central Washington, the Cascade Mountains, and Puget Sound. The Greenway Trust:

- Promotes a healthy and sustainable relationship between people and the land by holistically balancing built and natural environments.
- Provides a landscape and places for nature and wildlife, culture and tradition, outdoor recreation and education, working forests and local agricultural production, while embracing vibrant urban areas.


PHOTO BY SHUBHA TIRUMALE PHOTOGRAPHY

- Is valued by a broad cross-section of society, working together as an effective coalition to conserve this place and its heritage for future generations.

Since 2002, Issaquah has collaborated with the Greenway Trust to implement over 100 acres of restoration within the city's open spaces, with a focus on riparian habitat enhancement for salmon recovery efforts. These collaborations have included substantial ecological restoration efforts and support of projects such as Squak Valley Park North and Confluence Park, community engagement and education through volunteer participation at restoration and tree-planting events, and ongoing restoration-site maintenance and support. More than 11,000 volunteers have contributed nearly 50,000 hours toward ecological restoration and trail improvements on city-owned and -managed lands. These efforts have complemented the city's own work and have also included the Greenway Trust's work in the larger Issaquah Creek basin, with more than 60 acres of restoration underway within Lake Sammamish State Park, and more than a decade of collaboration with hundreds of public and private landowners throughout the Creek system, systematically controlling knotweed and replanting the riparian buffer.

The Greenway Education Program seeks to inspire and empower young people with the knowledge and skills they need to be conservation leaders. The Greenway Trust believes that one of the most important requirements in building a culture of stewardship, and achieving long-term sustainability of natural resources, is educating youth. By helping young people understand the role they play in their local environment, we can empower them to be part of the solution. The Greenway Trust uses Lake Sammamish State Park and Tiger Mountain State Forest outdoor classrooms, which more than 14,000 students from across King County visit to perform field study investigations on healthy forests, salmon streams and watersheds, and soil, thereby contextualizing lessons learned in the classroom. More than 6,000 of these students have participated in service-learning projects in the Issaquah area, supporting ecological restoration efforts in the Issaquah basin and broader restoration efforts in the Puget Sound region.

In addition to restoration, volunteer, and educational efforts, the Greenway Trust has supported the city's efforts to acquire and conserve public land, build and maintain trails and facilities that connect the city's visitors and residents to surrounding parks and natural areas, and connect regional trails.

### *Volunteers and the Community at Large*

Volunteers donate their time to the Green Issaquah Partnership by helping restore and enhance Issaquah's urban forest, leveraging the Partnership's financial resources, and allowing more areas to be actively cared for. They bolster community interest and support for local parks and natural areas through their advocacy and build critical local ownership of — and investment in — public spaces. A key responsibility of the Partnership will be to work with community members to provide training, site-planning assistance, support, and encouragement.

### *Commercial and Nonprofit Field Crews*

Professional field crews and contractors will complement the work of volunteers in achieving forest-enhancement goals. Professional crews typically focus on steep slopes and other sensitive areas not appropriate for volunteers, or projects that require technical expertise beyond the volunteers' scope, such as mature tree care and pruning. Several local training crews, including EarthCorps, Mountains to Sound Greenway Trust, and Washington Conservation Corps, provide excellent opportunities to get restoration work done on Green Issaquah sites, along with employment and job-skills development for local residents, especially youth. The Partnership hopes to secure funding for hiring professional crews in areas where it is appropriate or necessary.

### *Potential Sponsors*

Corporate and local business partners will have various opportunities to support the Partnership. Many businesses offer their employees opportunities to volunteer for various community projects. Corporations and local businesses will be invited to participate in volunteer restoration events, providing a substantial volunteer labor resource. Sponsors may also be asked to provide funding to support the Partnership, or other contributions as appropriate. For example, businesses could help defray Partnership expenses by donating event supplies, coffee and snacks, or in-kind services such as graphic design, advertising, or event planning. In return, these organizations receive the opportunity to engage with the community and contribute to a healthier, more livable urban environment.

### *Private Landowners*

Private and public lands create a patchwork of natural areas across the City of Issaquah. Private lands serve as vital connectors between fragmented public green spaces. Many of the pressures on Issaquah's forested parks and natural areas are related to actions on adjacent private land, which can either enhance surrounding public spaces or lead to their degradation. Private landowners can also have a powerful impact on increasing canopy cover. In 2017, private land had 44% canopy cover, a 2% increase since the 2011 study, and held 58% of all plantable spaces (i.e., able to support tree seedlings) within the city.

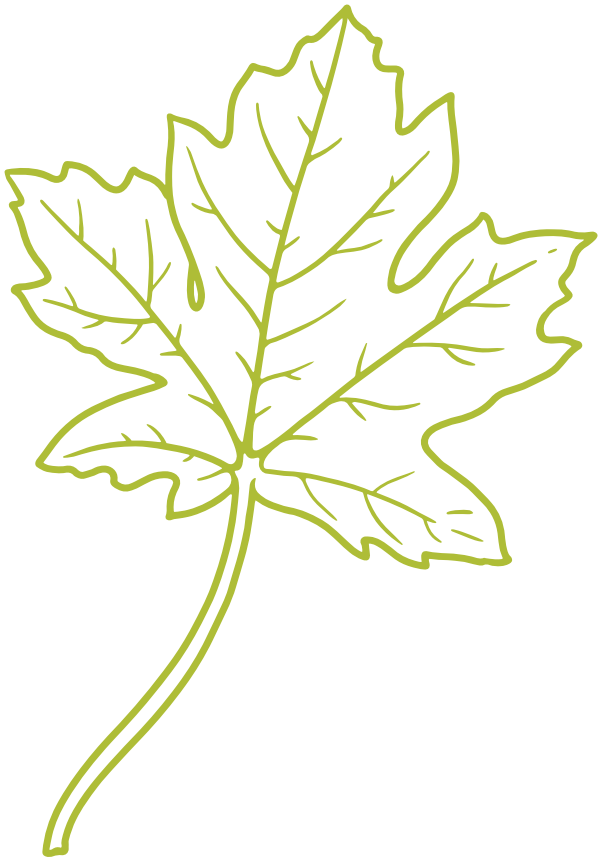
Landscaping choices and lack of maintenance on private property are major sources of invasive plants that spread to public parks. Illegal dumping of yard waste on park property also leads to the spread of invasive plants and smothers healthy plant communities. Issaquah landowners who live adjacent to forested parks will be

encouraged to be more active in the stewardship of their land.

In many instances, backyards are an extension of neighboring open space or forest. Efforts to educate landowners about the benefits of native shrubs and trees, and the problems of invasive species such as English ivy, can play a key role in preventing the continued spread of invasive species throughout the city. For example, the Greenway Trust has been working with private landowners since 2008 to control Japanese knotweed and policeman's helmet (*Impatiens glandulifera*) on private property along Issaquah Creek. The program, free to landowners, also includes native plant installation. Working with landowners through education programs, landowner-incentive stewardship programs, and other complementary programs for private property will help the Partnership generate a community of landowners who care about the well-being of the urban forest, both on their own lands and in public spaces. Engaging them as invested stakeholders will mobilize an important corps of advocates and volunteers to reverse negative trends and improve the health of their private property and public parks.

### *Other Supporting Partners*

It is the Partnership's intent to look for opportunities to collaborate with organizations that share common goals.



Reaching out to various government agencies, nonprofit organizations, and community groups that serve the Issaquah area and finding arenas for mutually beneficial work will strengthen and leverage community support for the Partnership. Some organizations that are currently active in park-related restoration projects and/or programing include:

- Friends of Lake Sammamish State Park
- Friends of the Issaquah Salmon Hatchery
- Issaquah Alps Trails Club
- Issaquah Highlands Community Association
- King Conservation District
- King County (Million Trees funding, Parks Levy funding, etc.)
- King County Community Work Program
- King County Noxious Weed Program
- Kokanee Work Group
- Snoqualmie and Muckleshoot tribes
- Talus Residential Association
- Trout Unlimited
- WA State Department of Natural Resources
- WA State Parks and Recreation Commission
- Washington Conservation Corps
- Washington Trails Association
- Woodland Park Zoo
- YMCA Earth Service Corps

# CHAPTER 5: PARKS AND NATURAL AREAS FOREST HEALTH ASSESSMENT

Effective and efficient natural-resource management can be accomplished only if planners, field staff, and decision makers have up-to-date environmental information on which to base their actions. Empowered with clear, systematically collected data, the Partnership will be able to understand on-the-ground conditions, identify the strategies and resources needed to accomplish the work, and identify priorities.

## METHODS

### Tree-iage and the Forest Landscape Assessment Tool

The Green Issaquah Partnership conducted a forest health assessment to characterize conditions across Issaquah's forested parks and natural areas, and to inform Green Issaquah Partnership restoration strategies. Although this work will not significantly increase canopy cover, it will ensure that the present canopy cover in these areas is not lost. For the purposes of the 20-Year Guide, we assessed parks with large portions of forested and natural areas owned and managed by the City of Issaquah. Combined, this land makes up 1,540 acres, or 2.4 square miles — roughly 20% of Issaquah's total land area. (See Appendix A for detailed maps of the Green Issaquah Partnership project sites.)

> ***How Big Is 1,540 Acres?***
>
> *At 1,540 acres combined, Issaquah's forested and natural area parkland represents an area equivalent to approximately 875 standard soccer fields.*

The parcels included in the Partnership's scope were those that currently support, or have the potential to support: (1) native lowland-forest communities with tree-canopy cover greater than 25%; and (2) forested and shrub-dominated wetlands or emergent wetlands that do not support a full tree canopy. Other city-owned, park-system properties such as playgrounds, sports fields, and other landscaped parks were not included in the assessment for the Green Issaquah program. While landscaped parks and street trees provide important ecological benefits and should be targeted for maintenance and tree planting where desired, they are not the focus of the Green Issaquah Partnership. Open water was also excluded (see Figure 5).

Forestry consultant American Forest Management collected baseline ecological data during the early fall of 2019 using a rapid-assessment data-collection protocol called the Forest Landscape Assessment Tool (FLAT), developed by the Green Cities Research Alliance.[3] FLAT is based on the "tree-iage" model, originally developed by the Green Seattle Partnership. Tree-iage is a prioritization tool, based on the concept of medical triage, that uses habitat composition (e.g., tree canopy cover) and invasive plant cover as the two parameters to prioritize restoration (Ciecko et al. 2016).

The FLAT adaptation builds on the existing framework of the tree-iage model to characterize additional habitat attributes beyond tree canopy and invasive plant cover. These include size class, native understory species present, and indicators of threats to forest health, including low tree-canopy vigor, root rot, mistletoe, and bare soils due to erosion. We also documented the presence of regenerating trees (canopy species less than 5 inches in diameter at breast height) and stocking class (estimated number of trees per acre and spacing between trees), which both play an important role in the forest's long-term sustainability. In addition, we deemed each contiguous habitat, or stand, "plantable" or "not plantable," based on whether site conditions were appropriate for tree-seedling establishment.

Rapid-assessment methodologies such as FLAT produce a snapshot of the overall condition at any one site and on a landscape or city scale. The data serves as a high-level baseline from which finer-scale, site-specific restoration planning can be conducted. Site-by-site analysis of the data will be done as work progresses to help ensure the most appropriate restoration practices and species composition are chosen for each site. Green Issaquah partners will develop more-detailed site-level stewardship plans to further assess on-the-ground planting conditions and outline management recommendations as more park sites are prioritized for restoration activities.

Prior to field-data collection, we classified natural areas within the Green Issaquah Partnership project area through digital orthophoto interpretation, dividing each stand into one of five categories: forested, natural, open water, hardscaped, or landscaped. We ground-verified these categorizations in the field

3 See https://www.fs.usda.gov/pnw/tools/forest-landscape-assessment-tool-flat-rapid-assessment-land-management for more information.

## DEFINING THE PROJECT AREA

**Included in the Green Issaquah Partnership project area:**

- Forests
- Meadows
- Wetlands
- Streams
- Shorelines
- Buffers

**Not included in the Green Issaquah Partnership project area:**

- Ball fields
- Playgrounds
- Beaches
- Orchards
- Landscaped gardens
- Open fields
- Open water
- Mowed stormwater detention ponds
- Hardscaped portions of parks and open spaces, e.g., parking lots and hard courts


**Figure 5: Defining the Green Issaquah Partnership project area**

and, if necessary, corrected delineations and adjusted boundaries in the Geographic Information System (GIS). The final delineated stands are called Management Units (MUs). All MUs were assigned unique letter combinations to be used for restoration planning and data tracking. Since hardscaped, open water, and landscaped areas are not suitable for active native-vegetation management, we removed them from the total acreage targeted by the Partnership.

In the field, we surveyed each MU to identify its specific habitat type (e.g., conifer forest, deciduous forest, riparian, shrubland) and to capture information on the dominant overstory species and tree canopy cover. See Appendix C for the FLAT-modified data-collection flowchart for the tree-iage habitat-composition component of the model.

From this data, we assigned a value (high, medium, or low) to each MU for habitat composition, according to the following breakdown:

### *HIGH-VALUE HABITAT COMPOSITION:*

MUs with more than 25% native tree-canopy cover, in which evergreen species make up more than 50% of the total canopy,

-or- MUs with more than 25% native tree canopy in partially inundated wetlands that can support 1% to 50% evergreen canopy,

-or- MUs in frequently inundated wetlands that cannot support evergreen canopy.

### *MEDIUM-VALUE HABITAT COMPOSITION:*

MUs with more than 25% native tree-canopy cover, in which evergreen species make up between 1% and 50% of the total canopy,

-or- MUs with less than 25% native tree canopy in partially inundated wetlands that can support 1% to 50% evergreen canopy.

***LOW-VALUE HABITAT COMPOSITION:***

MUs with less than 25% native tree-canopy cover,

-or- forests with more than 25% native tree canopy, in which evergreen species make up 0% of the total canopy.

In addition, we assigned each MU one of the following invasive-cover threat values:

***HIGH INVASIVE THREAT:***

MUs with more than 50% invasive species cover.

***MEDIUM INVASIVE THREAT:***

MUs with between 5% and 50% invasive species cover.

***LOW INVASIVE THREAT:***

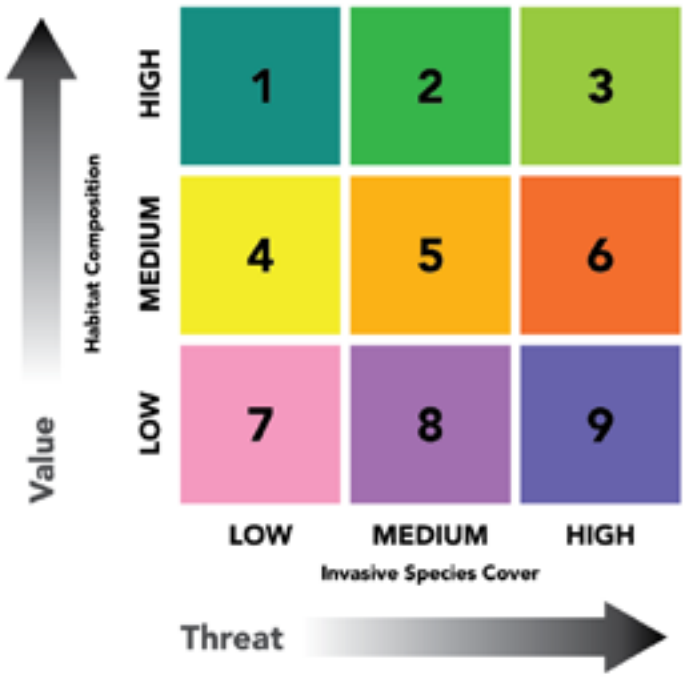
MUs with less than 5% invasive species cover.

## Tree-iage Categories

After we assigned habitat-composition and invasive-species-cover values, we used a matrix system to assign a tree-iage category or priority rating to each MU (see Table 2). Categories range from 1 to 9. One represents high-quality habitat and low invasive-species threat, and 9 represents low-quality habitat and high invasive-species threat. An MU that appears in tree-iage category 3 scored high for habitat value and high for invasive cover threat. MUs scoring low for habitat value and medium for invasive cover threat were assigned to category 8 based on the tree-iage model.

It is important to reiterate that we collected this data to provide a broad view of the habitat conditions of Issaquah's forested land and natural areas. Data collection occurred at the management-unit scale, but because MUs vary widely in size (from 0.02 acre to 10 acres for smaller park parcels and as big as to 93 acres where there are large areas of contiguous forest-habitat types), the results presented here use average conditions associated with each MU. Small pockets within MUs may differ from the average across the stand. When the guide refers to specific data in a given area, the term "MU acre" will be used. Keeping in mind the purpose of the FLAT analysis, this assessment will help prioritize restoration efforts during the next 20 years. The data gathered will also serve as a baseline from which the effectiveness of restoration efforts and the long-term health of Issaquah's forests and natural areas can be assessed in the future.

**TABLE 2: TREE-IAGE LEGEND**




# RESULTS

## Tree-iage Matrix

From the data gathered on all MUs during the FLAT assessment, a picture of Issaquah's forests and natural areas begins to form. Table 3 shows the distribution of acres in each tree-iage category. By summing the acres in each row and column, one can see how much of the total project area (1,540 acres) currently has low, medium, or high habitat value, and how much currently has low, medium, or high threat from invasive species.

This data informs the cost model discussed in Chapter 6 and is used to develop high-level cost estimates for the Partnership to consider when planning the next 20 years.

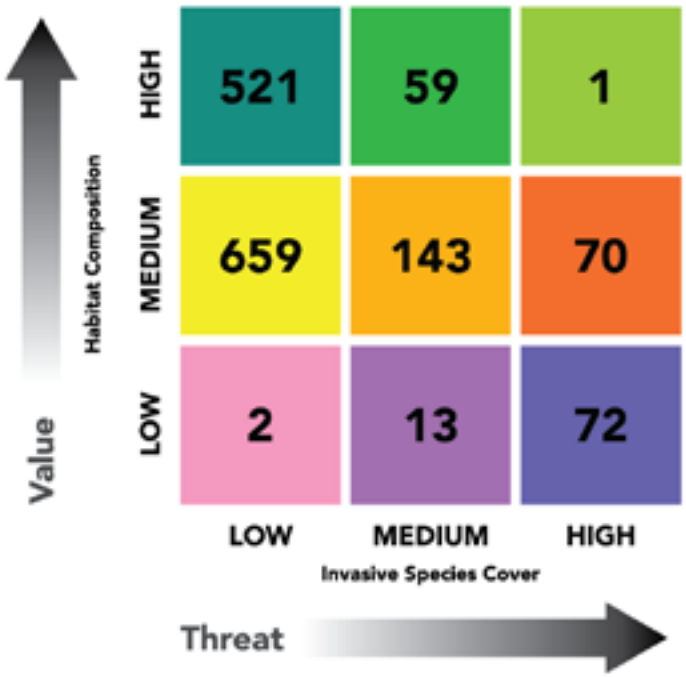
As seen in Table 3, 521 acres, or 34% of the Green Issaquah Partnership project area, is in exceptional condition (tree-iage category 1), with high-value habitat and low invasive-cover threat. Tradition Plateau Natural Resource Conservation Area is the largest contributor to this category, with 243 acres of high-value heathy forest. Other parks with large amounts of tree-iage category 1 forest include Talus Native Growth Protection Area, McCarry Woods, and Park Pointe.

Looking only at habitat composition on the tree-iage matrix, categories 1, 2, and 3 combined show that 38% of the acreage has high-value habitat composition (see Figure 6). Of the acres surveyed, 57% have medium habitat composition (categories 4, 5, and 6), leaving just 6% of areas that are in the lowest habitat

composition: a 7, 8, or 9 on the tree-iage matrix.

The second axis of the tree-iage matrix is the threat from invasive species, which is based on the percentage of the MU that is covered by invasives. The vast majority (77%) of MU acres surveyed have low invasive species cover (categories 1, 4, and 7). Fourteen percent of MU acres have a medium invasive species threat (categories 2, 5, and 8). With only a small portion (9%) of Issaquah's forested and natural area parklands showing high invasive species threat (categories 3, 6, and 9), there is great potential to restore and maintain the acres in need before the problem gets significantly worse and more expensive. The results also show that, out of the 143 acres with high invasive species threat, approximately 61 acres are utility corridors, owned by the city but managed per agreements with other entities. These areas are not likely suitable for large tree-planting or volunteer efforts, but do provide an opportunity to work with the managing entities to reduce invasive species and increase habitat value. Appendix E lists the number of acres in each tree-iage category by park.

## TABLE 3: DISTRIBUTION OF PROJECT ACRES BY TREE-IAGE CATEGORY



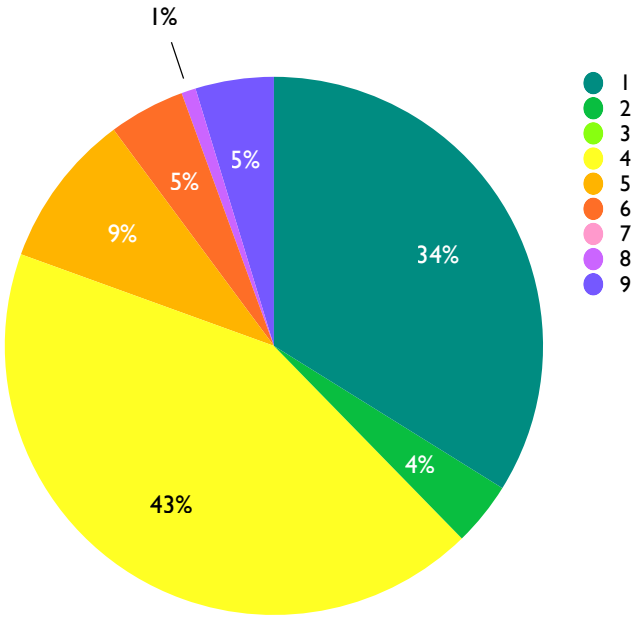




**Figure 6: Percentage of project acres by tree-iage category***

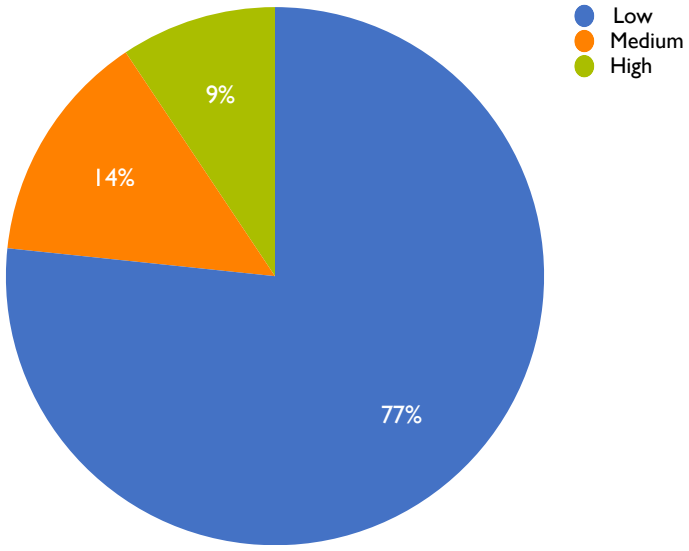



**Figure 7: Invasive species presence across MU acres**

* NOTE: Categories 3 and 7 represent less than 1% of the total project acres

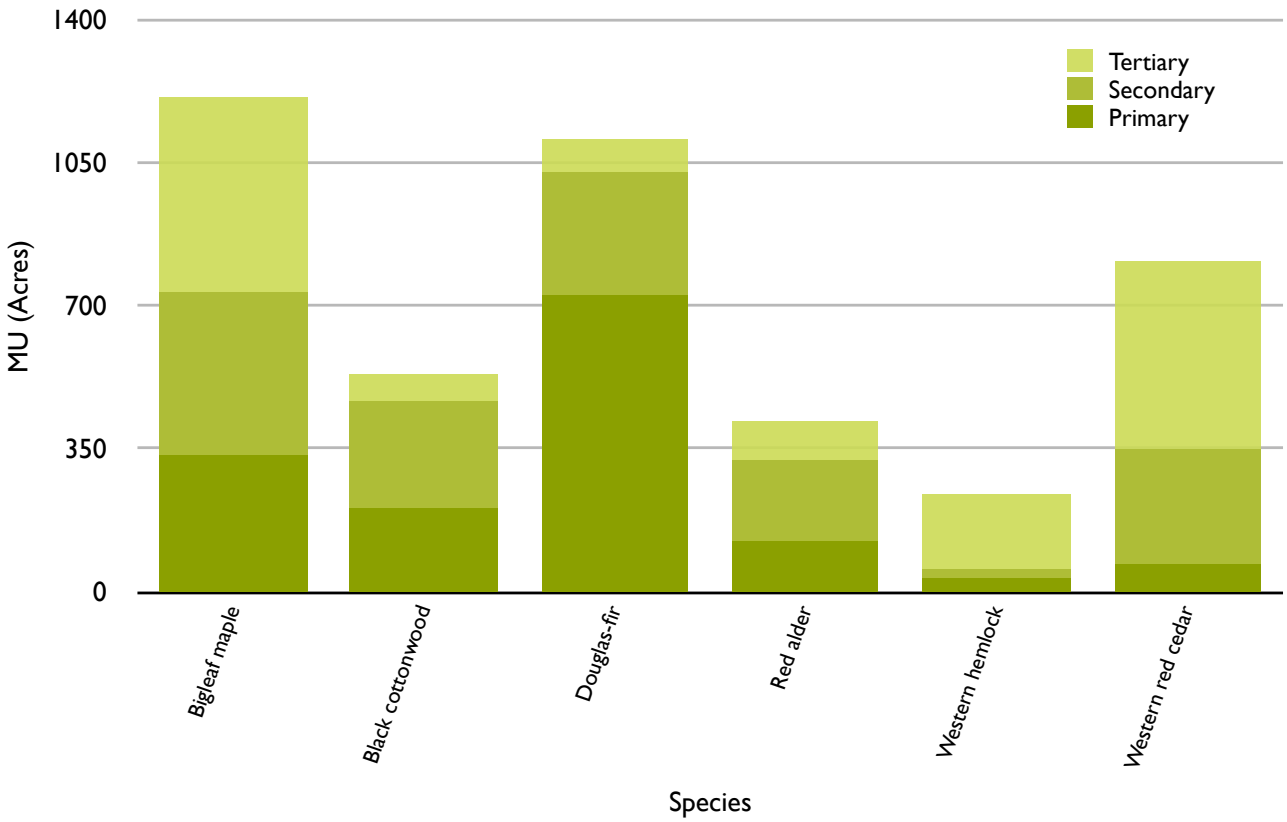



**Figure 8: Distribution of the dominant overstory composition by MU acres**

## Overstory Species

Maintaining the overall health of our urban tree canopy and managing it over the long term is an important part of achieving environmental sustainability as a community. The 2019 FLAT results show that 54% of lands surveyed have an overstory dominated by coniferous or evergreen trees, while 44% are dominated by deciduous trees, and 2% do not have any overstory species. Douglas-fir, a conifer, is the dominant overstory tree in nearly half (47%) of the surveyed acres, while our native deciduous bigleaf maple is the dominant overstory species on 22% of the surveyed acres. (See Figure 8 for the primary, secondary, and tertiary dominant overstory species. "Primary" refers to acres where the species is dominant or codominant, "secondary" is the second most dominant or codominant species within a given MU, and "tertiary" is where the species is third most dominant within a given MU. For a complete list of native overstory species documented during the FLAT assessment, see Appendix F.)

The high presence of Douglas-fir and the existence of additional coniferous species is good news, as they are of very high value. Coniferous trees often live longer than deciduous species, with a potential life span of 300 to 1,000-plus years, depending on species and conditions (see Figure 9). Therefore, conifers provide ecological services longer into the future. And because they keep their foliage year-round, conifers also sequester larger amounts of carbon and filter more stormwater.

Deciduous trees such as bigleaf maple also have ecological benefits: they grow fast and thereby provide shade for conifer seedlings to establish. They provide valuable habitat for wildlife and ecological diversity. Additionally, deciduous trees help build healthy soil by adding organic matter when their leaves drop in the fall. However, most deciduous species, such as red alder and black cottonwood — which are also dominant overstory species in Issaquah's forested and natural area parklands — are short lived, with a life span of 60 to 100 years. As they die, more sunlight reaches the ground, resulting in perfect growing

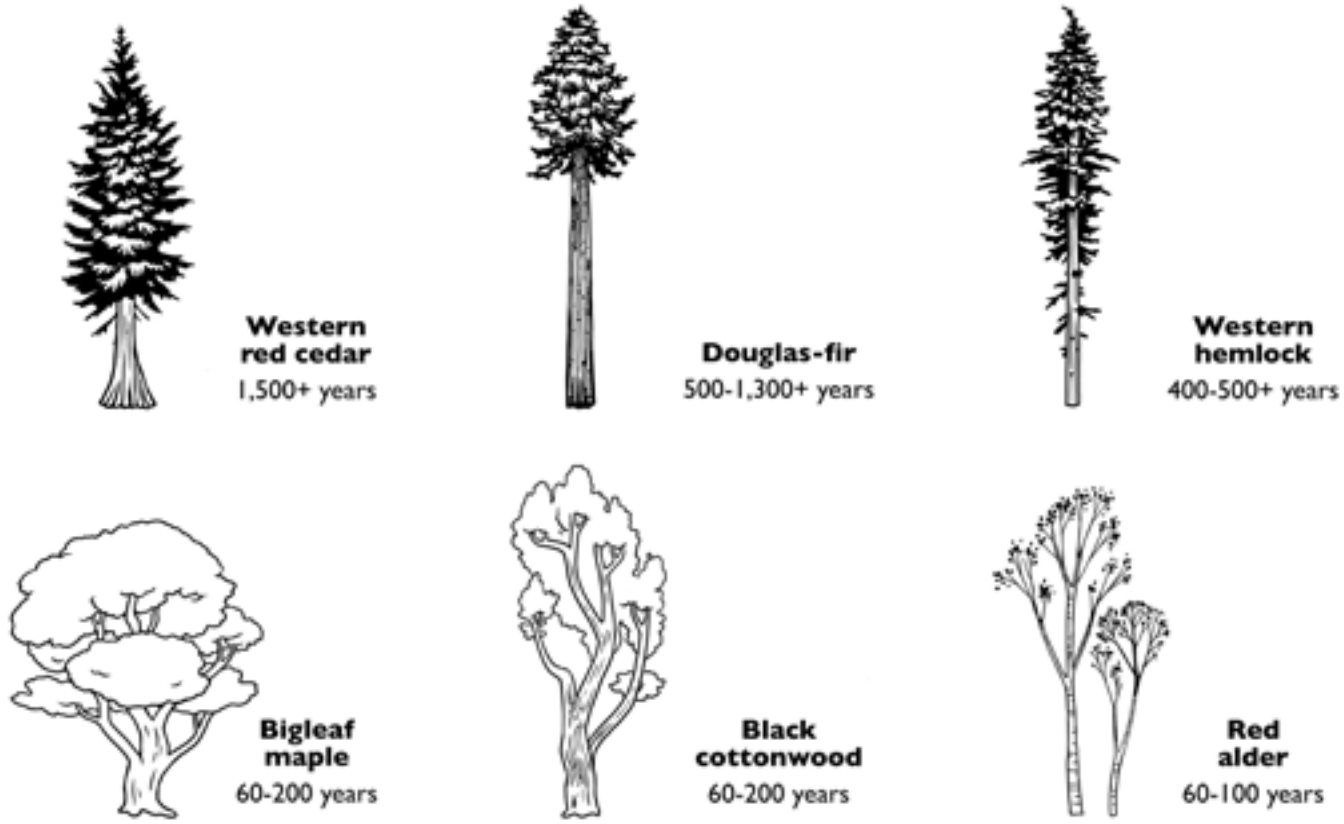



**Figure 9: Life span of different tree species**

conditions for aggressive, invasive plants to flourish, inhibiting the growth of new trees. Indeed, the FLAT results show that in the areas dominated by deciduous trees (677 acres), most of those trees (506 acres) are between 50 and 99 years old, and thus are beginning to decline or reaching the end of their lives.

While conifers such as Douglas-fir can live for much longer than a bigleaf maple's life span of only 50 to 200 years, there are ecological benefits to planting and maintaining native deciduous or mixed conifer-deciduous stands. The Partnership will restore and maintain suitable deciduous areas as appropriate, and will plant the next generation of long-lived native conifer trees in areas where deciduous trees are now reaching the end of their life spans.

## Forest Age Class and Regenerating Overstory Species

Forests need regenerating native plants and a diverse age class of trees in order to stay healthy and sustainable. The FLAT analysis shows that 80% of Issaquah's forested areas are mature at age class 3 (50 to 99 years), with just 1% in age class 4 (100 years or more), a reflection of logging that occurred in the early 1900s (see Figure 10). In areas containing the oldest trees, age class 3 and 4, 60% (736 acres) are dominated by long-lived evergreens such as Douglas-fir and western red cedar. If Issaquah's forest is restored and maintained, it has the potential to reach class 4 (100-plus years) and develop the characteristics and benefits of a mature old-growth forest.

Western red cedar and bigleaf maple were the most prevalent regenerating tree species in the Green Issaquah project area (see Figure 11). Regenerating trees are indicative of the sustainability and future of the forest canopy, as these trees serve as the next generation of dominant overstory in Issaquah's parks and natural areas. Many of these regenerating species, specifically conifers and evergreens, are of high value and should be protected and nurtured through restoration best management practices (BMPs).

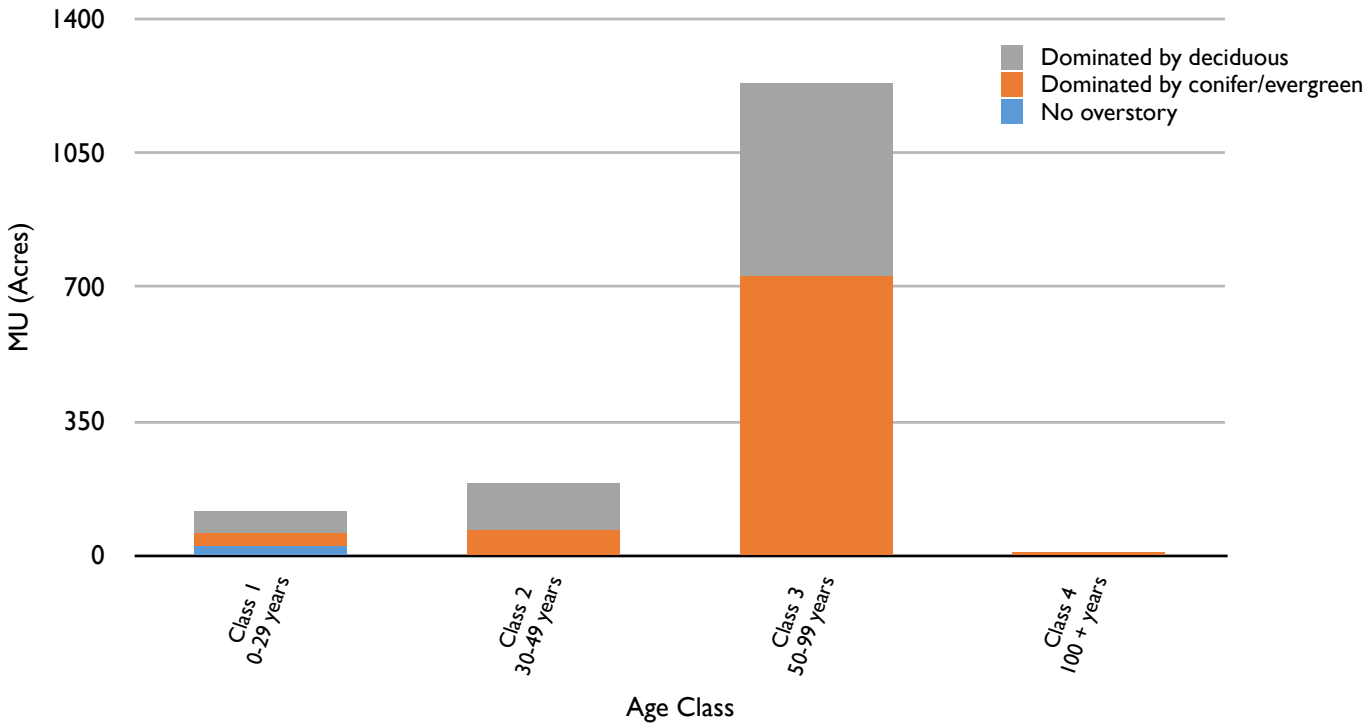



**Figure 10: Distribution of forest age class by MU Acres**

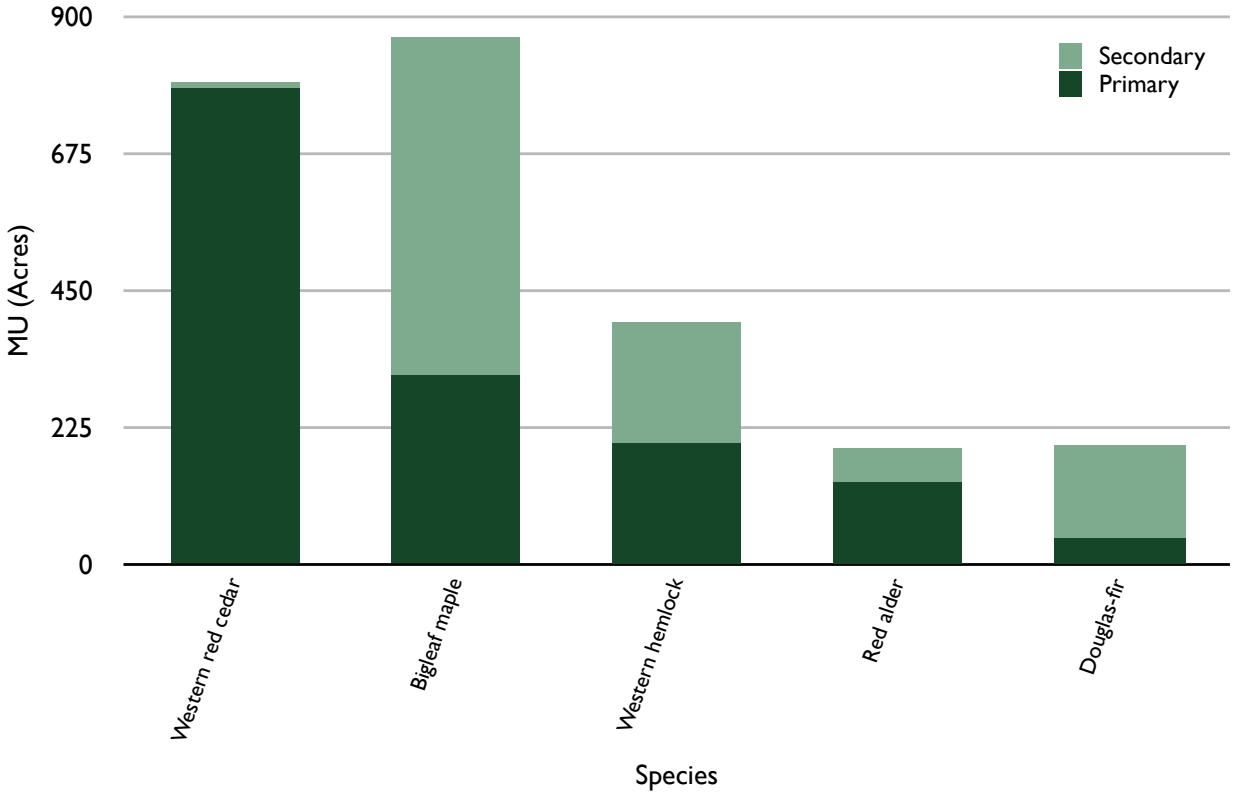



**Figure 11: Distribution of regenerating overstory species by MU Acres**

It is important to note that climate change is negatively impacting the health of our staple native plant species, specifically trees. Warming temperatures can stress trees, making them more susceptible to pests and disease. For example, experts are observing the die-off of western red cedars, noting prolific impacts from a wood-boring beetle called the western cedar borer, along with an unknown bark beetle from the beetle family Scolytidae (Rippey 2018). As western red cedar is the most common primary regenerating tree species in Issaquah's forested parks and natural areas, the Partnership will need to keep a close eye on these native species. It is a priority of the Partnership to utilize the best available science to inform site planting and restoration activities so that our restoration sites are best adapted to the impacts of climate change, now and into the future.

## Native Understory Species

Issaquah's forested parks and natural areas have a variety of native species in the understory, which contributes to the biodiversity of the urban forest and supports wildlife such as birds and pollinators. Many of these plants produce fruits and seeds that are food for larger animals. A diverse and healthy understory of native plants is also more resilient to the threats of invasive-plant establishment. Salmonberry, sword fern, salal, vine maple and Indian plum are among the most abundant understory plants found in the surveyed sites (see Figure 13). For a complete list of native understory species documented during the FLAT assessment, see Appendix G.

## Invasive Species

Compared to other Green Cities, Issaquah has a significantly lower percentage of acres categorized as highly threatened by invasives. In the project area, just 9% (143 acres) were categorized as having a high level of invasive cover, with more than 50% invasive cover (see Figure 7). Another 14% (215 acres) has a medium threat, between 5% and 50% invasive species cover. However, Issaquah also has more acres of forested parks and natural areas than other cities of its size, so its 358 acres of high and medium invasive cover will still require a significant effort. Controlling invasive plants and ongoing site maintenance can help prevent future impacts and avoid further major restoration costs.

In each MU, we documented the five most abundant invasive species. Figure 14 illustrates the most common invasive plant species across all MUs. Himalayan blackberry, English holly, and herb Robert are the biggest threats to Issaquah's forested parks and natural areas. Out of 1,540 total acres in the project area, Himalayan blackberry was either the primary, secondary, or tertiary invasive species occurring in management units that total 1,022 acres. English holly was present in management units that total 632 acres. Both of these invasive species are challenging to control. While Himalayan blackberry can be removed by hand, the BMP to remove English holly is to inject the stem with herbicide, an activity that is prohibited for volunteers and must be done by a crew with a licensed applicator. See Appendix H for a list of all invasive species documented in the FLAT analysis.

## Slope

Slope is another important consideration, as it can make restoration activities more difficult. For safety reasons, volunteers can work only on relatively flat terrain, and even professional crews need special equipment for very steep work. As a general rule, work on slopes steeper than a 40% grade requires additional professional resources and significantly increases the cost of restoration. Fortunately, according to the FLAT analysis, only 7% (100 acres) of the Green Issaquah Partnership project area includes slopes steeper than 40% (see Figure 12). Of that, the majority (85%) of MUs with steep slopes have low invasive cover, so the impact of slope on restoration costs will be minimal. We suggest using professional crews for all restoration work on steep slopes.

## Planting

Approximately 50% (778 acres) of the Green Issaquah project area was deemed suitable for some level of planting of native trees, shrubs, and ground cover. On-the-ground planning at each site is needed to determine exactly how much planting is needed to enhance forest health.

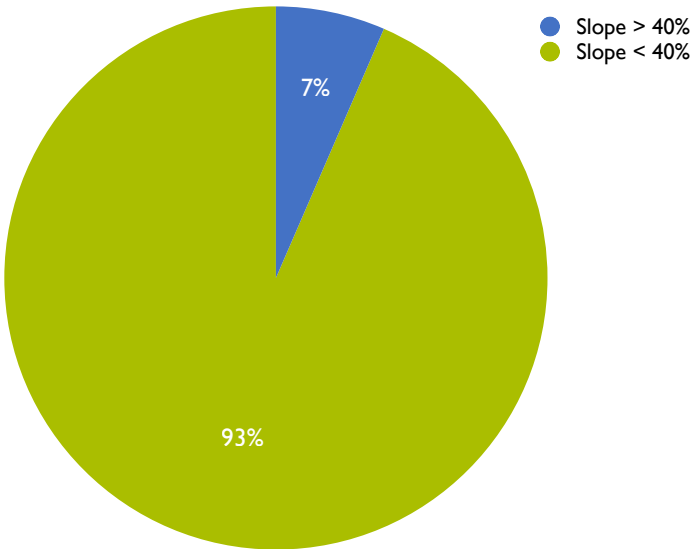



**Figure 12: Slope of Issaquah's forested parkland and natural areas**

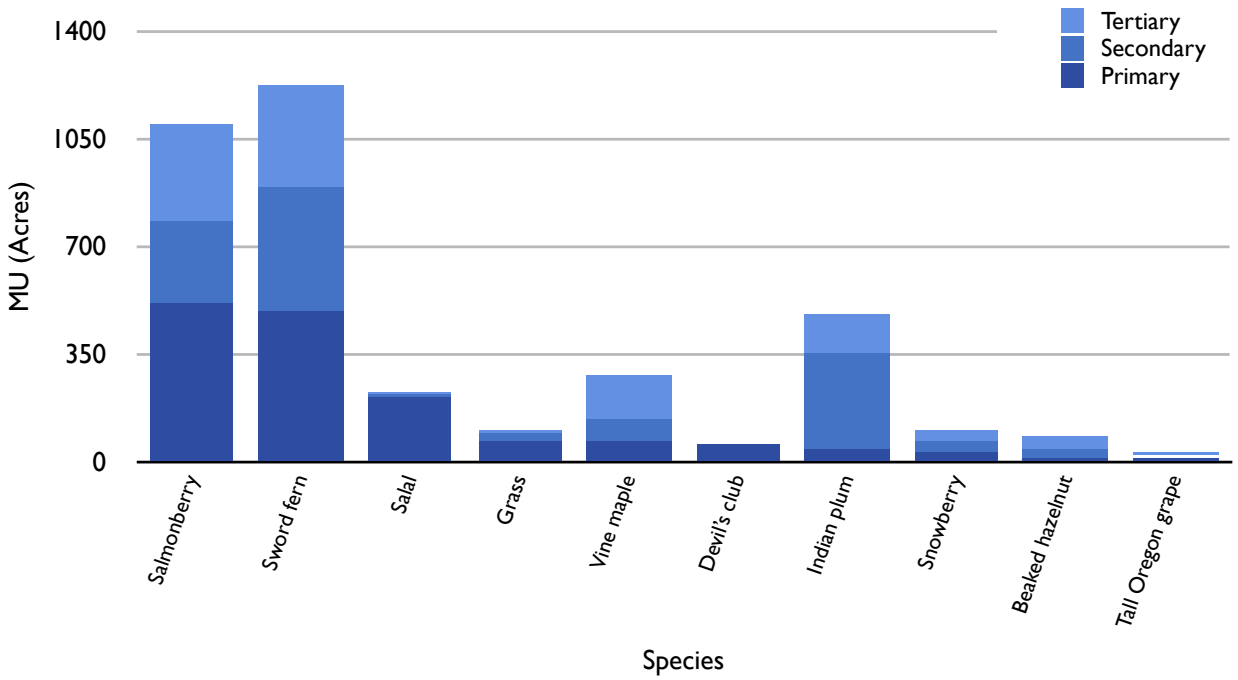



**Figure 13: Distribution of the most common native understory species across MU Acres**

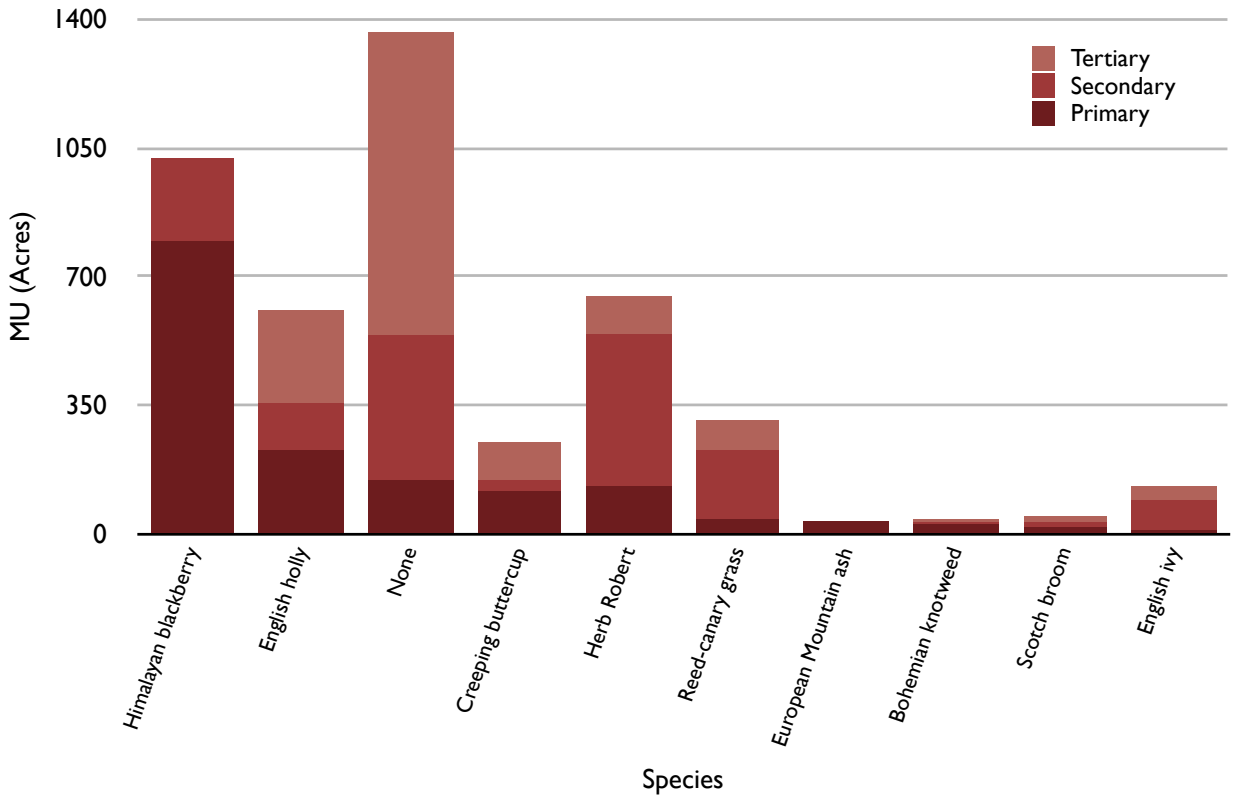



**Figure 14: Distribution of the most common invasive species across MU acres**

# CHAPTER 6: MOVING FORWARD — THE NEXT 20 YEARS

Green Issaquah Partnership implementation will focus on actively managing the city's 1,540 acres of forested parks and natural areas across 38 delineated sites, all needing various levels of restoration, maintenance, and long-term stewardship. These sites include approximately 70 acres of utility corridors owned by the city that have management agreements with other entities. The Green Issaquah Partnership serves as a comprehensive, citywide framework to coordinate all restoration activities and community engagement as part of a single overarching effort. This chapter describes the Partnership's implementation strategies, divided into three program areas: field, community, and resources.

## FIELD

The field element looks at how on-the-ground strategies will be carried out to restore Issaquah's parks and natural areas. The results of the forest health assessment will be used as a baseline to evaluate, prioritize, and measure progress. The following objectives will guide the Partnership's fieldwork to meet forest restoration goals.

### Field Objective 1: Prioritize parks and natural areas.

The Partnership recognizes Issaquah's significant investment in forest and natural area restoration to date, and will prioritize continuing restoration and maintenance activities at sites within the city's existing project areas. The Partnership will then prioritize additional parks based on a site's ecological value, community interest, and available resources (see Figure 15), and will try to ensure that restoration efforts are distributed throughout the city so every neighborhood can participate. For parks with an interested steward or active volunteer base, sites will be chosen that are appropriate for volunteers (e.g., less than 40% grade), where tools and restoration materials can be accessed easily. Since community engagement and education are key components in the Partnership's success, sites with high public visibility and high value to Issaquah residents may be chosen to support education and program promotion.

### Field Objective 2: Prioritize restoration work in MUs within sites.

There are 38 park sites included in the forest assessment, each of which contains MUs that are assigned to one of the nine tree-iage categories. As individual parks are prioritized, the MUs within these sites should be selected for annual and multiyear restoration plans. The first priority should be MUs with existing restoration projects, in order to ensure that prior and current restoration efforts continue moving forward — if they don't, these areas could revert to pre-work condition. Not only is "backsliding" expensive, it is also particularly discouraging to the public. The second priority is to expand sites already enrolled in restoration by continuing to clear invasive species in areas contiguous with previously cleared sites.

As new sites are brought into restoration, the tree-iage model can be used as a guide to anticipate needed restoration. For example, MUs with high-quality habitat and few to no invasive plants (tree-iage category 1) can immediately be enrolled in restoration and given the protection of annual monitoring and maintenance. Other high-value habitats, including evergreen-dominated forests or wetlands made up of a mosaic of native shrubs and emergent plants (tree-iage categories 2 and 3) and sites adjacent to salmon-bearing streams, will be considered high priorities for protection and restoration. Additional factors, such as public access and safety, and the presence of wetlands, streams, or shorelines, are also taken into consideration. Where there are agreements in place with other entities to manage specific areas such as utility corridors, it will remain the responsibility of those entities to provide maintenance per the agreements.

### Field Objective 3: Identify areas appropriate for professional-crew intervention.

Not all restoration activities in the Green Issaquah project area are suitable for volunteers. Some require the use of professional, trained field crews and staff. Sensitive areas such as steep slopes, wetlands, and riparian buffers require the expertise of professional crews. In addition, some BMPs require the use of herbicides, such as stem injection for invasive trees like English holly and English laurel, and knotweed species that aggressively invade critical riparian habitat. A licensed professional must conduct herbicide treatment to successfully eradicate these invasive plants.

Additionally, paid staff and crews can be used to assist and speed up the restoration process on volunteer sites; for example, by using power equipment to cut a large stand of blackberry so volunteers can follow up and dig out the roots. The Partnership will need to assist City of Issaquah staff and others in securing funding for these crewed projects. Crews contracted with Mountains to Sound Greenway Trust are already doing some

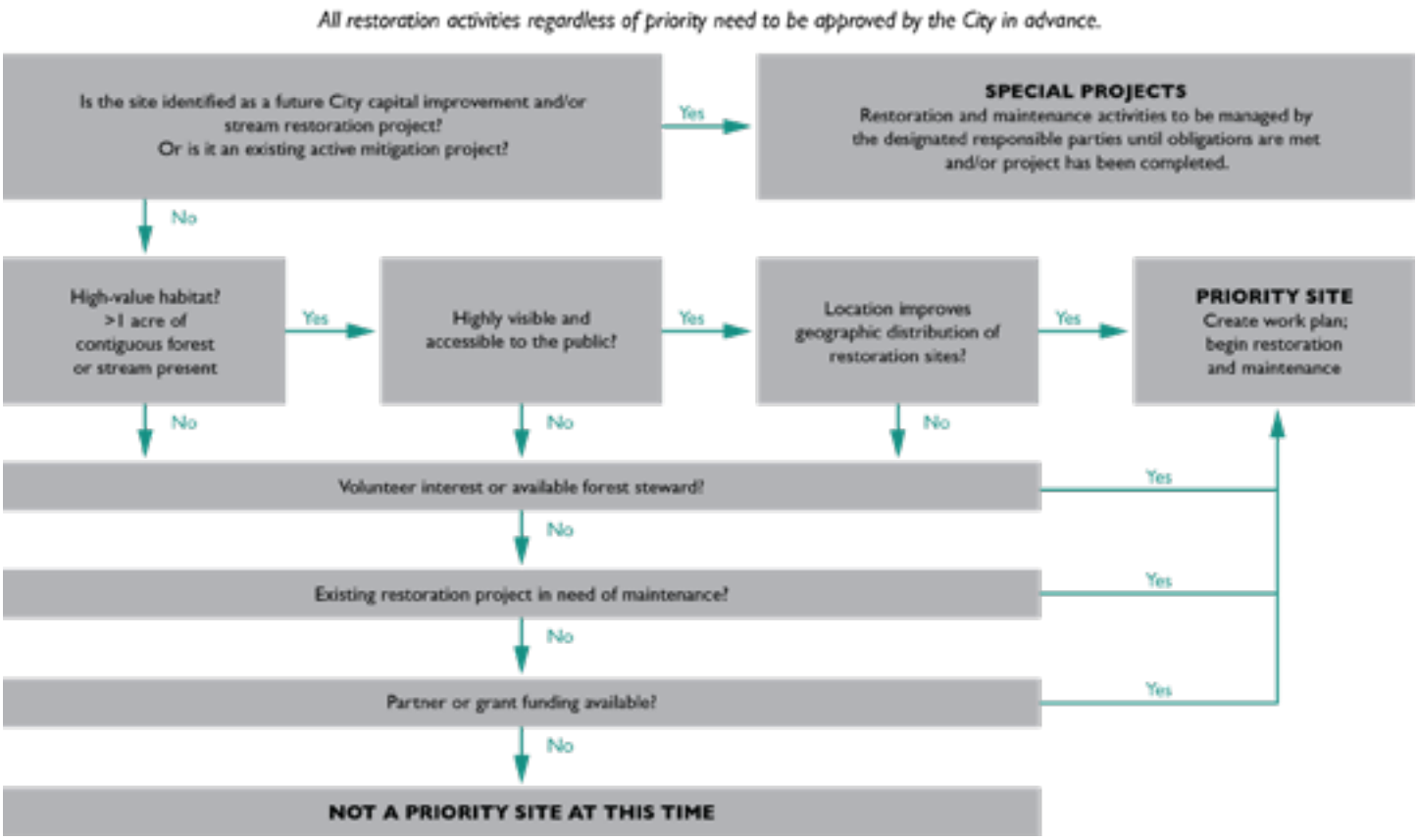



**Figure 15: Decision tree for prioritizing restoration sites**

work; volunteer work in other MUs can be used to match these and any other incoming funds. Sites that have support available through the City of Issaquah or otherwise-funded crews will be given priority status for restoration, as well as sites where noxious weed control is mandated by, and has support from, the King County Noxious Weed Control Program.[4]

## Field Objective 4: Implement restoration best practices on all project sites.

Restoration ecology is an interdisciplinary science that draws from the fields of ecology, forestry, and landscape horticulture. As more restoration projects are completed in urban environments, field practices are refined and improved. Field experience and best available science will continue to be integrated to improve techniques and restoration success now and in the future. Ongoing restoration projects within the Green Cities Network and other partner natural-resource organizations will inform and guide BMPs for Issaquah's fieldwork, including site planning, invasive control methods, planting and plant establishment, and volunteer management.

### *The Four-Phase Approach to Restoration Fieldwork*

An important BMP developed by the Green Seattle Partnership is the four-phase approach to restoration fieldwork, which has proven to be highly successful. It recognizes that restoration activities fall into four major phases:

**Phase 1:** Invasive plant removal

**Phase 2:** Secondary invasive removal and planting

**Phase 3:** Plant establishment and follow-up maintenance

**Phase 4:** Long-term stewardship and monitoring

It may take several years to move through each phase of restoration. These activities are tracked on work logs, and the work logs inform which phase each MU is in. The work logs and phases are entered into a database that can be accessed to measure and report progress. MUs that start out with low invasive cover and high-value canopy cover will quickly move into Phase 4, while sites with high invasive cover and low-value tree canopy will take a significant effort. Each site, however, will

4 See www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds/program-information.aspx.

need an on-the-ground assessment before work begins in the appropriate phase.

### Phase 1: Invasive Plant Removal

The first phase aims to clear the site of invasive plants, focusing on small areas one at a time to ensure thoroughness and minimize regrowth. Specific removal techniques will vary by species (see Appendix K for removal techniques for common invasives) and habitat type, and it may take more than a year to complete the initial removal.

Major invasive-plant reduction will be required on sites with 50% or greater invasive cover (high threat from invasive species: tree-iage categories 3, 6, and 9). Many of these areas will require skilled field crews or special equipment. Given the extent of invasive cover, these sites will also require a large investment of both funding and community volunteers to help ensure restoration success. Areas between 5% and 50% invasive cover (medium threat from invasive species: tree-iage categories 2, 5, and 8) will also require invasive removal. Invasive growth in these spots is patchy. Generally, projects in these sites are appropriate for community volunteers. Areas with 5% invasive cover or less (low threat from invasive species: tree-iage categories 1, 4, and 7) require little or no removal, and Phase 1 work in these areas may simply involve walking through to check that any small invasive growth is caught before it becomes a larger problem.

### Phase 2: Secondary Invasive Removal and Planting

Before planting, a second round of invasive removal targets any regrowth before it spreads, and prepares the area for young native plants to be installed. To give them the best chance of survival and health, planting activities should only take place in fall and winter (October through March).

Staff will work with Forest Stewards to develop an appropriate plant palette and work plan for each MU on a case-by-case basis. For example, forested habitats with more than 50% evergreen canopy cover (tree-iage categories 1, 2, and 3) will require the least amount of overstory planting, but may need to be filled in with ground cover, shrubs, and small trees in the understory. Areas with more than 25% native tree cover but less than 50% evergreen cover (tree-iage categories 4, 5, and 6) will generally be planted with native conifer species. Areas with less than 25% native tree-canopy cover that can support tree canopy cover (tree-iage categories 7, 8, and 9) will require extensive planting with native trees, shrubs, and ground cover. Restoration practices and planting requirements will vary, depending on the habitat type and target native-plant population. Most Phase 2 planting projects are appropriate and fun for community volunteers.

### Phase 3: Plant Establishment and Follow-up Maintenance

This phase repeats invasive plant removal or weeding, along with mulching and watering newly planted native plants until they are established. Although native plants have adapted to the Puget Sound area's dry summer climate, installed plants can experience transplant shock, which affects root and shoot health. Therefore, most plants require at least 3 to 5 years of establishment care to help ensure their survival. Sites may stay in Phase 3 for many years, depending on conditions.

### Phase 4: Long-Term Stewardship and Monitoring

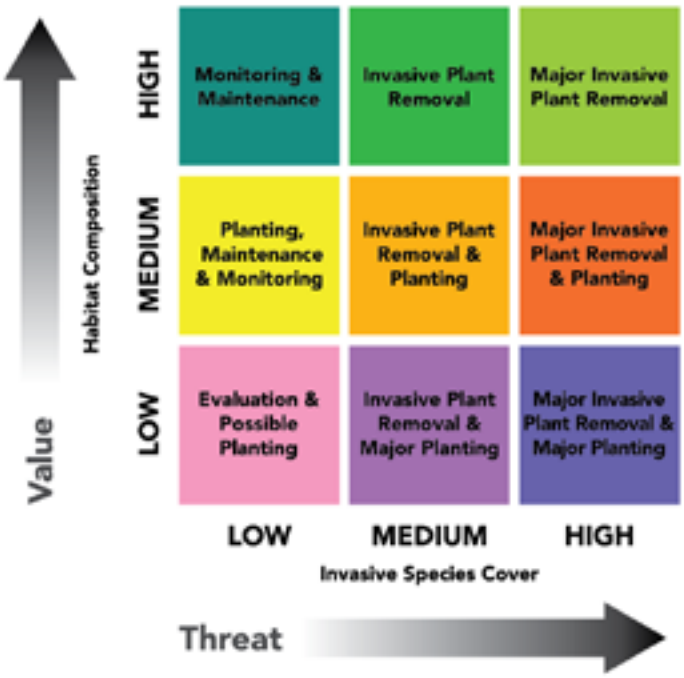
The final phase is long-term site stewardship, including monitoring by volunteers and professionals to provide information for ongoing maintenance. Monitoring may be as simple as neighborhood volunteers patrolling park trails to find invasive species, or it could involve regular measuring and documentation of various site characteristics and plant survivorship rates. Maintenance will typically consist of spot removal of invasive regrowth and occasional planting where survivorship of existing plants is low. Individual volunteers or small annual work parties can easily take care of any needs that come up, as long as they are addressed promptly before problems spread. The number of acres in Phase 4 is programmed to grow every year, with the goal that all 1,540 acres will be enrolled in the restoration process and graduate to this phase. The ultimate measure of the Green Issaquah Partnership's success is that all 1,540 acres reach Phase 4.

Without ongoing, long-term volunteer investment in the monitoring and maintenance of areas in restoration, Issaquah's natural areas will revert back into an unhealthy state. For that reason, monitoring and maintenance cannot be overlooked, and volunteer activities need to be paired with city resources. Monitoring will be conducted more frequently in the early phases of the program as the Partnership discovers how the sites respond to restoration.

In 2012, the Green Cities developed Regional Standardized Monitoring Protocols in order to understand the success, value, and effectiveness of restoration activities throughout the Partnerships. These protocols provide procedures for baseline and long-term data collection by staff or volunteers to measure changes in site characteristics and overall success. The Monitoring Protocols can be found in the Green Cities Toolbox on Forterra's website.[5] (For more information on the Green Cities Toolbox, see Appendix I.)

5 See https://forterra.org/subpage/green-cities-toolbox-restoration-monitoring

## TABLE 4: RESTORATION STRATEGIES AND TREE-IAGE CATEGORIES




### Application to the Tree-iage Categories

The four-phase approach can be applied to the tree-iage categories, as shown in Table 4. Each tree-iage category can be assigned appropriate management strategies.

### TREE-IAGE CATEGORY 1: High Habitat Composition, Low Invasive Threat

Acres in project area: 521

Condition

This category contains the healthiest forest areas in Issaquah's system of forested parks. Typical stands have more than 50% evergreen canopy. This category includes stands of mature conifers and the mixed conifer/deciduous stands found in forested wetlands. In scrub-shrub or emergent wetland areas, where full conifer coverage would not be appropriate, this category has full cover by native vegetation appropriate to the site. These stands are under low threat because the invasive cover is less than 5%.

Management Strategy: Monitoring and Maintenance

Work is focused on protecting these areas' existing high quality and making sure that invasive plants do not establish themselves.

### TREE-IAGE CATEGORY 2: High Habitat Composition, Medium Invasive Threat

Acres in project area: 59

Condition

Similar to category 1, these forest stands contain more than 50% conifer or evergreen broadleaf canopy, or appropriate native wetland vegetation. Forests in this category are at risk because the invasive cover is between 5% and 50%. In these areas, invasive growth is expected to be patchy with diffuse edges.

A forest in otherwise good condition but subject to a number of moderate threats may degrade if left untreated. If unattended, this level of invasive coverage could prevent native seedlings from establishing and could compete with existing trees for water and nutrients. The forest would persist in good condition, however, if threats were mitigated in a timely manner.

Management Strategy: Invasive-Plant Removal and Prompt Action

The main activity is removing invasive plants. Typically, these sites will also require site preparation (e.g., mulching) and infill planting. Projects in these areas are appropriate for volunteers. Removing invasive plants from category 2 sites is a very high priority for the first five years.

### TREE-IAGE CATEGORY 3: High Habitat Composition, High Invasive Threat

Acres in project area: 1

Condition

As in categories 1 and 2, forest stands in this category have mature conifers, madrones, forested wetlands, or wetland vegetation where appropriate. Category 3 areas have a high threat from greater than 50% invasive cover.

A forest in this category is in a high-risk situation and contains many desirable trees or highly valuable habitat or species. If restored, these forests can completely recover and persist in the long term.

Management Strategy: Major Invasive-Plant Removal and Prompt Action

Acres in category 3 should be high priority. Without prompt action, high-quality forest stands could be lost. Category 3 areas require aggressive invasive removal. Soil amendments and replanting are needed in most cases. Restoration efforts in this category are a top priority for the first five years.

### TREE-IAGE CATEGORY 4: Medium Habitat Composition, Low Invasive Threat

Acres in project area: 659

Condition

Forests assigned a medium tree-composition value are typically dominated by native deciduous trees but have at least 25% native tree cover. Between 1% and 50% of the canopy is made up of native conifers. In wetland areas not suitable for conifers, these areas have between 1% and 50% cover by appropriate wetland vegetation. Category 4 areas have low levels of invasive plants, covering less than 5% of the MU.

Management Strategy: Planting and Monitoring

We expect planting in these areas to consist of infilling with native species and establishing conifers to become the next generation of canopy. Often these sites require some invasive removal and site preparation (e.g., amending with woodchip mulch). Many of these sites may be converted to an evergreen forest by the addition of appropriate conifer trees.

Addressing category 4 forests is a high priority during the first five years. They offer a high likelihood of success at a minimum investment. These sites are well suited to community-led restoration efforts.

### TREE-IAGE CATEGORY 5: Medium Habitat Composition, Medium Invasive Threat

Acres in project area: 143

Condition

Areas in this category have between 5% and 50% invasive cover. Invasive growth is expected to be patchy with diffuse edges. These areas are estimated to have greater than 25% native canopy cover but less than 50% coniferous or broadleaf evergreen canopy cover. In the case of wetland forests, it is greater than 50% native tree canopy cover. In wetland areas not suitable for conifers, these areas have between 1% and 50% cover by appropriate wetland species. These forest stands contain many desirable native trees that are under threat from invasive plants.

Management Strategy: Invasive-Plant Removal and Planting

These sites will require invasive removal and infill planting. While some restoration work is planned for these areas in the first five years, aggressive efforts will be spread out throughout the life of the Green Issaquah Partnership.

### TREE-IAGE CATEGORY 6: Medium Habitat Composition, High Invasive Threat

Acres in project area: 70

Condition

Native deciduous trees typically dominate these areas, which have at least 25% native tree cover. Between 1% and 50% of the canopy is made up of native conifers. In wetland areas not suitable for conifers, these areas have between 1% and 50% cover by appropriate wetland vegetation. Invasive plants cover more than 50% of the MU.

A forest that retains an important native plant community but has a high cover of invasive plants may still have the potential to recover if remediation is prompt. Since these stands are at greater risk than category 5 forests, they also require greater labor investment.

Management Strategy: Major Invasive-Plant Removal and Planting

Extensive invasive removal, site preparation (e.g., amending with woodchip mulch), and replanting with native species are required. Initial invasive removal may be done with the aid of mechanical tools and equipment, and may require professionals. Planting in these areas consists of infilling with native species.

### TREE-IAGE CATEGORY 7: Low Habitat Composition, Low Invasive Threat

Acres in project area: 2

Condition

These forests are estimated to have less than 25% native canopy cover in a setting that could support full canopy cover under good conditions. Forested wetlands will have less than 25% trees or shrubs appropriate to the site. Levels of invasive plants are low. Parks in this category may include areas with large canopy gaps (perhaps due to windthrow or die-off of mature deciduous trees), sites of recent landslides, unstable slopes, sites that have been disturbed (e.g., by clearing or grading), and/or areas dominated by non-native trees.

Management Strategy: Evaluation and Possible Planting

The reasons underlying these sites' low value can differ greatly, and the stands will be addressed on a case-by-case basis. Because of the low levels of invasive plants, restoration may be quite cost effective in some category 7 sites. Sites will be evaluated to determine whether conditions and timing are appropriate to move them toward a more native forest

and what the appropriate composition of that forest should be. In some cases, it may be desirable to remove non-native trees, especially if they are aggressive. Areas that are ready for conversion to native forest would be a high priority during the first five years.

### TREE-IAGE CATEGORY 8: Low Habitat Composition, Medium Invasive Threat

Acres in project area: 13

Condition

Areas estimated to have less than 25% native tree-canopy cover or forested wetlands with less than 25% cover by trees, and 5% to 50% invasive cover fall into this category. Invasive growth in these areas is likely to be patchy with diffuse edges. A forest in this category might be chronically degraded by a variety of threatening processes and might have lost much of its value in terms of habitat quality or species composition.

Management Strategy: Invasive-Plant Removal and Major Planting

Restoration efforts in these areas require a large investment of time and resources. Although some work will be directed here, this is not a priority category for the first five years. The Partnership will support efforts that contain the spread of invasive plants, try out new techniques, or bolster enthusiastic community-led efforts. These sites will require major invasive removal and site preparation, such as mulching and infill planting. Planting within these areas will consist of infilling with native species.

### TREE-IAGE CATEGORY 9: Low Habitat Composition, High Invasive Threat

Acres in project area: 72

Condition

Areas estimated to have less than 25% native tree-canopy cover or appropriate forested wetland vegetation and greater than 50% invasive cover fall into this category.

Management Strategy: Major Invasive-Plant Removal and Major Planting

Category 9 sites require the most time and money to restore and are not likely to get much worse during the next five years. These sites require many years of major invasive removal and site preparation in the form of mulching and infill planting, and will almost definitely require the attention of professionals. Although work will be directed to category 9 forests in the future, this is not a priority category for the first five years unless there is strong community interest or specific funding in place. The Partnership will support efforts that contain the spread of invasive plants, try out new techniques, or bolster enthusiastic community-led efforts.

## *Forest Management Strategies*

### Ecological Thinning

The forestlands we see today throughout the Puget Sound area are a result of past management decisions and disturbances such as logging, fire, and development. Removing select trees, or ecological thinning, is a management strategy that can help increase forests' health, diversity, structure, habitat value, and resilience. Thinning practices may be appropriate in areas where forests are densely stocked, causing competition among trees for light, water, and nutrients. Thinning can also be used to convert early successional forest, such as red alder stands, to a mixed deciduous/conifer forest. Thinning allows for select trees to be cut and removed, which gives other trees more space to grow and/or create gaps in forest canopy for additional tree species to be planted, resulting in a forest that has a mix of young and old trees and different species. A diverse, mixed-age forest provides a wide array of habitat for wildlife and is more resistant to disease, pests, wildfires, and the effects of climate change. Further analysis is needed to identify sites that would make good candidates for thinning, along with the associated costs and feasibility, all of which are not included in the Green Issaquah Partnership program's cost estimates.

### Fire Prevention

While this guide does not directly prescribe urban-forest-management practices related to fire prevention, the Green Issaquah Partnership will work in collaboration with Eastside Fire and Rescue, local Firewise programs[6], Washington State Department of Natural Resources, King County, and King Conservation District to identify actions, such as forest health measures and community education, to help reduce the risk of fires resulting from the wildland-urban interface.

6 The term "firewise" describes the state of being knowledgeable about, and prepared for, wildfire in residential or urban settings. Firewise USA, a program administered by the National Fire Protection Association, conducts outreach and education to help homeowners and communities prepare for wildfire. See https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA.

### Planning for a Changing Climate

As our climate changes, Puget Sound's urban forests may be increasingly impacted by warmer and drier summers, flooding and high winds from increased winter storm events, and shoreline erosion (Kim et al. 2012). To maximize our forests' ability to withstand and adapt to climate-change impacts, we need to consider future conditions in our restoration planning and BMPs (see Table 5).

Successful restoration requires planted, or naturally regenerated, seedlings that are well suited to site conditions (St. Clair and Howe 2009; see Table 6). The 2009 Washington Climate Change Impacts Assessment projected sea level rise, temperature increase, and changes in precipitation for Washington State (Mote and Salathé 2009). Our region is projected to experience an increase of 5° to 6°F in annual minimum temperature and an increase of approximately 2° to 3°F in annual extreme minimum temperature by the 2080s (Kim et al. 2012). With this increase in temperature, plant hardiness zones are expected to shift in the Puget Sound area. These shifting zones have implications for plant selection for urban forestry, horticulture, and restoration purposes, as well as for invasive-plant risks (Widrlechner et al. 2012; Bradley et al. 2012).

As species ranges shift, locally adapted seeds may be maladapted to future conditions. This may mean shifting tree composition toward long-lived, climate-resilient, drought-tolerant native species, such as Douglas-fir, lodgepole pine, madrone, and Oregon white oak (Fischer et al. 2018). Sourcing native seeds or seedling stock that is genetically adapted to warmer, drier climates may also help grow climate-resilient forests (Fischer et al. 2018). As well, some forest habitats, such as madrone forests, stands of moisture-loving western red cedar and western hemlocks, and others, may require special management considerations in order to support a diverse array of ecosystems (Fischer et al. 2018).

## TABLE 5: RESPONSES TO EXPECTED CLIMATE CHANGES IN THE PUGET SOUND LOWLANDS

| Expected Climate Changes in the Puget Sound Lowlands | |
|---|---|
| **Change** | **Response** |
| Warming in all seasons | • Plant species and seeds adapted to warmer climates. |
| Less snow, earlier snowmelt, and less summer rain lead to drier summer conditions | • Remove invasive species to reduce drought stress on native plants.<br>• Increase planting distance between trees to relieve competition and reduce drought stress.<br>• Plant more drought-tolerant species and genotypes.<br>• Plan for wildfire response and recovery. |
| Heavier winter rains, more winter runoff | • Riparian buffers and erosion control around salmon-bearing creeks become even more important to keep sediment out of rivers and protect juvenile fish. |

## TABLE 6: TOOLS AND ACTIONS TO ADDRESS PUGET SOUND–AREA CLIMATE-CHANGE CONSIDERATIONS

| Climate Change Considerations | | |
|---|---|---|
| **Considerations** | **Actions** | **Tools** |
| **Native tree species' geographic ranges are shifting. Conditions in their current geographic ranges may no longer be suitable by the time those trees reach maturity.** | • Identify tree species that are suitable for specific sites given future climate change scenarios. | • **Species Potential Habitat Tool** specieshabitattool.org/spht/ |
| **Locally adapted seeds may be maladapted to future climate conditions. Even if sites can still support a particular species, there may be other seeds that will be better adapted to a future climate.** | • Identify seeds that have the right climate adaptations for specific sites in the future, and work with local nurseries to source those seeds. | • **Seedlot Selection Tool** seedlotselectiontool.org/sst/ |
| **Changes to climate will not be uniform across the landscape. Try to learn as much as possible about the predicted changes at selected sites and expect ongoing and increased weather variability.** | • Help people understand and plan for the effects of climate change in their area. Analyze specific changes in selected sites. | • **University of Washington Climate Impacts Group Analysis Tools** cig.uw.edu/resources/analysis-tools/ |

## COMMUNITY

The community element assesses how an engaged community and a prepared workforce will be maintained in the long term, and how private landowners will be educated and encouraged to complement the Partnership's efforts. The Green Issaquah Partnership is a community-based stewardship program that calls upon residents to help prevent the loss of precious resources. With an active and engaged community, Issaquah will not only be "greener," but it will also be a better city for everyone who lives and works there. The following objectives will guide Green Issaquah Partnership community-engagement goals to support restoration efforts and connect people to their local forested parks and natural areas.

### Community Objective 1: Support and maintain a Forest Steward Program to promote and sustain community leadership.

To achieve the Partnership's restoration goals, the program will actively support volunteer restoration projects and recruit new Forest Stewards, with the intent of having stewards working in all identified forested parks and natural areas by 2035.

The Green Issaquah Forest Steward Program is designed to build an educated, engaged, and active volunteer base around management, monitoring, and stewardship of Issaquah's urban forest. The program provides volunteers with an opportunity to take on leadership responsibilities, expand their skill sets, tackle larger challenges associated with restoration and maintenance, and receive support and guidance to complete projects that improve the health of public spaces they care about.

The Green Issaquah Partnership will actively recruit, train, and support Forest Stewards. Trained Forest Stewards will work with the Partnership in the following ways:

- Attend regular training events, including a program orientation and skill-specific training as resources allow.

- Serve as key contacts for the Green Issaquah Partnership projects at their site.
- Organize and lead volunteer events and activities with support from Partnership staff.
- Coordinate with staff to develop site restoration plans.
- Request tools, materials, and assistance as needed.
- Track and report progress on activities through the Partnership's work log.

In turn, the Partnership will support stewards with staff time, resources, and guidance in site-planning and restoration work.

### Community Objective 2: Promote community awareness about, and engagement with, forested parks and natural areas.

Through social media, the Green Issaquah Partnership webpage, community celebrations, community work parties, trainings, and outreach, the Partnership will help create excitement about — and advocacy around — our shared forested parks and natural areas.

At work parties and other volunteer events, participants can assist the Partnership in enhancing the urban forest by planting new trees and restoring and monitoring project sites in parks. Each event should include a warm welcome; training on the tasks to be accomplished that day; something warm or cool to drink, depending on the weather; a chance to get to know other volunteers; and an invitation to have some fun and spend a few hours outside doing something good for the community.

It is vital that participants feel welcome in all aspects of the work done by the Partnership. Providing opportunities for diverse community members to connect around a cup of coffee or a newly planted western red cedar are foundational to the Partnership's success. Since so much of this work will take place on public land, it is important for events to be inclusive and welcoming to all. Whenever possible, barriers to participation should be addressed, such as making the event child-friendly, having an interpreter at events where needed, planning a variety of tasks that accommodate many ability levels, encouraging rest and hydration, and providing meals or snacks, and restrooms.

### Community Objective 3: Promote positive engagement with parks and natural open space.

This foundational objective drives most of the Green Issaquah Partnership's work. The Partnership is centered in the belief that Issaquah's residents, employees, and visitors deserve great parks and natural areas, and that they shouldn't have to travel far to get to those places. Natural areas are essential — both for their environmental services and their benefits to health and well-being — to the future of the city and its people. The Green Issaquah Partnership will address this need directly as it promotes opportunities for Issaquah residents to access and connect with their local parks and natural areas. This includes education about how to be a good friend to the forest by keeping dogs, bikes, and feet on established trails and out of restoration sites.

Restoration and active maintenance are critical for the enjoyment of these natural areas, so that trees can thrive and we do not lose our green spaces altogether. Parks that may have been viewed as unsafe or neglected will benefit from the added presence and tender care of volunteers. Well-loved parks will benefit from the diversity of voices in the Green Issaquah Partnership. Volunteer projects that build community among neighbors also increase a sense of ownership over public spaces and foster a special connection to them, in addition to getting people outside. The Partnership will hold events that get people out into Issaquah's parks and natural areas, and encourage and inspire them to see these places as the incredible public resources that they are.

### Community Objective 4: Use Partnership efforts to prioritize and contribute to Issaquah's public safety.

Safety is also a key priority for the Partnership. Active maintenance and regular community events promote more active use of public spaces. As both volunteers and staff frequent a site, care and stewardship become evident and decrease the sentiment that parks are forgotten, abandoned places. In addition, providing more presence in the park discourages illegal activity. Volunteers will be provided with training and tools for how to avoid dangerous situations and how best to protect themselves when necessary.

Green Issaquah projects will utilize Crime Prevention Through Environmental Design (CPTED), a set of landscape-design principles aimed at increasing safety. From relatively straightforward planning and maintenance best practices to optimize safe view corridors along trails to complex challenges for activating spaces, these principles will provide valuable insights. Forterra has developed a CPTED training guide, applicable to both city staff and Forest Stewards, which applies these principles to forest restoration projects.

### Community Objective 5: Develop and implement community outreach and engagement strategies to equitably serve Issaquah's residential population.

Creating programs that are culturally relevant, accessible, and enjoyable for the many people who call Issaquah home will be essential to forming a Partnership that equitably serves this

community. By building relationships with local organizations, community groups, and houses of worship, and by continuing to reach out and listen to local residents, the Partnership hopes to provide a variety of ways to equitably engage.

Community building and an ethic of environmental responsibility are at the core of the Green Issaquah Partnership and the Green Cities Network across Puget Sound. Community members are encouraged to participate in caring for our shared public urban forests and natural areas regardless of age, income, ethnicity, or languages spoken at home. Volunteer restoration projects provide an opportunity for neighbors, classmates, families, friends, and strangers to come together to restore health to their parks, build community through shared experiences, and deepen ties to the natural world and each other.

The Green Issaquah Partnership seeks to build a successful volunteer program by strengthening efforts to provide equitable and inclusive opportunities for the entire Issaquah community. Issaquah's population has become increasingly diverse, with 27% of families speaking a language other than English in their home, most of them in addition to English. According to the U.S. Census Bureau, 23.8% of Issaquah residents in 2017 were not born in the U.S.

### *What Is Environmental Justice?*

*Some environmental factors, such as canopy cover and pollution, are disproportionately distributed across populations of people. The EPA recognizes that negative environmental factors are concentrated in areas where there are low-income earners, a majority of people of color, immigrant communities, and the elderly. Environmental justice, as defined by the EPA, is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."*

*The EPA gives a metric for achieving environmental justice: "When everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work."*

Environmental conservation organizations and programs across the country and here in Puget Sound typically have challenges engaging communities of color, recent immigrants, and low-income families (Taylor 2014). In addition to seeking opportunities to work with existing successful community organizations and programs, the Green Issaquah Partnership will need to employ creative strategies of its own during the next 20 years in order to equitably engage the city's diverse population.

## Community Objective 6: Work with local businesses to encourage support for the Partnership.

Corporate support will be needed for the Partnership to reach its goals. Local businesses have already been involved in restoration projects in Issaquah and should be called on for advice and future assistance. The Partnership will continue to build on these relationships and expand to work with other businesses as well. Corporate support could come in the form of encouraging employees to volunteer, or providing in-kind resources or financial support through grants and donations. In turn, Partnership staff will support Issaquah businesses, both large and small.

## Community Objective 7: Seek opportunities to engage youth and provide education.

Studies have shown that students' productivity and creativity is increased amid natural surroundings, due to nature's calming effect and its ability to reduce mental fatigue (Kaplan 1995; Hartig et al. 1991). The Green Issaquah Partnership will work with Issaquah Public Schools to engage youth in outdoor experiences and environmental stewardship. Weekend volunteer work parties are a way for students to earn community-service hours. The Partnership hopes that opportunities like this will serve as pilot projects and guides for other potential collaborations with schools.

By working with local partners to provide engagement opportunities for youth of all ages, we seek to create a pathway of engagement from elementary school through high school. For post-high school youth, there are several regional and state conservation corps programs, where young people can make a living while learning restoration skills and contributing to projects that improve local environmental health. Some examples include Washington Service Corps, Washington Conservation Corps, EarthCorps, and the Student Conservation Association. All these programs are currently available to Issaquah youth. The Green Issaquah Partnership will link them together, pursue funding opportunities that would provide support for these efforts, and provide additional opportunities for youth and families to volunteer together in their local parks and green spaces, further improving their access to safe and healthy outdoor public places.

## Community Objective 8: Appreciate volunteers and celebrate Partnership successes.

The Green Issaquah Partnership will celebrate volunteers' achievements and emphasize the crucial role they play in restoring and maintaining Issaquah's urban forest. Stewards and

volunteers are the heart and soul of the Partnership and are valued for their expertise and the rich, diverse perspectives they bring, not only to community engagement, but also to on-the-ground stewardship. The Partnership will regularly seek advice from volunteers on which BMPs work well and which may need reassessment. The Green Issaquah Partnership will host volunteer appreciation activities, such as an annual celebration for Green Issaquah stewards and recognition at community planting events. The Partnership seeks to find a variety of ways to recognize stewards and other volunteers for their valuable efforts.

### Community Objective 9: Encourage private landowners to be good stewards of their land.

While stewardship of public forest and natural areas is an important step toward protecting wildlife habitat, improving air and water quality, and providing public recreational opportunities, private properties cover a greater portion of Issaquah's land area. Landscaping on private lands can either greatly enhance or greatly degrade the condition of the city's urban forest, despite best efforts to restore, maintain, and steward it. For instance, English ivy growing as a border plant in a landowner's backyard can quickly escape into a forested or natural-area park either by spreading beyond the property line or by birds dispersing the seeds. Many invasive species also spread when landowners illegally dump yard waste in parkland.

Private land can also be a resource for enhancing and expanding current forest canopy and habitat. Privately owned forest and natural areas in good health, such as those found at homes, private school grounds, or churches, can serve as important buffers to adjacent public lands and help mitigate habitat fragmentation and edge effects.

Potential ways for the Green Issaquah Partnership to engage private landowners as an important constituency include:

- Developing educational materials to explain the problems facing the urban forest, the benefits of removing invasive species from their property and planting with native or noninvasive ornamental species, and how to get involved in the Partnership.
- Developing educational content for e-newsletters, social media, and blogs with tips and information about how people can apply restoration practices to private lands.
- Providing public trainings that landowners can attend to learn about BMPs for invasive removal and landscaping with native plants.
- Connecting landowners with programs and organizations such as the National Wildlife Federation's Certified Wildlife Habitat or Schoolyard Habitats, Washington Native Plant Society, King County homeowner resources, and King Conservation District.

## RESOURCES

The resources element examines how sufficient financial, staff, and volunteer resources will be garnered to implement the plan. For the purposes of this guide, Forterra attempted to address the known costs associated with continuing the enhancement of Issaquah's urban forest by restoring forested parklands and natural areas over a 20-year time frame.

During the next 20 years (2021–2040), the Partnership estimates at least $17.6 million in funding (in 2020 dollars) will be needed, as well as volunteer support, to accomplish the proposed goals. The goal of more than 100,000 volunteer hours over the life of the program will leverage an additional value of $3.2 million as a match to the estimated $17.6 million in direct costs. (Volunteer time is valued at $31.72 an hour, based on the 2019 Independent Sector valuation of a volunteer hour in Washington State.) The following section provides an overview of the components used to develop these cost estimates, and identifies resource objectives and strategies to achieve the Partnership's goals.

### Estimating Program Costs

For the Green Issaquah Partnership, Forterra adapted a cost model from the Green Seattle Partnership's original estimates (inflated to 2020 dollars) and adjusted it to reflect the experience of the other Green Cities. For the 20-Year Guide, all cost estimates and leverage volunteer values are listed in 2020 dollars.

The estimated program costs to restore 1,540 acres by 2040 include:

- **Field expenses** such as materials and crew time to assist with the restoration projects of removing invasive species, replanting, and providing ongoing maintenance
- **Staff time (city, partner entity, and/or contracted)** for program coordination, planning, tracking, volunteer management, funding development, outreach, and marketing
- **Supplies and materials** for volunteer outreach, training, and appreciation
- **Overhead** for field and office work

Using a cost model that enrolls a percentage of acres from each tree-iage category every year over 20 years, the average cost per acre going through the four phases of restoration and ongoing maintenance can be calculated (see Table 7). For the Green Issaquah Partnership, the model estimates that enrolling all 1,540 acres in active management will cost from $5,000 per acre for

tree-iage category 1 acres to $35,400 per acre for tree-iage category 9 acres. These costs per tree-iage category are specific for Issaquah and the length of the program, and will need to be adjusted for use in other areas and program durations.

The cost per acre for each tree-iage category is the total estimated cost from the time it is enrolled until the end of the 20-year timeline in 2040. For example, the model projects enrolling five new acres in 2021, with a combined first-year program cost of $130,000 for staff, field expenses, and overhead. The average cost per acre in the first year is higher than in subsequent years due to a higher investment of staff time to set up the program and recruit volunteers. The cost model accounts for the five acres enrolled in 2021 with subsequent planting, plant establishment, and maintenance during the full 20 years. As more new acres are added each year, the cost model accounts for various phases and maintenance of the total accumulation of acres enrolled.

Based on the adjusted estimates, the model forecasts a cost of about $17.6 million in 2020 dollars to implement the Green Issaquah Partnership through 2040. This is an ambitious plan that relies on additional resources. While it is a significant investment, if the program is delayed, the future cost of restoration and maintenance will be significantly higher as forest conditions further decline. More importantly, this investment also supports residents to be active and engaged in their community through long-term stewardship of Issaquah's forested parks and natural areas.

Figure 16 shows the estimated cost per year, along with the financial value of the match provided by volunteers according to the goals set for our volunteer program.

### Resource Objective 1: Continue current City of Issaquah funding and build capacity for future growth.

The cost model projects an estimated cost of $130,000 in 2021 and grows significantly to a cost of $1.5 million in 2031. In 2021, funding from Issaquah's Parks and Community Services Department operating budget will support activities and events defined by the Green Issaquah Partnership, including sites already in active restoration and management by Mountains to Sound Greenway Trust and other partners. Additional city funding will be needed to reach the targeted 1,540 acres of active restoration. Annual city funding will support the program components described below.

## TABLE 7: ESTIMATED COST OF RESTORATION PER TREE-IAGE CATEGORY

| Tree-iage Category | Acreage | Average Restoration Cost/Acre | Total Cost per Tree-iage Category |
|---|---|---|---|
| 1 | 521 | $5,000 | $2,605,000 |
| 2 | 59 | $13,900 | $820,100 |
| 3 | 1 | $20,600 | $20,600 |
| 4 | 659 | $10,800 | $7,117,200 |
| 5 | 143 | $16,100 | $2,302,300 |
| 6 | 70 | $26,900 | $1,883,000 |
| 7 | 2 | $14,500 | $29,000 |
| 8 | 13 | $24,200 | $314,600 |
| 9 | 72 | $35,400 | $2,548,800 |
| **TOTAL** | **1,540** | | **$17,640,600** |

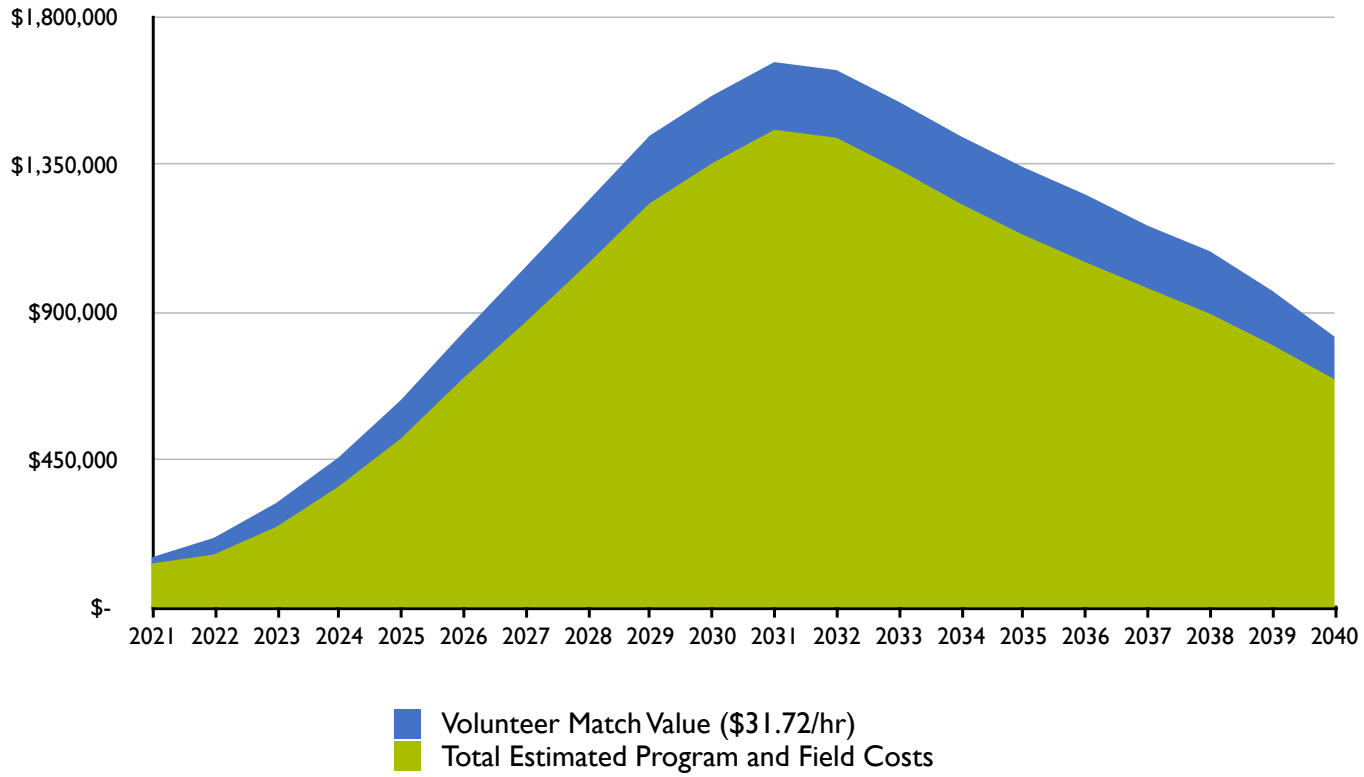



**Figure 16: 20-year projection of program costs and volunteer match by year**

## Resource Objective 2: Leverage city funds through partnerships and develop long-term funding to support the work.

City funding alone will not be enough to secure the $17.6 million needed over the next 20 years to meet the Partnership's goals. There are several partners currently working with the city on restoration projects within the Green Issaquah project area. By bringing in additional partners, strengthening partner relationships, and seeking outside funding to support partners working together, City of Issaquah funds will be leveraged to achieve the 20-Year Guide's projected outcomes. (Note that the 70 acres within the project area owned by the city but managed by other entities are not funded by the city.) The cost analysis projects that Issaquah should aim to leverage its funding 1:1: $10.5 million in city funding matched with $7.1 million in partner funding or time and $3.2 million in volunteer time over 20 years (see Figure 17).

Several possible mechanisms could be evaluated for consideration, either separately or in combination, to meet the funding goal, such as:

- Federal, state, and local grants from such entities as King Conservation District, Washington State Recreation and Conservation Office, Washington State Department of Natural Resources, and the King County Conservation Futures Program
- Contributions from local businesses and their employees
- Establishment of a financial nexus between the restoration and maintenance of forested and natural area parkland and stormwater management or other ecosystem services related to utilities infrastructure
- State and federal discretionary funding for forest and natural area restoration
- Carbon credit markets
- Other funding mechanisms (e.g. impact fees, levies, green infrastructure funding, special-purpose-district tax and other taxes), if determined feasible

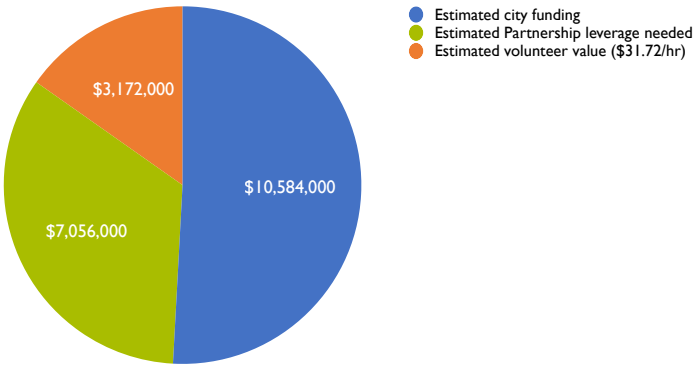



**Figure 17 : Projected city and leverage funds needed to support Green Issaquah Partnership goals**

## Resource Objective 3: Provide sufficient staff and resources to support fieldwork, volunteer outreach and management, community engagement, and program administration.

### *Volunteer Management*

Volunteers currently provide more than 2,500 hours of stewardship each year in Issaquah's parks and natural areas — an amount the Partnership seeks to increase. Many volunteers participate across different partner organizations and city departments, especially within Parks and Community Services. The Green Issaquah Partnership will prioritize data management by setting up a database to successfully track and report Partnership volunteer successes and accomplishments.

Issaquah's Parks and Community Services Department does not currently have a dedicated full-time volunteer coordinator who could manage Green Issaquah volunteers. As the Green Issaquah Partnership approaches its peak goal of 6,500 volunteer hours starting in 2029, experience suggests that one employee will need to dedicate at least half time to managing and coordinating Partnership volunteer efforts. This position would track volunteer time, recognize volunteer achievements, and recruit additional volunteers, and could also manage and support the Green Issaquah Forest Steward Program.

Forterra will initially play a major role in volunteer program coordination to help incorporate the experience gained through implementing the other Green City Partnerships. As a structure becomes established, the City of Issaquah can take the lead in volunteer management internally or continue to contract these services with Forterra or another volunteer-services provider.

### *Forest Steward Program Management and Training*

The Green Issaquah Partnership will recruit, train, and support Forest Stewards. Forest Stewards are trained volunteers committed to a particular park. They work individually or in small teams to organize and implement restoration projects. Forest Stewards will lead volunteer events, work closely with staff to create restoration work plans, track restoration progress, and may apply for small grants to manage their sites. Forest Stewards allow the Partnership to increase its capacity to reach more restoration sites and engage more people in their local parks.

Success will depend on a staff member being able to coordinate the Forest Steward Program, including training new stewards, working with them to develop site plans, providing support and encouragement, coordinating their efforts with other city staff, and keeping track of their accomplishments in relation to Partnership goals. This role could be incorporated into the duties of a volunteer coordinator or filled by a different staff member.

### *Recommended Staff Capacity*

*The Green Issaquah Partnership recognizes that adding staff capacity would benefit its program of urban forest management and recommends creating a full-time or part-time* ***volunteer coordinator position*** *to manage stewards under the Green Issaquah Partnership and other programs. This capacity could be met internally, with additional city staff, or through contracted services.*

### *Outreach and Education*

City staff time devoted to education and outreach will be critical in helping increase volunteer capacity and hosting many appreciation and public engagement events each year. In order to reach the broader Issaquah public, a city staff person will need to devote a portion of time each week to Green Issaquah Partnership outreach and education. Forterra can help fill some of this role during the Partnership's first year, or longer as needed and if resources allow. The city's Communications Department can provide guidance and expertise in how best to equitably engage and inform Issaquah's residents.

### *Communications and Marketing*

Communications and marketing are linked to the duties of volunteer management, outreach, and education. Forterra will start this work in the program's first year by creating and implementing several communications and marketing tools. This will help the Partnership increase visibility and recruit volunteers, as well as increase the potential for generating additional program funding by reaching a wider audience.

### *Field Restoration*

At current levels, City of Issaquah staffing alone cannot meet the management needs of restoring and maintaining all 1,540 acres of the Green Issaquah Partnership project area by 2040. Partner agencies, organizations, and community leadership will play a major role in filling the gap. Parks and Community Services staff will continue to play a lead role in evaluating and managing Issaquah's forested parks and natural areas, especially as more volunteers are brought in to help with restoration work. Managing field operations related to the Green Issaquah Partnership will require at least a part-time position in the first few years, ramping up to a full-time position by 2025. In addition to these staff members, the City of Issaquah and partners may contract with skilled crews for fieldwork on sites that are not appropriate for volunteers.

In the first few years of the Partnership, training in restoration BMPs and volunteer management will help ensure that all staff are up to speed with the same techniques and approaches being taught to Forest Stewards, in addition to crew-specific practices that volunteers are not permitted to perform. This coordination will be one of the functions of the Green Issaquah Management Team.

### *Fund Development and Management*

Stable funding is crucial to supporting the Partnership's efforts. As has been demonstrated in other Green Cities, thinking creatively about funding sources and how they apply to urban forestry will benefit the City of Issaquah and the Partnership.

Uniting existing projects can help build a narrative for funders to better understand the important work the city is already doing. Nonprofit partners, such Forterra and Mountains to Sound Greenway Trust, that are already working on projects in the Partnership area could assist the City of Issaquah in applying for grants to cover various portions of the Green Issaquah Partnership projects. Approval of the 20-Year Guide, in and of itself, could serve as an opportunity to attract funders.

The city will need to allocate staff time to coordinate funding and program visibility within city leadership. This may be a large role if many small funding sources are compiled, or less intensive if funding is derived from one or a few larger sources. This role may work closely with the Green Issaquah Management Team on grant writing, policy creation, and more.

## Resource Objective 4: Coordinate efforts by partner staff and volunteers to maximize joint success and share resources.

To achieve the goals outlined in this guide, partners — including landowners, the City of Issaquah, Forterra, Mountains to Sound Greenway Trust, and others — will need to work across ownership boundaries. All partners will need to communicate and coordinate their efforts so the work on the ground and in the community addresses needs in a comprehensive, rather than piecemeal, manner. To share resources and avoid duplication,

all active partners will meet regularly as a Management Team. The Management Team will hold quarterly meetings in the first year of the Partnership and may meet more often and/or form committees to address certain topics as the Partnership grows. The Management Team also will be in communication with other relevant local groups, such as the Green Cities Network.

## Resource Objective 5: Deploy skilled field crews, prioritizing those that offer training and job-skills development to Issaquah residents.

Professional crews will be needed for priority sites that lack sufficient volunteer support or sites with conditions that are unsafe or otherwise inappropriate for volunteers. Some sites containing extreme invasive plant infestations, steep slopes, riparian areas, and wetlands may be better suited to skilled field crews.

The Partnership will seek to contract with organizations that focus on forest-habitat management, prioritizing those that provide training and job-skills development to local residents, especially youth. The following activities will support this objective:

- Nonprofit and training crews will have priority to be hired, as needed, for fieldwork at difficult sites.
- Private landscaping and habitat-restoration companies (commercial crews) will be hired for highly technical projects as budget and need dictate.

## Resource Objective 6: Increase volunteer engagement to leverage support from the community.

### *Volunteer Participation*

*Across 20 years, our goal is for volunteers to provide more than 100,000 hours of work time, valued at $3.2 million, based on the 2019 Independent Sector valuation of a volunteer hour at $31.72 in Washington State. To put this number in perspective, if every Issaquah resident contributed just 2.5 hours during the entire 20-year program, the Partnership would achieve its community engagement and restoration goals.*

Increased levels of volunteerism will be encouraged. Volunteers who participate in one-day events with a business or community group will be invited to continue their participation in ongoing work parties. Frequent volunteers may be interested in becoming Forest Stewards to increase their involvement. To do this, there will be a need to keep existing volunteers motivated by showing them how their efforts, in concert with those of many other volunteers, have a significant impact in maintaining and restoring Issaquah's forested parks.

The Partnership provides opportunities for individuals of varying physical ability and time commitment to get involved. There are numerous volunteer activities for those uninterested or unable to participate in physical fieldwork, or who require a more flexible schedule. The opportunities include photography, database and administrative work, publicity and marketing, fundraising, sponsor recruitment, community event support, and donating snacks and beverages to work parties.

Diversity within the Partnership will strengthen work efforts and build community. An important component of outreach efforts will involve contacting communities that have not traditionally participated in environmental restoration or stewardship. Outreach to these communities can be increased by working with local groups, youth organizations, schools, and businesses, and looking for ways to collaborate on projects that offer mutual benefit and culturally relevant ways to participate. Informational signs at park sites can be posted describing the work underway and inviting participation. The existing partnership between the City of Issaquah and Issaquah School District can be strengthened to provide opportunities for students who want to complete community-service requirements within the Green Issaquah project area.

## Resource Objective 7: Support local businesses.

The Green Issaquah Partnership offers the opportunity to support Issaquah's economy by working with the following types of local businesses and services:

- Professional field crews for on-the-ground restoration and stewardship.
- Providers of food, refreshments, and supplies for volunteer and other community events.
- Graphic designers, marketing and outreach specialists, and other professionals to help promote Partnership activities.
- Photographers to help document events.
- Skilled professionals to offer training to staff and volunteers in a wide variety of topics, from plant identification and ecology to ethnobotany, community engagement, and grant writing.

The Partnership will also welcome opportunities to engage local businesses through donations and volunteering, for businesses to get their name out in front of the community and offer team-building activities for their employees.

PHOTO BY SHUBHA TIRUMALE PHOTOGRAPHY

# CHAPTER 7: ADAPTIVE MANAGEMENT

This chapter describes how the Partnership will apply an adaptive management approach to track and monitor progress, distribute resources, and report on the Partnership's success.

Adaptive management is the process of hypothesizing how a system works, monitoring the results of actions taken, comparing these observations with expectations, and modifying management plans and procedures to better achieve objectives. The process systematically improves management policies and practices.

Once we have taken actions, managers use monitoring and evaluation to determine how our actions have affected the system and use that data to adapt our understanding of how the system works. Once an evaluation is complete, new information gathered from monitoring is used to reassess the problem and develop new strategies as needed. Then implementation, monitoring, and evaluation occur, and the cycle begins again (see Figure 18). Adaptive management allows staff to track the resources and community support necessary for accomplishing the fieldwork while considering the changing ecological and social realities of the urban forest.

## MEASURING SUCCESS

Program monitoring and field monitoring will help the Green Issaquah Partnership improve its program design and performance. Monitoring analyzes and measures the effectiveness of strategies and techniques. The results from that monitoring inform Partnership planning and methodologies to achieve continuous improvement. Monitoring and evaluation also provide accountability to funding sources and supporters, and help ensure that goals and benchmarks are met.

Table 8 illustrates near-term actions and benchmarks for the three primary program elements of implementing the 20-Year Guide: fieldwork, community, and resources. By measuring progress toward each objective, we can assess the effectiveness of the implementation and program strategies. (See Appendix D for actions and benchmarks from 2026–2040.) The effectiveness of the Partnership needs to be tracked throughout its life, using adaptive management and adjustments when necessary.

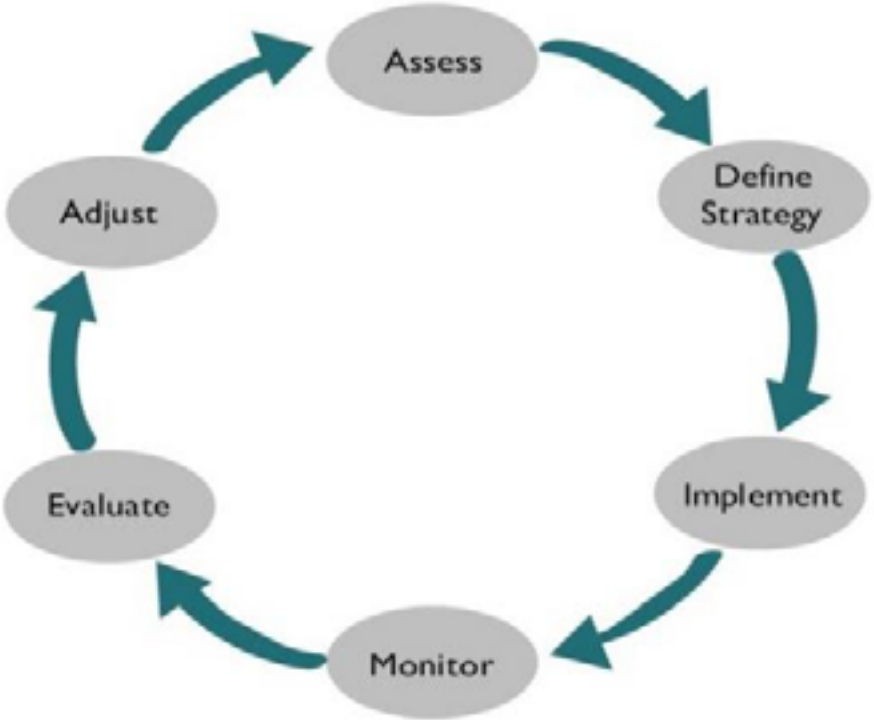



**Figure 18: Adaptive management cycle**

## TABLE 8: NEAR-TERM ACTIONS AND BENCHMARKS, 2021–2025

### FIELD

| 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|
| • Enroll 5 acres into restoration<br>• Develop tracking protocols and database | • Continue work on previously enrolled 5 acres<br>• Enroll 10 new acres into restoration | • Continue work on previously enrolled 15 acres<br>• Enroll 30 new acres into restoration | • Continue work on previously enrolled 45 acres<br>• Enroll 50 new acres into restoration | • Continue work on previously enrolled 95 acres<br>• Enroll 70 new acres into restoration |

### COMMUNITY

| 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|
| • Recruit and manage 600 volunteer hours<br>• Host first Forest Steward orientation; recruit 5 new stewards<br>• Publicize Partnership in local media<br>• Develop basic branded outreach and promotional items<br>• Host first Green Issaquah Day (fall planting) | • Recruit and manage 1,600 volunteer hours<br>• Recruit 2–3 new stewards and support and maintain 7 active stewards<br>• Establish relationships with local school district/ student groups and clubs | • Recruit and manage 2,300 volunteer hours<br>• Recruit 2–3 new stewards to support and maintain 10 active stewards<br>• Update branded outreach and promotional items | • Recruit and manage 2,800 volunteer hours<br>• Recruit new stewards as needed and support 12 active stewards | • Recruit and manage 3,700 volunteer hours<br>• Recruit new stewards as need to support and maintain 15 active stewards<br>• Publicize first five years of work |
| | • Host annual Forest Steward orientation<br>• Host trainings for Forest Stewards and open them to the public<br>• Plan and host signature Partnership events each Arbor Day and Green Issaquah Day (100–150 people)<br>• Host annual volunteer appreciation event/activity<br>• Arrange local media coverage of at least 2 Partnership activities and accomplishments per year<br>• Secure at least 1 new corporate/local business partner (sponsorship/donations/volunteers) each year<br>• Advertise events and trainings (monthly e-newsletter, social media, local media, schools, businesses, HOAs, etc.) | | | |

**RESOURCES**

| 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|
| • Convene agency partners for preliminary coordination meetings<br>• Publish and distribute Green Issaquah 20-Year Guide | • Establish Management Team of working partners<br>• Seek additional partners | • Seek additional partners<br>• Expand business engagement | • Expand capacity to support more volunteer and community events | • Explore options for a more formalized management structure, if needed<br>• Review 20-Year Guide benchmarks to make sure the Partnership is utilizing the best available science for establishing program goals |
| | • Develop annual work plan and write annual report of accomplishments<br>• Present annual accomplishments to partners, volunteers, and city leadership<br>• Identify and pursue annual funding to support field, community, and administrative work as needed | | | |

## PROGRAM EVALUATION

At the close of each year, Green Issaquah Partnership staff will use the Centralized Data Repository (CEDAR) database to collect data to measure and track progress toward the annual work-plan goals and benchmarks. CEDAR is a customized database for Green City Partnerships to record field restoration and volunteer metrics, so that progress can be summarized easily at any point in the year. The data can be used to analyze and evaluate volunteer attendance, retention, and basic demographic information to measure program effectiveness and reach. Field-based metrics, recorded by park location and MU, will also be collected, such as the area and types of invasive plants removed, acres enrolled in restoration, the number of plants installed and watered, and the area mulched and maintained. The Partnership will share successes and lessons learned, celebrate progress, and evaluate effectiveness. The Partnership should consider evaluating and updating the 20-Year Guide and forest assessment midway through the program in 2031.

## FIELD MONITORING

As the field program proceeds, the Partnership will continue to conduct routine monitoring of planting and restoration sites to track their condition and health, and gauge progress. On forested land, success will rely on developing and refining effective strategies to remove and control invasive plants and keep newly planted natives healthy. Planting refinement may need to occur if areas change due to climate, development, or other conditions.

To monitor fieldwork, new acres will be tracked as they are brought into active restoration and mapped in GIS. Volunteer and skilled-field-crew time will be devoted to revisiting sites that have been previously worked on and assessing their ongoing needs as they move through the four phases of restoration. One component of monitoring is to track plant survival rates, as forests and natural areas will always be subject to pressure from their surroundings. Although the work needed decreases dramatically each year that an area goes through the program,

Phase 4 of restoration continues indefinitely.

As the Partnership enrolls more acres in restoration and plants more trees, tracking successes can become complicated. Managing data entry and paperwork as the program grows has proven to be expensive in other Green Cities. CEDAR allows Forest Stewards and staff to directly enter volunteer and restoration data online, greatly reducing the need for staff management and streamlining project reporting.

## RESOURCE DISTRIBUTION

It is assumed that Green Issaquah Partnership funding will continue to be housed entirely within current active partners — the City of Issaquah, Forterra, and Mountains to Sound Greenway Trust — for at least the first year of the program (through December 2021). After that, partner staff will continue to oversee program funding and generate additional public funding, both from the City of Issaquah and non-city sources. Staff will also seek donations from outside sources to support the Partnership. The Partnership will allocate funds for the three program areas — community, fieldwork, and resources — in proportions that will change over time to help ensure that the program's basic goals are achieved. As it grows from single-site efforts to a systemwide program, the emphasis will shift from funding program development to supporting fieldwork.

At the front end, resources will be directed toward recruiting and supporting Forest Stewards, demonstrating on-the-ground results and success in the field, and hosting highly visible community events that foster engagement with Green Issaquah sites. These activities will ramp up during the first five years (2021–2025) as volunteer efforts grow. Once a strong volunteer program is established, some resources can shift to provide more field support for restoration projects.

The Partnership should use adaptive management to regularly evaluate and adapt the distribution of funding and resources for field operations and volunteer recruitment and support. As funding allows in the future, the field-management budget can expand from funding Partnership staff time and supporting volunteers to include additional skilled field crews to help meet restoration and maintenance demands.

After 2040, Issaquah's parks and natural areas will need ongoing volunteer support and stewardship. The role of the Partnership, field crews, and volunteers will need to continue indefinitely in some capacity beyond the 20 years outlined in this guide to maintain and protect Green Issaquah's investment for the long term. Forterra estimates long-term maintenance costs once all acres reach Phase 4 to be at least $300,000 per year (in 2020 dollars), assuming a maintenance rotation of roughly 300 acres per year at $1,000 per acre and each acre revisited every five years.

## REPORTING AND KNOWLEDGE SHARING

The Green Issaquah Partnership will report its progress annually to the Issaquah mayor's office, Issaquah City Council, Issaquah Parks and Community Services, the Parks Board, partners, Forest Stewards, and other volunteers, along with the public. Annual work projects will be adjusted in response to available funding, monitoring results, and emerging knowledge of successful restoration techniques.

Partnership staff should consider utilizing creative outreach strategies and networking with regional restoration practitioners so staff can share information and learn from other agencies. As a member of the Green Cities Network, the Green Issaquah Partnership will have opportunities to share successes and challenges with other cities dedicated to a similar goal and vision: Burien, Des Moines, Everett, Kent, Kirkland, Puyallup, Redmond, Seattle, SeaTac, Shoreline, Snoqualmie, Tacoma, and Tukwila. Forterra will post written materials, including this 20-Year Guide, on the Green Issaquah Partnership website (www.GreenIssaquah.org), and all parties using these resources will be given the opportunity to provide feedback on the Partnership's methods and materials.

## LOOKING TO THE FUTURE

Issaquah's leaders are considering ways to preserve the health of the city's urban forest for generations to come. The successful completion of this 20-year program to restore Issaquah's forested parklands and natural areas is an important first step in this process. There are additional actions that could assist the city in the future:

- Expand the Green Issaquah Partnership model beyond parks to restore and care for other public landscapes, thus encompassing Issaquah's entire urban forest.
- Build upon previous efforts to maintain the City of Issaquah's canopy cover.
- Establish a residential tree give-away program to increase tree canopy on private property.
- Increase staff capacity to meet the needs of a growing city and the Green Issaquah Partnership to retain, and potentially expand, the benefits Issaquah currently receives from its urban forest.
- Connect and stay up to date with the Green Cities Network and the Green City Toolbox to explore new tools, BMPs, resources, and funding as they become available.

# CHAPTER 8: GLOSSARY OF TERMS USED IN THIS GUIDE

**Adaptive Management**

A structured, repeating process of decision making aimed at better understanding a management system through monitoring, evaluation, and development of new management strategies. The Green Issaquah Partnership utilizes an adaptive management approach to inform its administrative and restoration practices over time.

**Biomass**

The amount of living matter (as in a unit area or volume of habitat).

**Canopy Cover**

The percentage of a forest floor or specific geographic area covered by tree crowns. Assessed using aerial orthophotographs (see definition below) and ground-based techniques, it can be calculated for all trees in a given geographic area or specific individual tree species. Canopy cover has been shown to be an important ecological indicator for distinguishing plant and animal habitats, as well as assessing on-the-ground conditions in urban areas.

**Climate Change**

Change in global or regional climate patterns — in particular, change apparent from the mid- to late 20th century onward and attributed largely to increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

**Conifers**

Cone-bearing trees, most of which are evergreen, with needle or scale-like leaves. Examples include pine, fir, hemlock, and spruce. The dominant conifers found in Issaquah's urban forest are Douglas-fir, western red cedar, and western hemlock.

**Deciduous**

A tree or shrub that loses its leaves or needles during the fall and winter months (in contrast to an evergreen plant). Examples found in Puget Sound forests include bigleaf maple, red alder, and snowberry.

**Ecosystem**

The interactive community or relationships of living (biotic) organisms such as plants, animals, and microbes with nonliving (abiotic) components such as air, water, soils, and weather.

**Edge Effects**

The change in habitat quality and plant species that occurs in the transition zone between two disparate habitat types. Urbanized forests and natural areas that are fragmented and isolated experience negative ecological changes at the abrupt transition between the built and natural environments. These include an increased susceptibility to encroachment by invasive plants; loss of plant-species diversity; loss of contiguous habitat for birds, amphibians, and mammals; and impacts from human activity.

**Evapotranspiration**

The process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces, and by transpiration from plants.

**Forest Restoration**

Actions and management to reestablish or enhance processes that support a healthy forest's structure, ecological functions, and biodiversity levels. Restoration actions may include removal of non-native invasive plants, applying mulch, and planting native trees, shrubs, and ground cover. In an urban environment, the natural ecological processes may never be fully restored; therefore, forests will need ongoing management with long-term maintenance and monitoring.

**Fragmentation**

The process of changing land use, such as development, that impacts and transforms a large contiguous forest or habitat type into several smaller patches separated and isolated from each other.

**Geographic Information System (GIS)**

A computer program used for visualizing, storing, and analyzing data related to positions on the earth's surface. The Green

City Partnerships use GIS to map and assess land cover, habitat types, and canopy cover. It is also used to track and assess acres enrolled in restoration.

### Green Cities Network

The combined regional group of Green City Partnerships, which currently comprise the cities of Burien, Des Moines, Everett, Kent, Kirkland, Puyallup, Redmond, Seattle, SeaTac, Shoreline, Snoqualmie, Tacoma, and Tukwila, as well as Snohomish County — and now, Issaquah. The Green Cities Network is not a formally defined entity; rather, it is made up of the city partners, Forterra staff, other nonprofits, and participating volunteers who contribute to achieving the goals of each Green City. Network participants are invited to share best management practices, current relevant research, and funding opportunities.

### Green City Partnership

A public-private venture involving a local municipality (e.g., parks departments, public works, utilities, and other government agencies), community groups, and Forterra. The vision of each Green City Partnership is to create a healthy, livable city with sustainable urban forests and natural areas that connect people to nature through community-based stewardship.

### Infiltration

The process by which water on the ground surface enters the soil.

### Invasive Plants

Introduced non-native plant species with traits that allow them to thrive outside their natural range and outcompete native plants. Invasive plants are typically adaptable and aggressive, with high reproductive capacity, and are likely to cause economic and/or environmental harm.

### Madrone

*Arbutus menziesii* (aka Pacific madrone, madrona) is a broadleaf evergreen tree native to western North America that offers unique habitat particular to Puget Sound lowland forests. The Pacific madrone is in decline, especially in urban areas, and is a difficult species to reestablish.

### Management Unit (MU)

A defined geographic area within a park characterized by the vegetation type or conditions present. Open-space areas within the Green Issaquah Partnership sites were grouped into MUs based on one of five categories: forested, natural (nonforested), open water, hardscaped, or landscaped. Forested and other natural areas were further subdivided based on tree-iage values.

### Mulch

A protective covering, usually of organic matter such as leaves, straw, bark, or wood chips, placed around plants to prevent weed growth, moisture evaporation, and the freezing of roots. Covering the ground with mulch is a maintenance practice used in urban forest restoration following invasive plant removal and native plant installation.

### Native Growth Protection Easement (NGPE) or Area (NGPA)

As defined in section 18.10.380 of the Issaquah Municipal Code, "an easement [or area] granted to the City or other nonprofit entity for the protection of native vegetation within a critical area or critical area buffer." Pickering Reach NGPE, Issaquah Highlands NGPA, Talus NGPA, and The Woods NGPA are Green Issaquah Partnership restoration sites.

### Native Plants

Also called indigenous plants, they occur naturally, having evolved over hundreds or thousands of years to adapt to the geography, hydrology, and climate of a particular region.

### Natural Areas

Undeveloped parkland with less than 25% tree cover, in contrast to forested areas, which have more than 25% tree cover. Natural areas may include wetlands and riparian areas.

### Natural Resource Conservation Area (NRCA)

As defined in section 18.06.070 of the Issaquah Municipal Code, "a zoning district that protects and preserve natural systems wildlife habitat area; water quality; restoration and enhancement of damaged ecological systems; archaeological, cultural and historic resources." Tradition Plateau NRCA is a Green Issaquah Partnership restoration site.

### Open Space

An area of protected or conserved land that is left in its natural state or specifically designated to be used for recreation, resource protection, agriculture, greenbelt, or amenity and is not covered with structures, roads, or parking areas.

**Orthophotograph**

An aerial photograph that has been adjusted for topographic relief, lens distortion, and camera tilt. As it is an accurate representation of the earth's surface, it can be used to measure true distances, and is often used with Geographic Information Systems (GIS).

**Overstory**

The uppermost layer of branches and foliage that forms the forest canopy. Common overstory trees found in Puget Sound forests include Douglas-fir, western red cedar, western hemlock, and bigleaf maple.

**Photosynthesis**

A process used by plants and some algae to convert light energy from the sun, carbon dioxide, and water into carbohydrates that provide sustenance for those organisms. Photosynthesis takes place in the chloroplast cells of leaves. The primary by-product of photosynthesis is oxygen.

**Phytoremediation**

The treatment of pollutants or waste (as in contaminated soil or groundwater) by the use of green plants that remove, degrade, or stabilize the undesirable substances (such as toxic metals).

**Pollinators**

An animal that helps carry pollen from the male reproductive part of a flower (stamen) to the female reproductive part of the same or another flower (stigma), thus fertilizing the plant to produce fruits, seeds, and young plants. Examples include bees, wasps, moths, butterflies, birds, flies, and bats.

**Riparian**

Pertains to the terrestrial area along the banks of a river, stream, or lake.

**Runoff**

Runoff refers to unfiltered rainwater that reaches nearby water bodies by flowing across impervious surfaces such as roads, parking lots, driveways, roofs, and even compacted soils in landscapes. Where the landscape is undeveloped or soils are not compacted, rainwater soaks into forest and meadow soils, where it is filtered by natural processes, slowly feeding into underground aquifers, streams, and lakes. The filtration process removes pollutants such as motor oils, gasoline, fertilizers, and pesticides.

**Scrub-Shrub Wetland**

A forested wetland classification that includes areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species present include willow, red osier dogwood, and hardhack.

**Stand**

A forest stand is a contiguous community of trees sufficiently uniform in composition, structure, age, size, class, distribution, spatial arrangement, condition, or location to distinguish it from adjacent communities.

**Stormwater Runoff — see Runoff.**

**Tree Canopy**

The uppermost layer of the forest, formed by the leaves and branches of dominant tree crowns. The tree canopy forms the forest overstory.

**Tree-Canopy Vigor**

Vigor refers to a tree's active, healthy growth. Plants with low tree-canopy vigor have stunted growth, premature leaf drop, late spring-leaf development, sparse foliage, light-green or yellow foliage, twig and branch die-off, or other abnormal symptoms. A combination of factors (e.g., flooding, shifts in environmental conditions, or physical damage) reduces a tree's vigor. Stress on a tree can make it vulnerable to diseases and insects that accelerate its decline.

**Tree-iage**

A prioritization tool, modeled after traditional medical triage, used to assess urban habitat conditions and inform restoration-management planning. The tool uses measurements of habitat quality and invasive plant threat to assign each management unit a tree-iage category from 1 to 9. Category 1 represents high-quality habitat and low invasive species threat, and category 9 represents low-quality habitat and high invasive species threat.

**Understory**

The vegetation that grows below the forest canopy. Understory plants consist of saplings of canopy trees, together with smaller understory trees, shrubs, and herbs. Examples of understory plants found in Puget Sound forests include vine maple, beaked hazelnut, tall Oregon grape, salal, and sword fern.

**Urban-Heat-Island Effect**

The increase in surface and atmospheric temperatures of urbanized landscapes caused by the replacement of vegetation and natural areas with impermeable surfaces such as roads, buildings, and other built infrastructure. Lack of vegetation in the built environment results in elevated energy consumption (due to increased demand for cooling and electricity), an increase in greenhouse gases and air pollutants, water quality impairment (due to the heating of stormwater runoff entering streams and lakes), and human health problems, such as respiratory illness, heat exhaustion, heat stroke, and heat-related mortality.

**Urban Natural Areas — see Natural Areas.**

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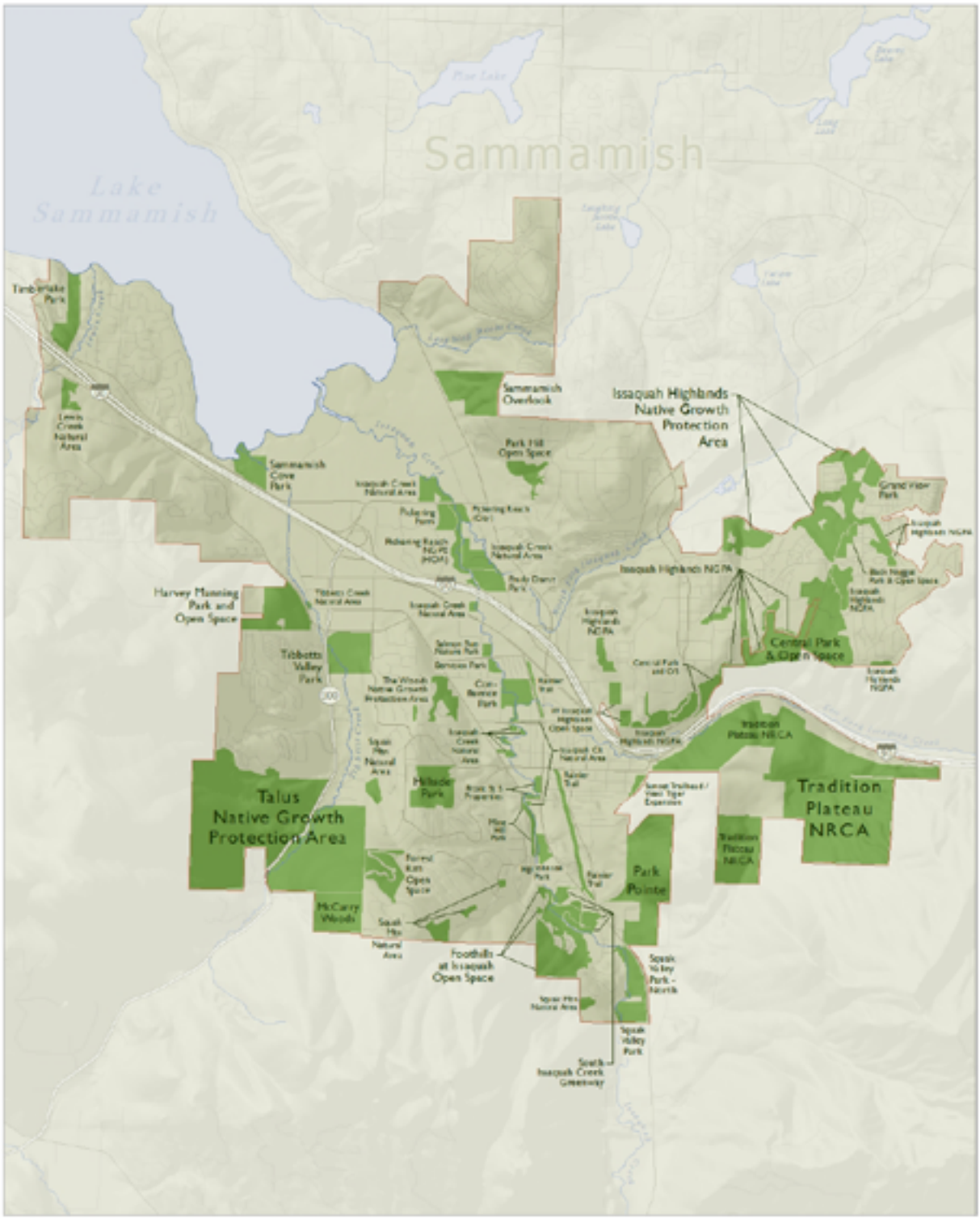
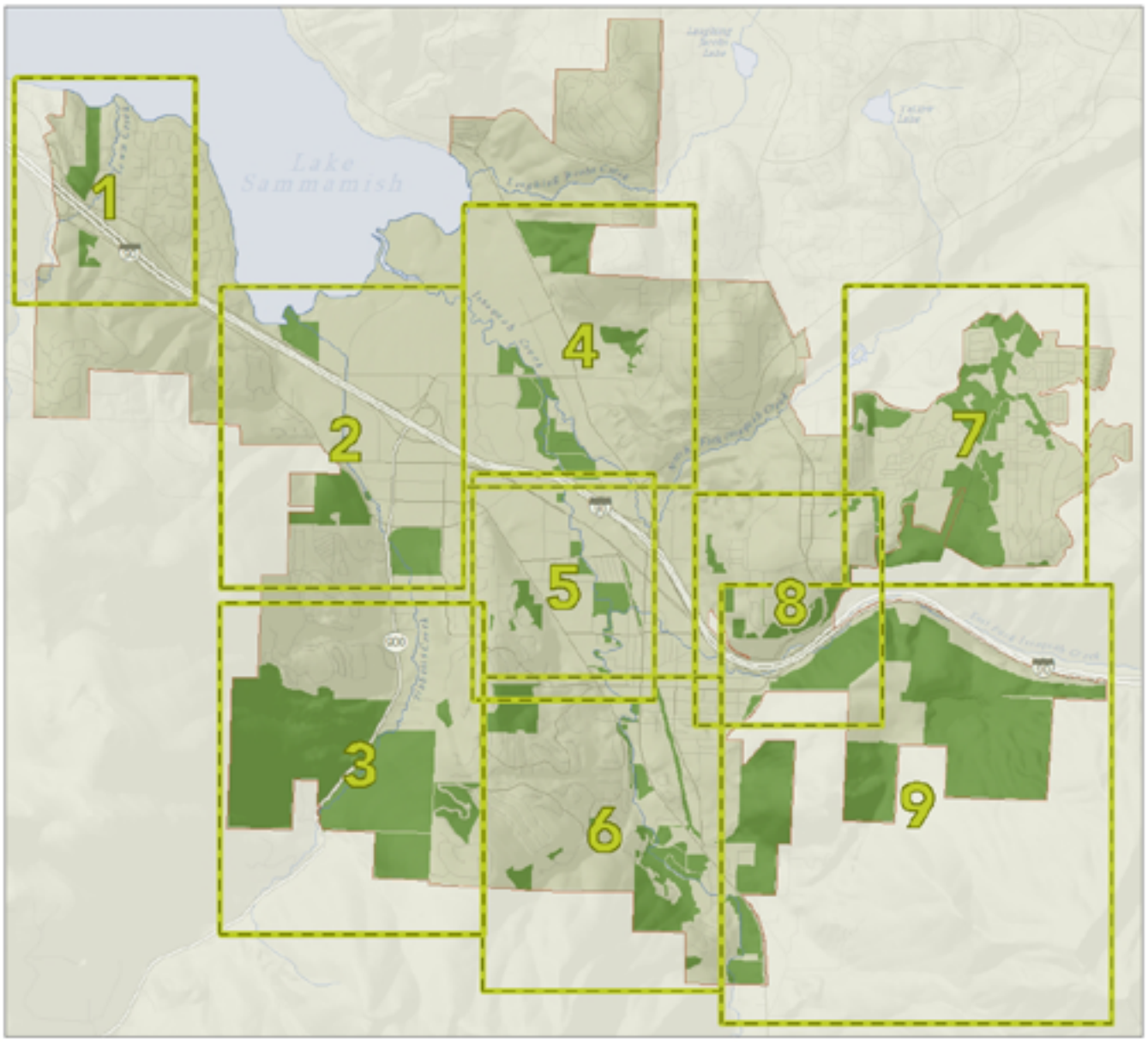
# CHAPTER 10: APPENDICES

## APPENDIX A: DETAILED TREE-IAGE MAPS OF GREEN ISSAQUAH SITES



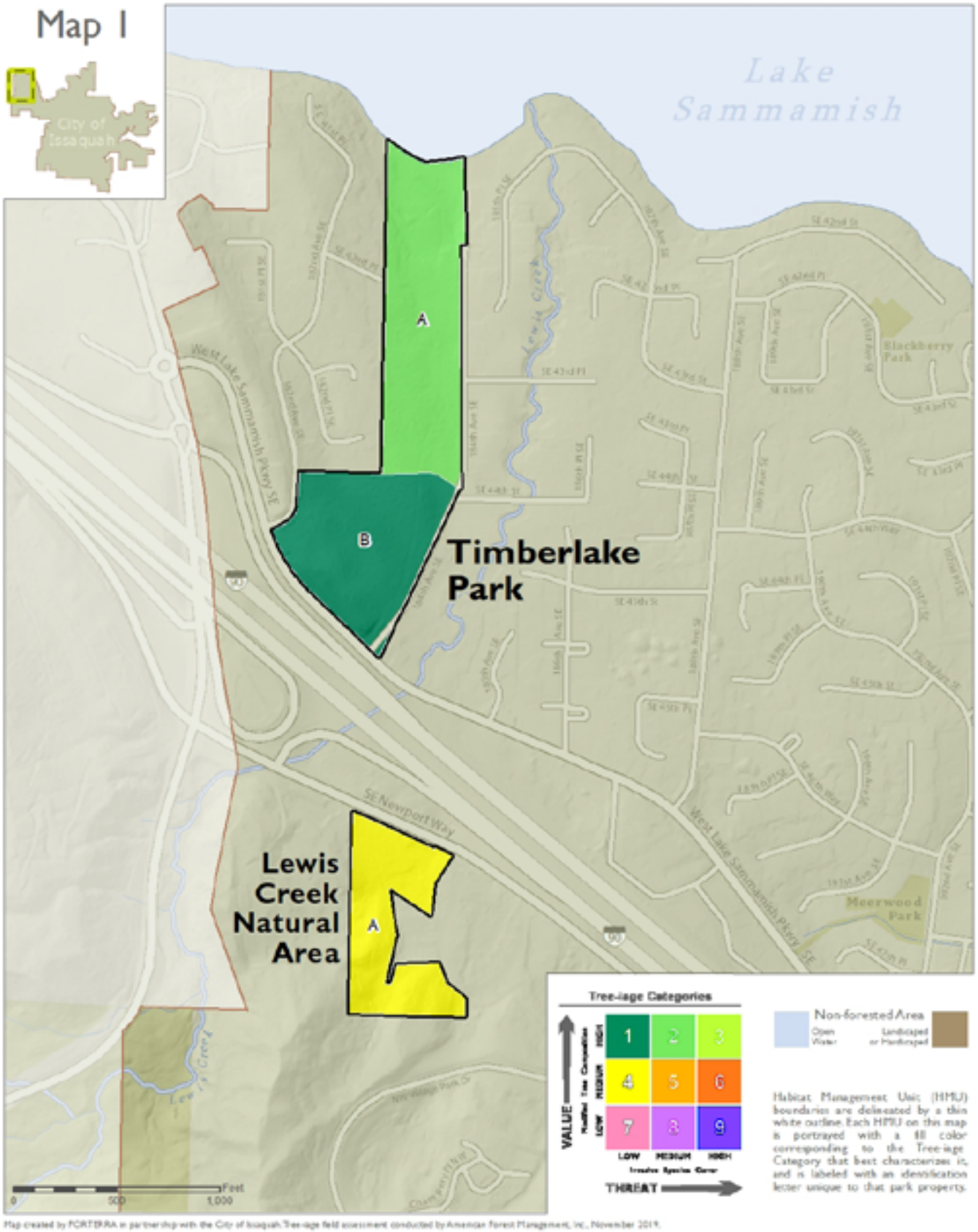

Map created by FORTERRA in partnership with the City of Issaquah.



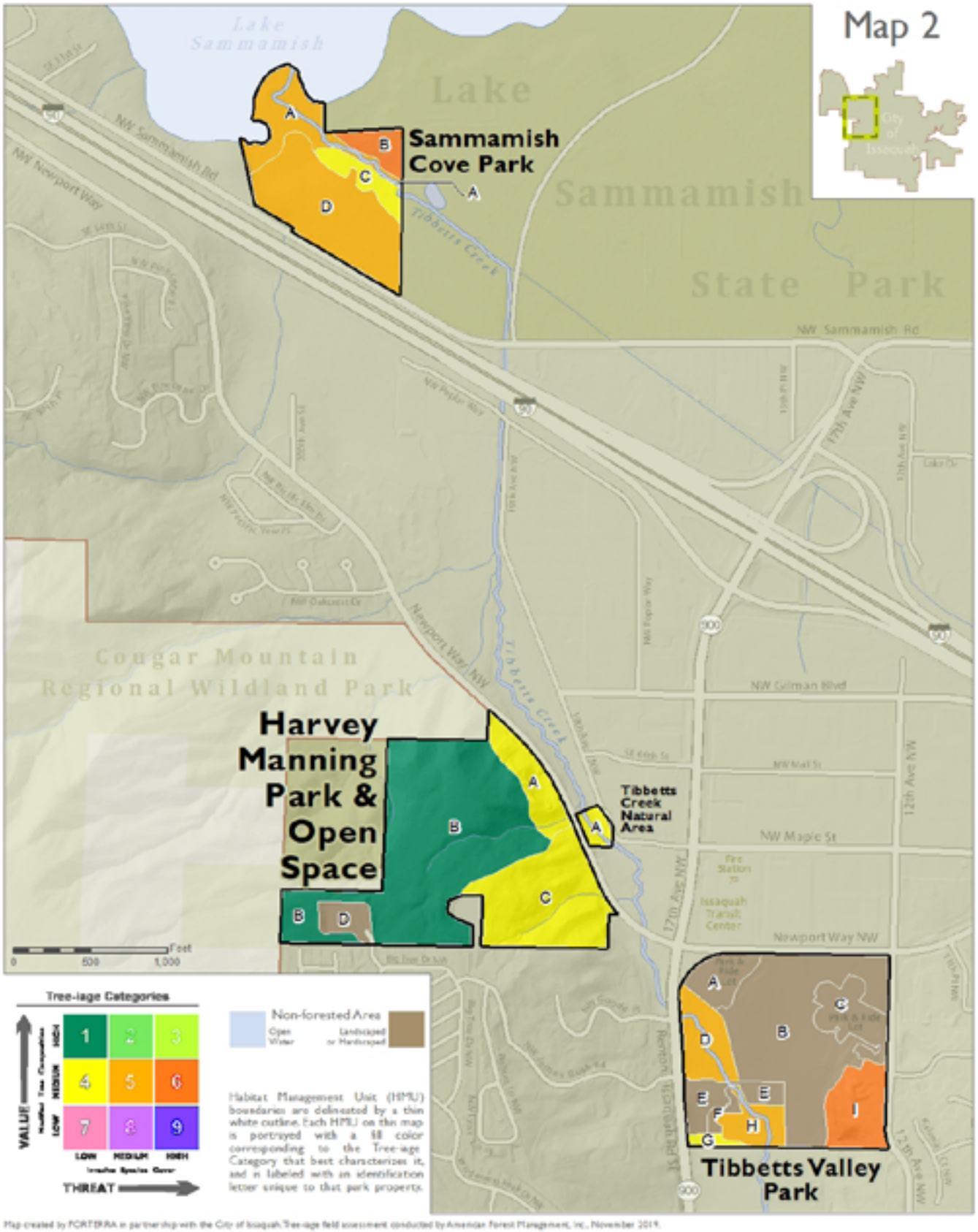

## Key to Individual Site Maps

| Site Name | Map Number(s) |
|---|---|
| Berntsen Park | 5 |
| Black Nugget Park & Open Space | 7 |
| Central Park & Open Space | 7 and 8 |
| Confluence Park | 5 |
| Emily Darst Park | 4 |
| Foothills at Issaquah Open Space | 6 |
| Forest Rim Open Space | 3 |
| Front Street South Properties | 6 |
| GrandView Park | 7 |
| Harvey Manning Park & Open Space | 2 |
| Hillside Park | 6 |
| Ingi Johnson Park | 6 |
| Issaquah Creek Natural Area | 4, 5 and 6 |
| Issaquah Highlands Native Growth Protection Area | 7 and 8 |
| Lewis Creek Natural Area | 1 |
| McCarry Woods | 3 |
| Mine Hill Park | 6 |
| Park Hill Open Space | 4 |
| Park Pointe | 9 |
| Pickering Farm | 4 |
| Pickering Reach (City) | 4 |
| Pickering Reach NGPE (HOA) | 4 |
| Rainier Trail | 5 and 6 |
| Salmon Run Nature Park | 5 |
| Sammamish Cove Park | 2 |
| Sammamish Overlook | 4 |
| South Issaquah Creek Greenway | 6 |
| Squak Mountain Natural Area | 3 and 6 |
| Squak Valley Park | 9 |
| Squak Valley Park – North | 9 |
| Sunset Trailhead / West Tiger Expansion | 8 or 9 |
| Talus Native Growth Protection Area | 3 |
| The Woods Native Growth Protection Area | 5 |
| Tibbetts Creek Natural Area | 2 |
| Tibbetts Valley Park | 2 |
| Timberlake Park | 1 |
| Tradition Plateau NRCA | 9 |
| West Issaquah Highlands Open Space | 8 |

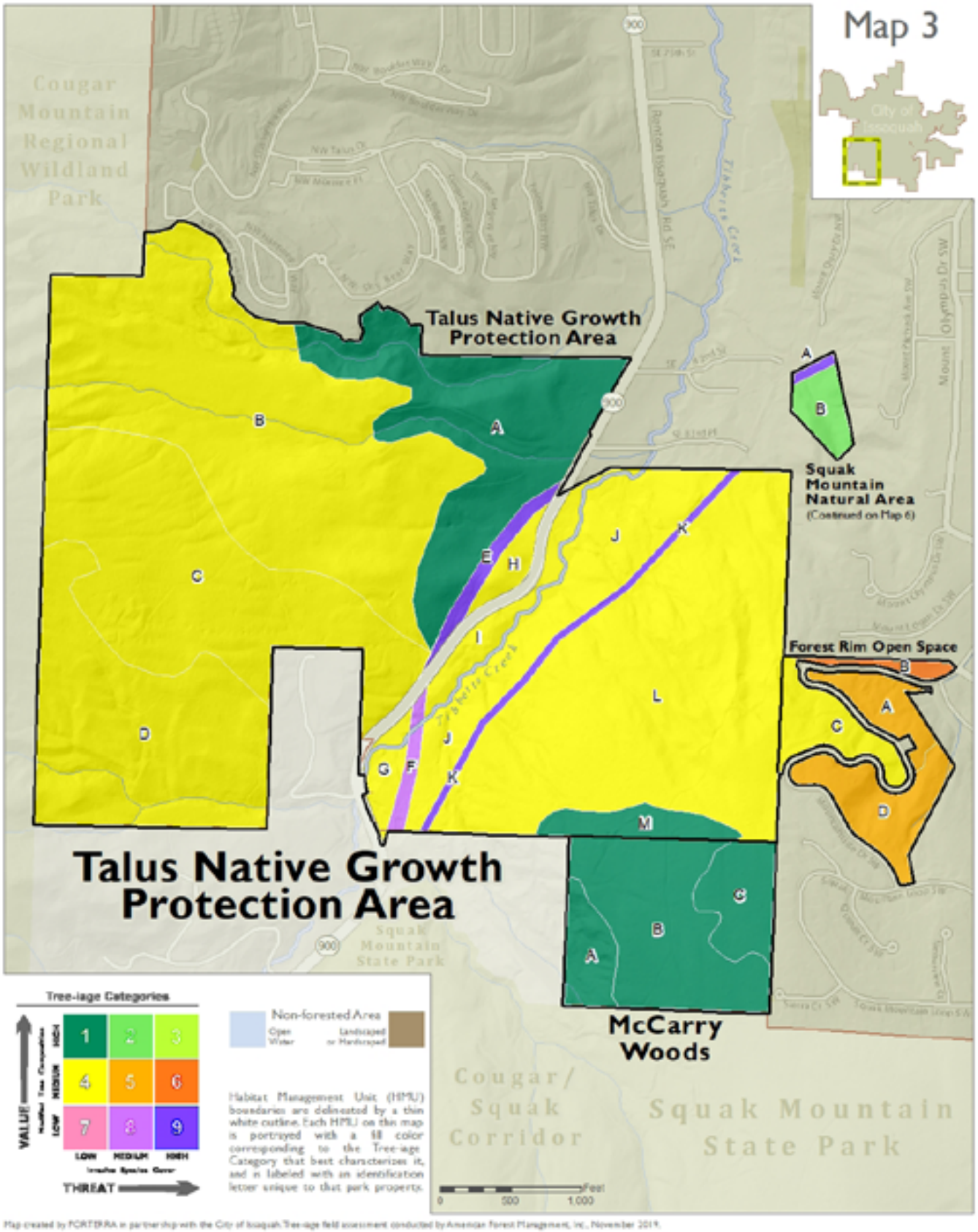
Map created by PORTERRA in partnership with the City of Issaquah.



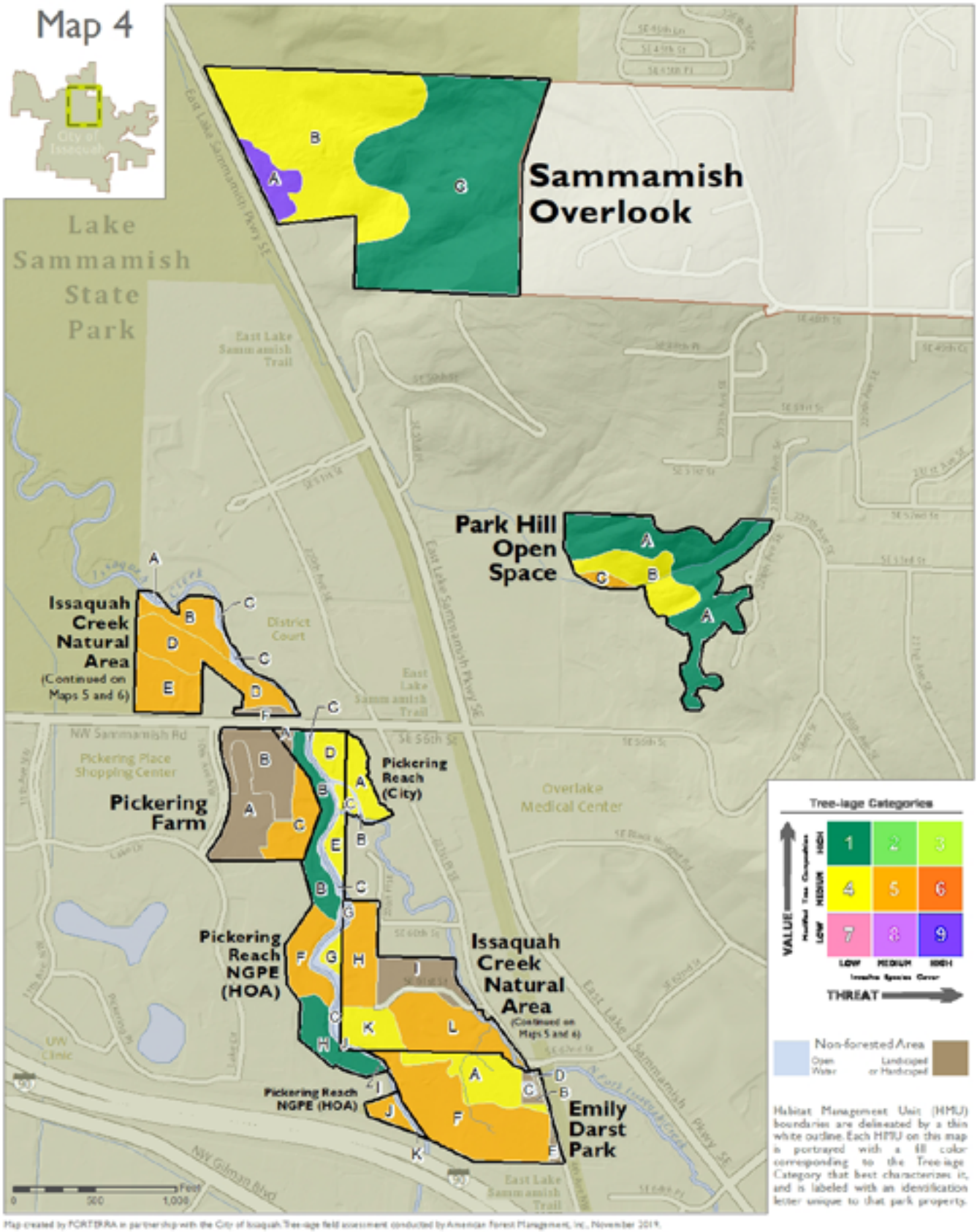

Map created by FORTERRA in partnership with the City of Issaquah. Tree-age field assessment conducted by American Forest Management, Inc., November 2019.



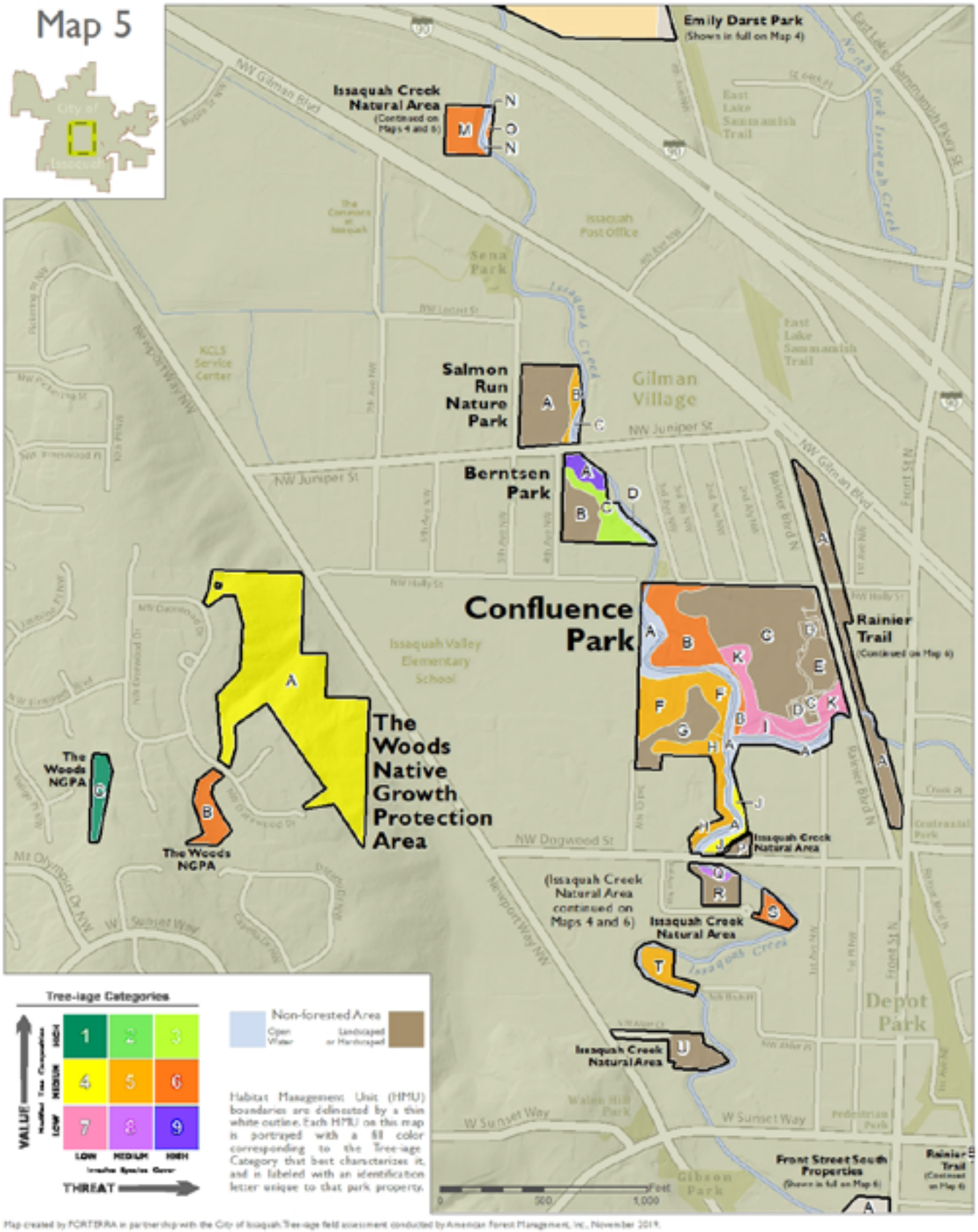

Map created by FORTERRA in partnership with the City of Issaquah. Tree-iage field assessment conducted by American Forest Management, Inc., November 2019.

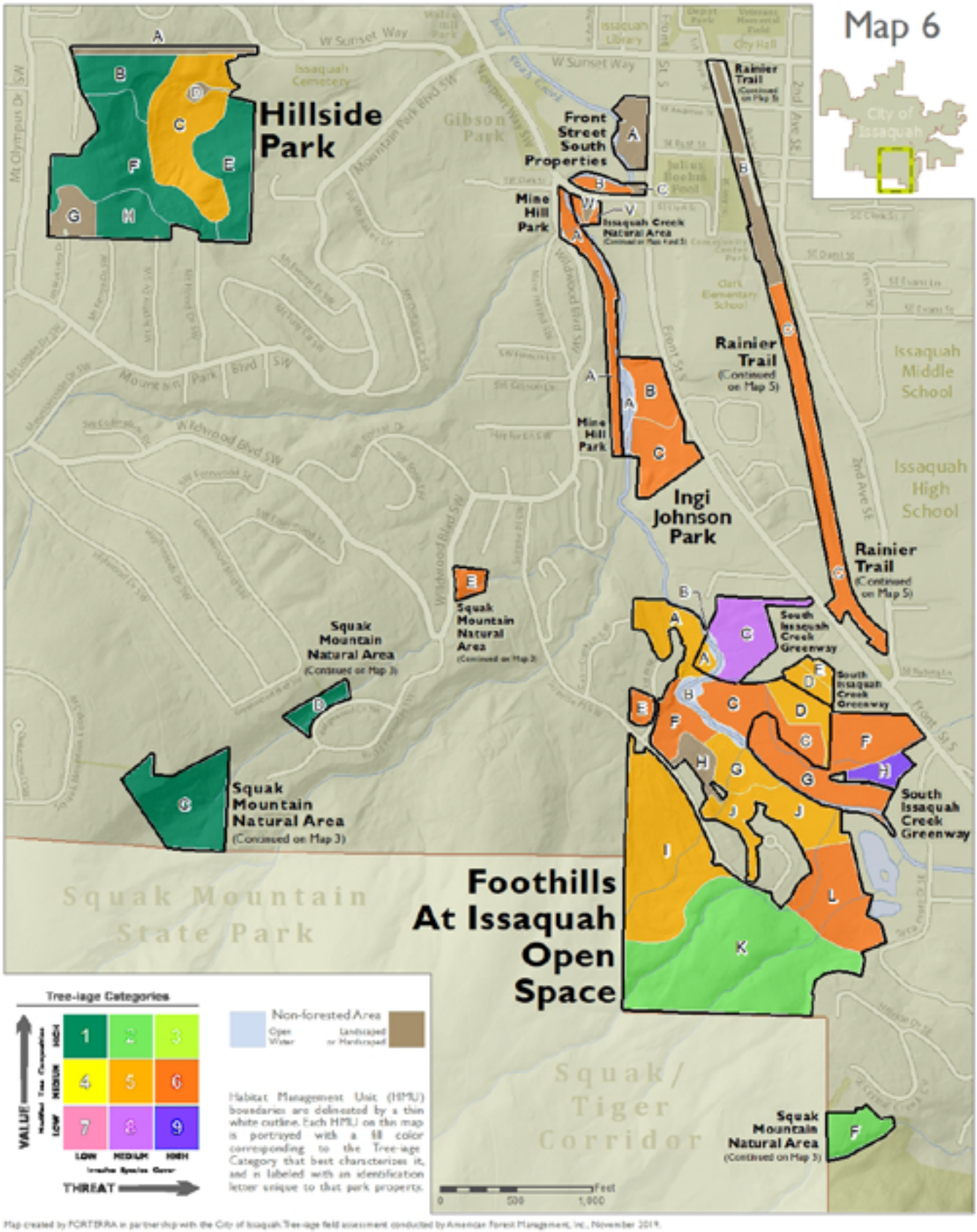



Map created by FORTERRA in partnership with the City of Issaquah. Tree-iage field assessment conducted by American Forest Management, Inc., November 2019.

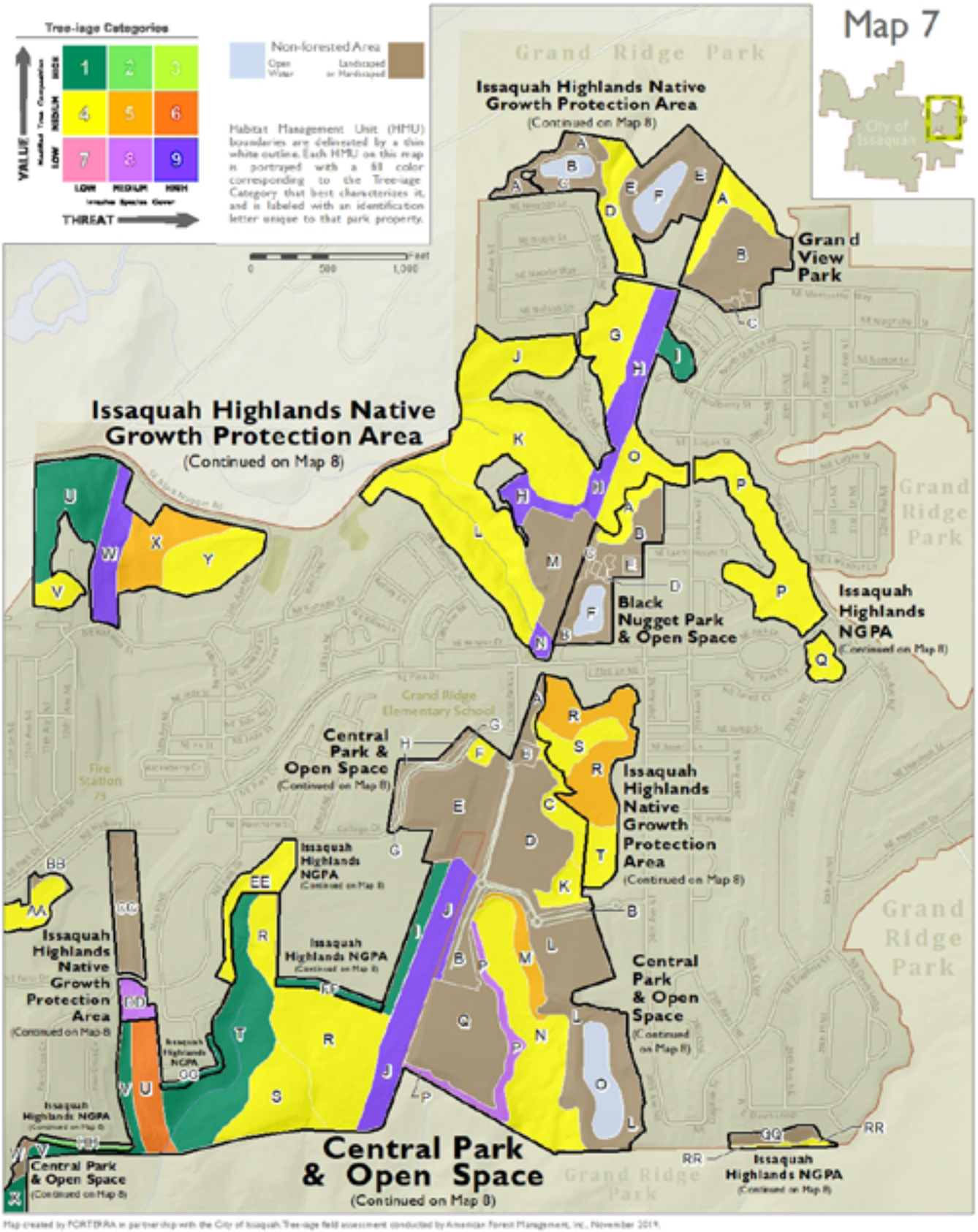



Map created by FORTERRA in partnership with the City of Issaquah. Tree-lage field assessment conducted by American Forest Management, Inc., November 2019.

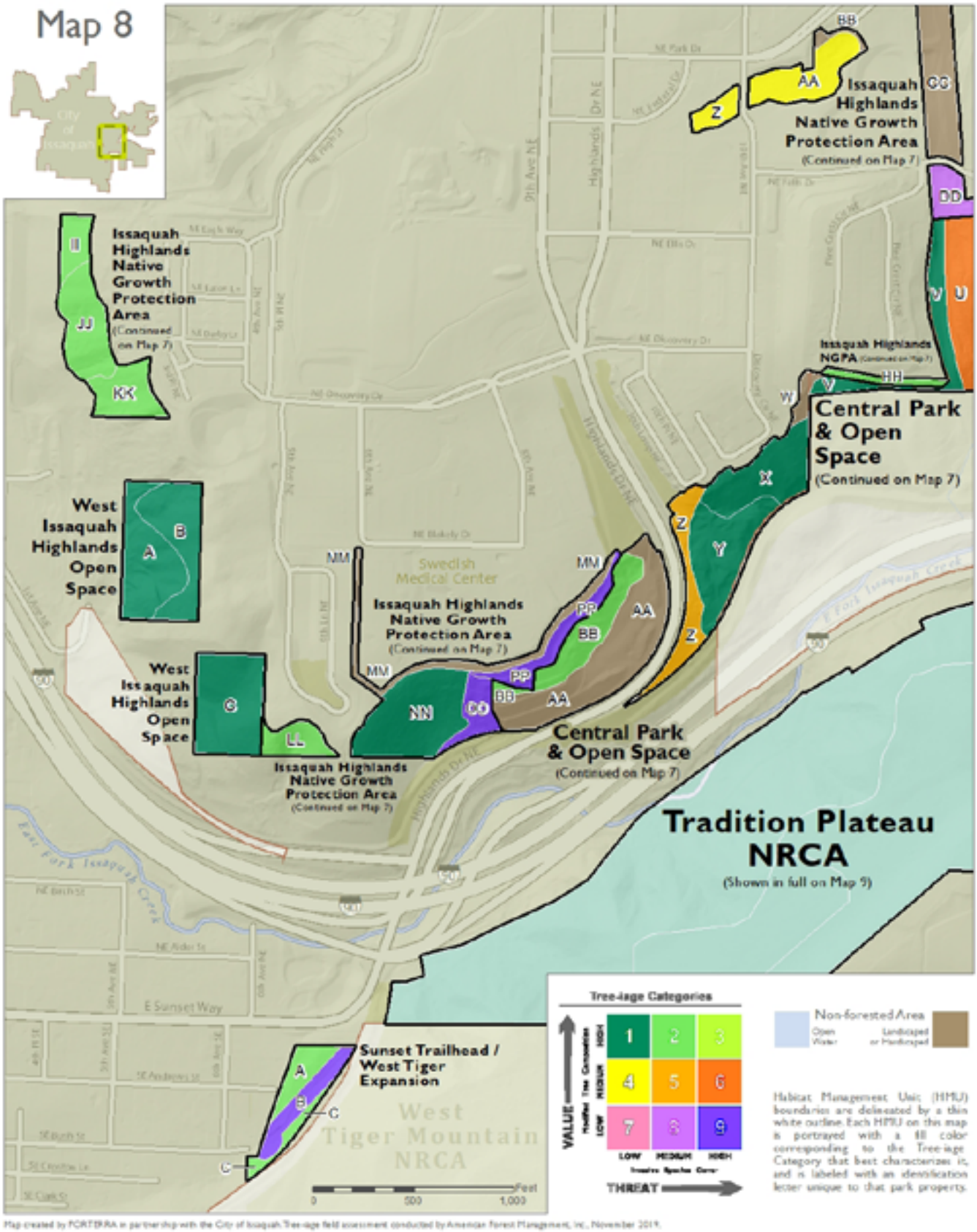

Map 5
Emily Darst Park
(Shown in full on Map 4)
Issaquah Creek Natural Area
(Continued on Maps 4 and 6)
Salmon Run Nature Park
Berntsen Park
Confluence Park
The Woods Native Growth Protection Area
The Woods NGPA
The Woods NGPA
Rainier Trail
(Continued on Map 6)
Issaquah Creek Natural Area
(Issaquah Creek Natural Area continued on Maps 4 and 6)
Issaquah Creek Natural Area
Issaquah Creek Natural Area
Front Street South Properties
(Shown in full on Map 6)
Rainier Trail
(Continued on Map 6)
Gilman Village
Depot Park
Issaquah Valley Elementary School
NW Juniper St
NW Dogwood St
W Sunset Way
Tree-iage Categories
VALUE
THREAT
LOW
MEDIUM
HIGH
Non-forested Area
Open Water
Landscaped or Hardscaped
Habitat Management Unit (HMU) boundaries are delineated by a thin white outline. Each HMU on this map is portrayed with a fill color corresponding to the Tree-iage Category that best characterizes it, and is labeled with an identification letter unique to that park property.
Feet
0
500
1,000
Map created by FORTERRA in partnership with the City of Issaquah. Tree-iage field assessment conducted by American Forest Management, Inc., November 2019.



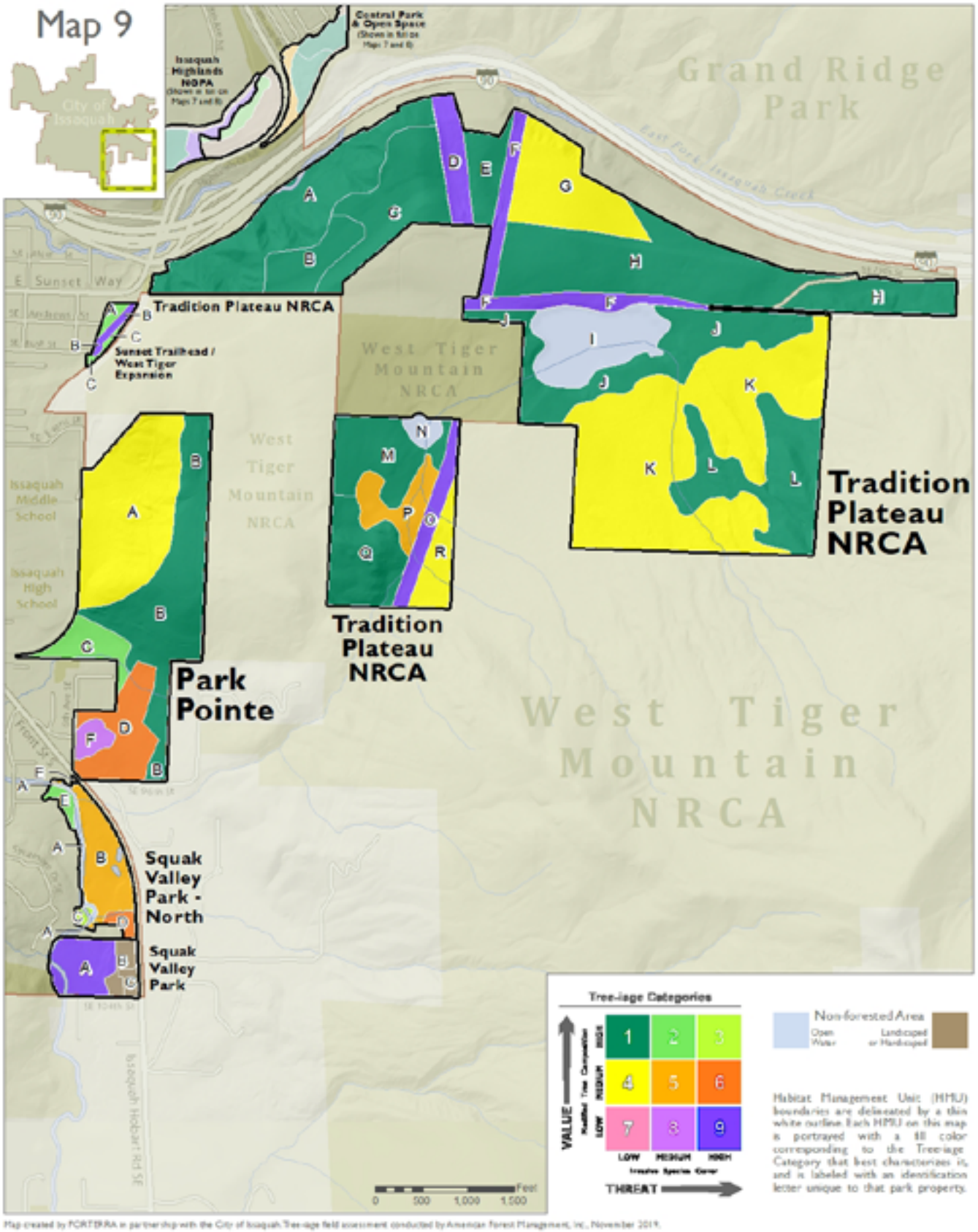

Map created by FORTERRA in partnership with the City of Issaquah. Tree-iage field assessment conducted by American Forest Management, Inc., November 2019.




Map created by FORTERRA in partnership with the City of Issaquah. Tree-iage field assessment conducted by American Forest Management, Inc., November 2019.

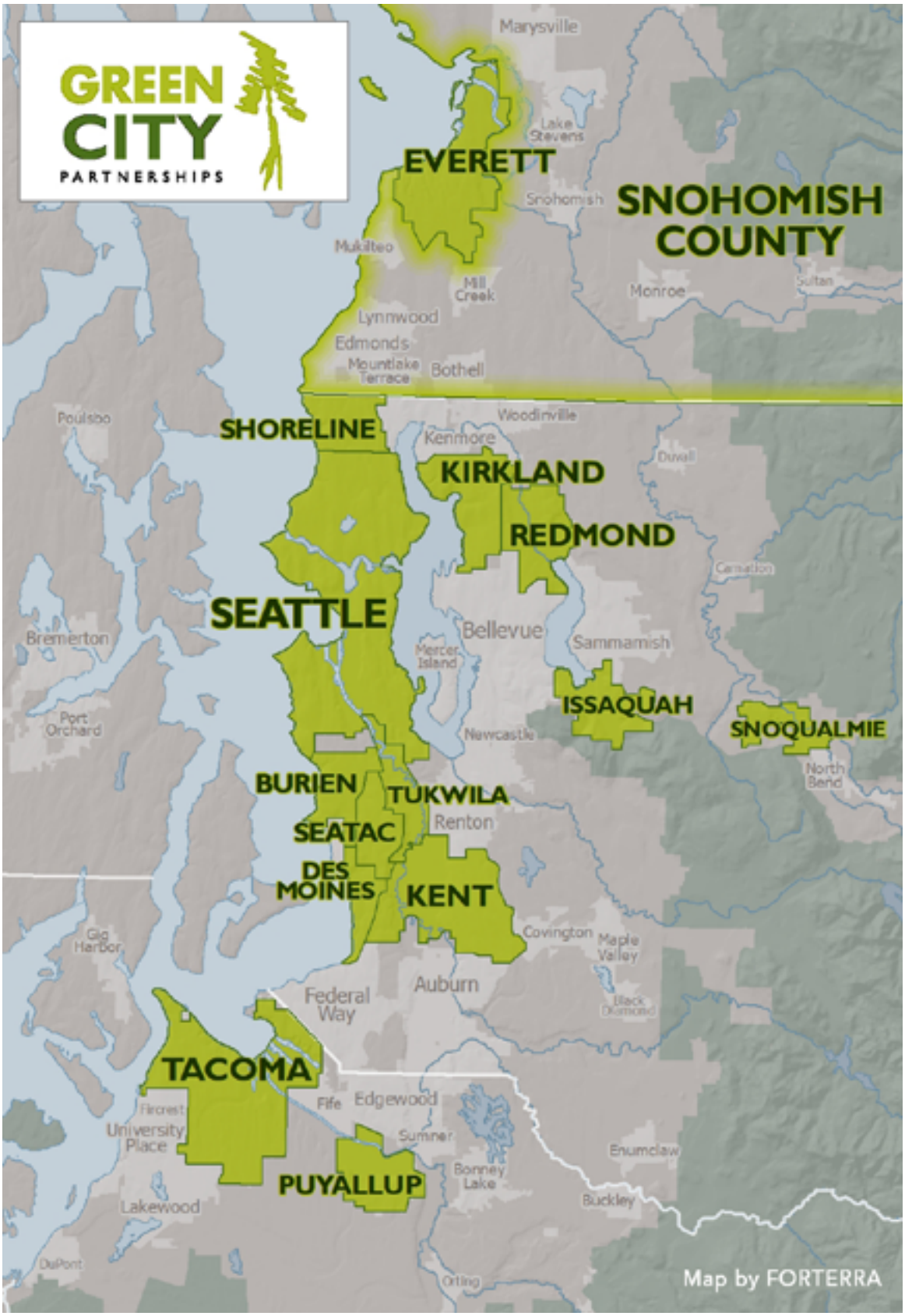



Map created by PORTERRA in partnership with the City of Issaquah. Tree-age field assessment conducted by American Forest Management, Inc., November 2019.




Map created by FORTERRA in partnership with the City of Issaquah. Tree-lage field assessment conducted by American Forest Management, Inc., November 2019.

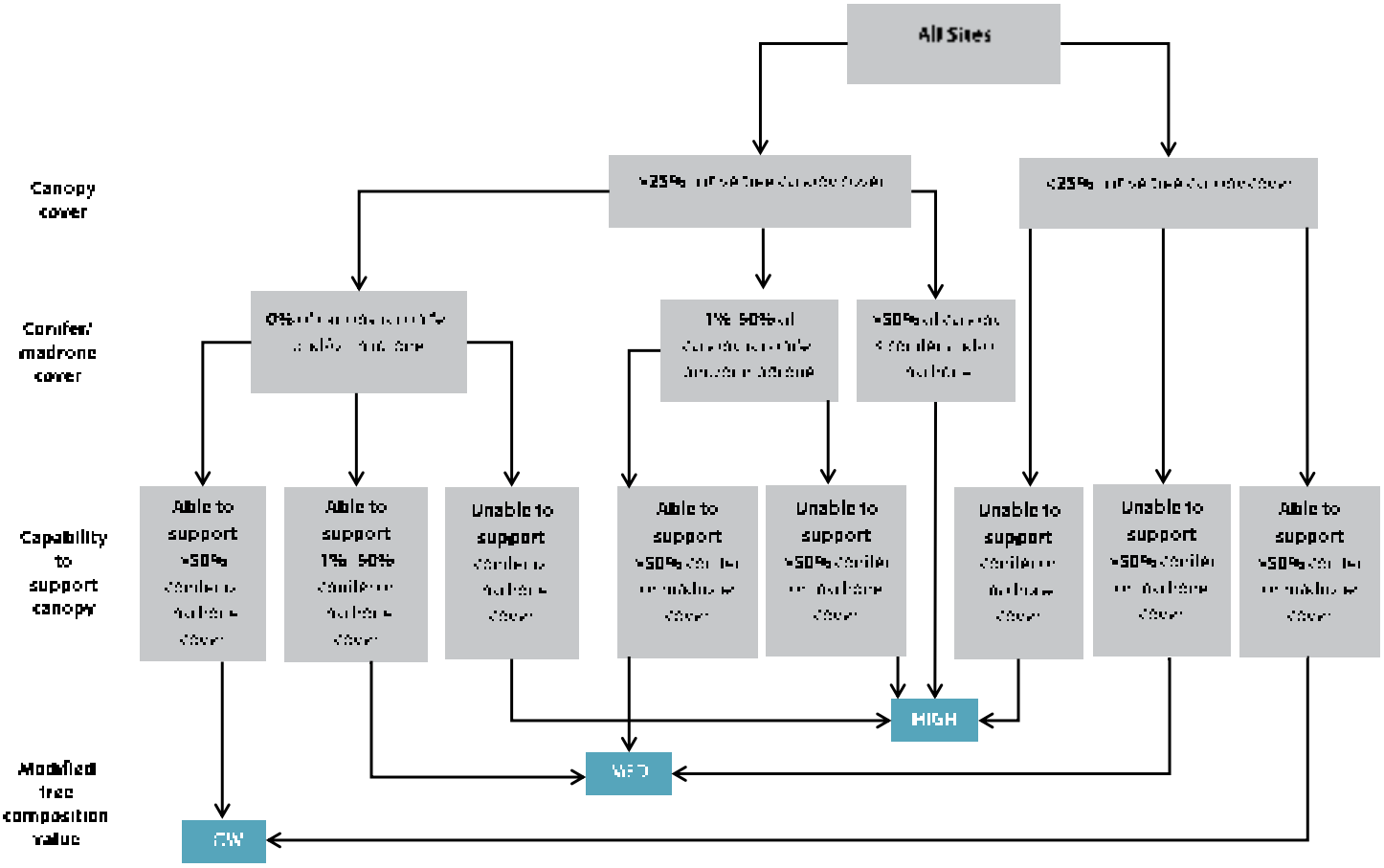
# APPENDIX B: 2020 GREEN CITIES NETWORK MAP



# APPENDIX C: FLAT-MODIFIED DATA-COLLECTION FLOWCHART

Forest Landscape Assessment Tool (FLAT)

Habitat Quality/Management Unit Composition



# APPENDIX D: LONG-TERM ACTIONS AND BENCHMARKS (2026–2040)

## FIELD

| 2026–2030 | 2031–2035 | 2036–2040 |
|---|---|---|
| Enroll new acres in initial restoration per year:<br>• 2026: 90 new acres<br>• 2027: 110 new acres<br>• 2028: 130 new acres<br>• 2029: 150 new acres<br>• 2030: 150 new acres<br><br>Conduct 5-year monitoring and BMP review | Enroll new acres in initial restoration per year:<br>• 2031: 150 new acres<br>• 2032: 125 new acres<br>• 2033: 100 new acres<br>• 2034: 85 new acres<br>• 2035: 75 new acres<br><br>Conduct 10-year monitoring and BMP review | Enroll new acres in initial restoration per year:<br>• 2036: 65 new acres<br>• 2037: 55 new acres<br>• 2038: 45 new acres<br>• 2039: 30 new acres<br>• 2040: 30 new acres<br><br>Conduct 15-year monitoring and BMP review |

- Continue maintenance and restoration on all previously enrolled acres
- Revise and update site stewardship plans as needed
- Ensure that restoration activities are equitably dispersed throughout the city

## COMMUNITY

| 2026–2030 | 2031–2035 | 2036–2040 |
|---|---|---|
| Recruit, train, and support 25 active Forest Stewards<br><br>Recruit and manage:<br>• 2026: 4,400 volunteer hours (approx. 40 events/year)<br>• 2027: 5,300 volunteer hours (approx. 50 events/year)<br>• 2028: 6,000 volunteer hours (approx. 55 events/year)<br>• 2029: 6,500 volunteer hours (approx. 60 events/year)<br>• 2030: 6,500 volunteer hours (approx. 60 events/year) | Recruit, train, and support 25 active Forest Stewards<br><br>Recruit and manage 6,500 volunteer hours annually (approx. 60 volunteer events/year):<br>• 25 small events (5–15 people)<br>• 25 medium events (15–30 people)<br>• 8 large corporate/school groups (30–80 people)<br>• 2 extra-large events (80–150 people) | Recruit, train, and support 25 active Forest Stewards<br><br>Recruit and manage:<br>• 2036: 6,500 volunteer hours<br>• 2037: 6,000 volunteer hours<br>• 2038: 6,000 volunteer hours<br>• 2039: 5,200 volunteer hours<br>• 2040: 4,100 volunteer hours<br><br>Host at least 60 volunteer events/year |

- Update branded outreach and promotional items
- Host annual Forest Steward orientation
- Host trainings for Forest Stewards and open them to the public
- Plan and host signature Partnership events each Arbor Day and Green Issaquah Day (100–150 people)
- Host annual volunteer appreciation event/activity
- Arrange local media coverage of at least 2 Partnership activities and accomplishments per year
- Evaluate community engagement for next 5 years of growth
- Secure at least 1 new corporate/local business partner (sponsorship/donations/volunteers) each year
- Advertise events and trainings (monthly e-newsletter, social media, local media, schools, businesses, HOAs, etc.)

## RESOURCES

| 2026–2030 | 2031–2035 | 2036–2040 |
|---|---|---|
| Celebrate 5-year program accomplishments<br><br>Evaluate needs, costs, and resources based on first 5 years of work | Celebrate 10-year program accomplishments<br><br>Consider a 10-year update to the forest assessment and guide based on progress and whether a significant number of new properties have been acquired and included in the program<br><br>Consider replicating or expanding the Green Issaquah Partnership model to meet additional citywide urban-forest-management goals. | Celebrate 20-year program accomplishments<br><br>Ensure proper funding base is in place for long-term maintenance, monitoring, and community engagement beyond 2040. |

- Evaluate overall program and adapt goals/metrics as needed
- Develop annual work plan and write annual report of accomplishments
- Present annual accomplishments to partners, volunteers, and city leadership
- Identify and pursue annual funding to support field, community, and administrative work as needed

# APPENDIX E: MANAGEMENT-UNIT ACRES PER TREE-IAGE CATEGORY

| Site Name | Tree-iage Category | | | | | | | | | Acres Per Site |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. Berntsen Park | | | 0.86 | | | | | | 0.41 | 1.27 |
| 2. Black Nugget Park & Open Space | | | | 1.25 | | | | | | 1.25 |
| 3. Central Park & Open Space | 21.08 | 2.50 | | 31.81 | 3.58 | 3.55 | | 2.55 | 7.50 | 72.57 |
| 4. Confluence Park | | | | 0.35 | 3.10 | 2.31 | 1.92 | | | 7.68 |
| 5. Emily Darst Park | | | | 3.39 | 8.12 | | | | | 11.51 |
| 6. Foothills at Issaquah Open Space | | 20.84 | | | 25.06 | 13.52 | | | | 59.42 |
| 7. Forest Rim Open Space | | | | 7.24 | 14.93 | 1.47 | | | | 23.64 |
| 8. Front Street South Properties | | | | | | 0.70 | | | | 0.70 |
| 9. Grand View Park | | | | 2.56 | | | | | | 2.56 |
| 10. Harvey Manning Park & Open Space | 26.02 | | | 14.33 | | | | | | 40.35 |
| 11. Hillside Park | 20.85 | | | | 8.78 | | | | | 29.63 |
| 12. Ingi Johnson Park | | | | | | 6.03 | | | | 6.03 |
| 13. Issaquah Creek Natural Area | | | | 2.05 | 17.16 | 1.72 | | 0.20 | | 21.13 |
| 14. Issaquah Highlands NGPA | 12.43 | 6.58 | | 57.88 | 10.64 | | | 1.02 | 12.87 | 101.42 |
| 15. Lewis Creek Natural Area | | | | 7.55 | | | | | | 7.55 |
| 16. McCarry Woods | 40.22 | | | | | | | | | 40.22 |
| 17. Mine Hill Park | | | | | | 3.04 | | | | 3.04 |
| 18. Park Hill Open Space | 9.57 | | | 3.25 | 0.45 | | | | | 13.27 |
| 19. Park Pointe | 38.77 | 7.00 | | 39.67 | | 14.25 | | 3.12 | | 102.81 |
| 20. Pickering Farm | | | | | 2.40 | | | | | 2.40 |
| 21. Pickering Reach (City) | | | | 1.68 | | | | | | 1.68 |
| 22. Pickering Reach NGPE (HOA) | 4.97 | | | 2.57 | 3.06 | | | | | 10.60 |
| 23. Rainier Trail | | | | | | 5.89 | | | | 5.89 |
| 24. Salmon Run Nature Park | | | | | 0.27 | | | | | 0.27 |
| 25. Sammamish Cove Park | | | | 1.94 | 16.29 | 1.69 | | | | 19.92 |
| 26. Sammamish Overlook | 26.05 | | | 18.17 | | | | | 1.84 | 46.06 |
| 27. South Issaquah Creek Greenway | | | | | 1.83 | 8.94 | | 4.16 | 1.22 | 16.15 |
| 28. Squak Mountain Natural Area | 7.89 | 6.01 | | | | 0.74 | | | 0.52 | 15.16 |
| 29. Squak Valley Park | | | | | | | | | 8.94 | 8.94 |
| 30. Squak Valley Park - North | | 1.41 | 0.62 | | 12.28 | 1.42 | | | | 15.73 |
| 31. Sunset Trailhead/West Tiger Expansion | | 1.45 | | | | | | | 1.24 | 2.69 |
| 32. Talus NGPA | 48.41 | | | 328.70 | | | | 2.25 | 7.30 | 386.66 |
| 33. The Woods NGPA | 0.58 | | | 10.01 | | 0.77 | | | | 11.36 |
| 34. Tibbetts Creek Natural Area | | | | 0.87 | | | | | | 0.87 |
| 35. Tibbetts Valley Park | | | | 0.44 | 6.05 | 4.35 | | | | 10.84 |
| 36. Timberlake Park | 10.92 | 13.11 | | | | | | | | 24.03 |
| 37. Tradition Plateau NRCA | 243.22 | | | 122.80 | 9.22 | | | | 30.58 | 405.82 |
| 38. West Issaquah Highlands Open Space | 9.60 | | | | | | | | | 9.60 |
| **TOTAL ACRES** | **520.58** | **58.90** | **1.47** | **658.50** | **143.21** | **70.38** | **1.92** | **13.30** | **72.42** | **1,540.72** |

# APPENDIX F: OVERSTORY SPECIES DOMINANCE BY MU ACRES

| Scientific Name | Common Name | Tree Type | Primary | Secondary | Tertiary |
|---|---|---|---|---|---|
| *Pseudotsuga menziesii* | Douglas-fir | Coniferous/evergreen | 726.92 | 300.97 | 83.53 |
| *Acer macrophyllum* | Bigleaf maple | Deciduous | 333.33 | 396.22 | 480.40 |
| *Populus balsamifera* | Black cottonwood | Deciduous | 208.44 | 256.69 | 67.95 |
| *Alnus rubra* | Red alder | Deciduous | 122.9 | 202.82 | 90.13 |
| *Thuja plicata* | Western red cedar | Coniferous/evergreen | 68.41 | 281.85 | 455.22 |
| *Tsuga heterophylla* | Western hemlock | Coniferous/evergreen | 38.47 | 20.63 | 182.83 |
| *Fraxinus latifolia* | Oregon ash | Deciduous | 5.05 | 0.44 | 1.94 |
| *Prunus emarginata* | Bitter cherry | Deciduous | 4.14 | 7.37 | 13.73 |
| *Salix lucida* | Pacific willow | Deciduous | 3.62 | | 5.44 |
| *Pinus contorta* | Lodgepole/shore pine | Coniferous/evergreen | 2.56 | | 1.09 |
| *Salix hookeriana* | Hooker's willow | Deciduous | | 8.58 | 2.46 |
| *Rhamnus purshiana* | Cascara | Deciduous | | 8.13 | |
| *Arbutus menziesii* | Pacific madrone | Coniferous/evergreen | | | 38.77 |
| *Betula papyrifera* | Paper birch | Deciduous | | | 0.86 |
| | Ornamental | NA | | | 0.44 |
| | None | NA | 26.82 | 56.98 | 115.59 |
| | | **Total Deciduous** | 677.48 | 880.25 | 662.91 |
| | | **Total Coniferous/Evergreen** | 836.36 | 603.45 | 761.44 |
| | | **Ornamental** | 0 | 0 | 0.44 |
| | | **None** | 26.82 | 56.98 | 115.59 |

*Forest assessment data collected in September to October 2019*

# APPENDIX G: UNDERSTORY SPECIES DOMINANCE BY MU ACRES

| Scientific Name | Common Name | Primary | Secondary | Tertiary |
|---|---|---|---|---|
| *Rubus spectabilis* | Salmonberry | 520 | 261 | 315 |
| *Polystichum munitum* | Sword fern | 485 | 407 | 337 |
| *Gaultheria shallon* | Salal | 208 | 13 | 11 |
| | Native grasses (various) | 69 | 21 | 15 |
| *Acer circinatum* | Vine maple | 65 | 69 | 147 |
| *Oplopanax horridus* | Devil's club | 55 | | |
| *Oemleria cerasiformis* | Indian plum | 36 | 314 | 127 |
| *Symphoricarpos albus* | Snowberry | 33 | 35 | 31 |
| *Corylus cornuta* | Beaked hazelnut | 15 | 28 | 37 |
| *Mahonia aquifolium* | Tall Oregon grape | 15 | 4 | 12 |
| *Typha latifolia* | Cattail | 10 | | |
| *Cornus sericea* | Red osier dogwood | 8 | 5 | 6 |
| *Rubus parviflorus* | Thimbleberry | 7 | | 3 |
| *Spiraea douglasii* | Spirea | 4 | | |
| *Holodiscus discolor* | Oceanspray | 4 | | 2 |
| *Equisetum arvense* | Horsetail | 4 | 5 | 1 |
| *Rubus ursinus* | Trailing blackberry | 2 | 95 | 212 |
| *Sambucus racemosa* | Red elderberry | 1 | 22 | 5 |
| *Mahonia nervosa* | Dull Oregon grape | | 133 | 156 |
| *Pteridium aquilinum* | Bracken fern | | 96 | 72 |
| *Amelanchier alnifolia* | Serviceberry | | 15 | |
| *Ribes sanguineum* | Red flowering currant | | 1 | 2 |
| *Rosa pisocarpa* | Swamp rose | | 1 | |
| *Urtica dioica* | Stinging nettle | | | |
| *Epilobium augustifolium* | Fireweed | | | 7 |
| *Rosa nutkana* | Nootka rose | | | 2 |
| No native plant understory found | | | 15 | 40 |

*Forest assessment data collected in September to October 2019*

# APPENDIX H: INVASIVE SPECIES DOMINANCE BY MU ACRES

| Scientific Name | Common Name | King County Noxious Weed Status | Primary | Secondary | Tertiary |
|---|---|---|---|---|---|
| *Rubus armeniacus* | Himalayan blackberry | Class C, nonregulated* | 793.26 | 228.59 | 0.49 |
| *Ilex aquifolium* | English holly | Weed of concern** | 226.54 | 126.33 | 254.89 |
| *Geranium robertianum* | Herb Robert | Class B, nonregulated | 133.86 | 408.73 | 103.01 |
| *Ranunculus repens* | Creeping buttercup | Weed of concern | 116.12 | 30.75 | 103.73 |
| *Phalaris arundinacea* | Reed canary grass | Class C, nonregulated | 42.34 | 183.02 | 84.73 |
| *Sorbus aucuparia* | European mountain ash | Weed of concern | 31.96 | | |
| *Polygonum x bohemicum* | Bohemian knotweed | Class B, nonregulated | 23.04 | 10.45 | 6.42 |
| *Cytisus scoparius* | Scotch broom | Class B, nonregulated | 18.76 | 13.40 | 15.76 |
| *Hedera helix* | English ivy | Class C, nonregulated | 9.98 | 82.76 | 37.11 |
| *Rubus laciniatus* | Evergreen blackberry | Class C, nonregulated | | 28.78 | 15.05 |
| *Calystegia sepium* | Bindweed/morning glory | Weed of concern | | 11.96 | 9.22 |
| *Buddleia davidii* | Butterfly bush | Class B, nonregulated | | 9.35 | 10.01 |
| *Cirsium arvense* | Canada thistle | Class C, nonregulated | | 5.36 | 19.04 |
| *Cirsium vulgare* | Bull thistle | Class C, nonregulated | | 1.43 | |
| *Prunus laurocerasus* | English/cherry laurel | Weed of concern | | | 48.43 |
| *Robinia pseudoacacia* | Black locust | Weed of concern | | | 0.31 |
| *Crataegus monogyna* | English hawthorn | Weed of concern | | | 10.89 |
| No invasive plants found | | | 144.83 | 399.78 | 822.21 |

*Forest assessment data collected in September to October 2019*

***Class B and C, nonregulated:** Not designated for mandatory control, but encouraged due to negative impacts on people and the environment.*

****Weed of concern:** Control is recommended where possible, and new plantings are discouraged.*

# APPENDIX I. GREEN CITIES TOOLBOX INFORMATION

The Green Cities Toolbox[7] provides a wealth of information for Green Cities and Forest Stewards. Find in-depth information on these topics:

**Restoration, planning, and implementation.** Tools and expertise to plan and implement restoration at the park or site level. Includes step-by-step guides for site planning and best management practices for invasive plant removal, native plant installation, mulching, and maintenance.

**Native plants.** Native plant identification and propagation resources such as image libraries, keys, databases, and how-to guides.

**Invasive species.** Resources on the identification and management of aggressive non-native plants and insects.

**Restoration monitoring.** Protocols and instructions for implementing short- and long-term monitoring of restoration sites.

**Community engagement and volunteer management.** Best practices for engaging youth, families, and diverse communities in stewardship activities, as well as tips for recruiting, managing, and retaining volunteers and running successful community restoration events.

**Site safety.** Information on Crime Prevention Through Environmental Design (CPTED) and other safety issues to consider in community-based stewardship.

**City-specific volunteer resources.** Reporting forms, maps, and other documents specific to your Green City.

7 Available at forterra.org/service/green-cities-toolbox.

# APPENDIX J. COMMON PLANTS REFERENCED IN THIS GUIDE

| INVASIVE PLANTS | | NATIVE PLANTS | |
|---|---|---|---|
|  | **Himalayan blackberry**<br>*Rubus armeniacus* |  | **Douglas-fir**<br>*Pseudotsuga menziesii* |
|  | **English holly**<br>*Ilex aquifolium* |  | **Red alder**<br>*Alnus rubra* |
|  | **Reed canary grass**<br>*Phalaris arundinacea* |  | **Bigleaf maple**<br>*Acer macrophyllum* |
|  | **English ivy**<br>*Hedera helix* |  | **Black cottonwood**<br>*Populus balsamifera* |
|  | **Bindweed**<br>*Convolvulus arvensis* |  | **Western red cedar**<br>*Thuja plicata* |

# APPENDIX K: MANAGEMENT STRATEGIES FOR INVASIVE PLANTS

The species below are some of the more common invasive plants in the Puget Sound area. For the methods of removal described below, "small infestations" refers to an area from which you can effectively and reasonably remove all necessary plant material (usually all above- and belowground plant parts).[8]

## Woody Invasive Trees and Shrubs

Do not cut down or pull out a woody invasive tree or shrub unless you also remove all of its roots. If roots are left behind, they will send up suckers that will grow into many more trees, greatly multiplying the problem. Small, young trees and shrubs less than 1 inch in diameter may be successfully pulled out using a handheld tool called a Pullerbear™.

For any trees and shrubs more than 1 inch in diameter, we recommended using a licensed applicator to apply an appropriate herbicide injection. The lower branches may be removed to provide access to the ground around the tree. Do not leave freshly cut or pulled holly stems or branches in direct contact with the soil, as the cuttings can easily reroot — make sure they are left out to dry on top of an on-site compost pile. Place invasive branches and stems on their own compost piles, separate from cut and pulled blackberry and ivy, as they decompose at different rates.

At right is a list of target woody invasive trees and shrubs, some of which were not detected in the forest assessment, but should be controlled if found.

**Woody Invasive Trees and Shrubs**

| Botanical Name | Common Name |
|---|---|
| *Acer platanoides* | Norway maple |
| *Acer pseudoplatanus* | Sycamore maple |
| *Aesculus hippocastanum* | Horse chestnut |
| *Buddleia davidii* | Butterfly bush |
| *Cotoneaster* spp. | Cotoneaster |
| *Crataegus monogyna* | English hawthorn |
| *Ilex aquifolium* | English holly |
| *Populus alba* | Silver poplar |
| *Populus nigra* | Black/Lombardy poplar |
| *Prunus avium* | Wild cherry |
| *Prunus cerasifera* | Thundercloud plum |
| *Prunus domestica* | European plum |
| *Prunus laurocerasus* | English/cherry laurel |
| *Prunus lusitanica* | Portuguese laurel |
| *Prunus spinosa* | Blackthorn |
| *Pyracantha* spp. | Firethorn |
| *Robinia pseudoacacia* | Black locust |
| *Sorbus aucuparia* | European mountain ash |
| *Tamarix ramosissima* | Salt cedar |
| *Ulex europaeus* | Gorse |
| *Ulmus parvifolia* | Chinese elm |
| *Ulmus procera* | English elm |
| *Ulmus pumila* | Siberian elm |

8 For more information on invasive plant identification and removal and disposal methods, visit the King County Noxious Weeds website, kingcounty.gov/services/environment/animals-and-plants/noxious-weeds.aspx, or go to kingcounty.gov and search on "noxious weeds."

## Invasive Vines and Non-Woody Plants

### Bittersweet Nightshade (*Solanum dulcamara*)

Hand-pull the stem close to the ground and pull or dig up the slender roots, taking care not to break them. This method is most effective with young plants and small infestations. Manual control works best after rain or in loose soils. Recommended tools include shovels, spades, and hand tillers to loosen soil. When substantial manual removal is used in wet areas, take care to prevent soil erosion. Wear gloves when handling bittersweet nightshade, as it can be toxic to people, pets, and livestock.

Fruiting plants and root balls should be collected and disposed of in the garbage; composting root balls is not recommended. Stems can be left on-site to dry out and decompose if they are in a dry area where they will not move into waterways or onto moist soil.

### English Ivy (*Hedera helix*) and Clematis/Traveler's Joy (*Clematis vitalba*)

Create "lifesavers" or "survival rings" to preserve existing trees and reduce the source of invasive seeds: cut ivy or clematis vines at shoulder height, cut them again at the base of the tree, then remove the cut vines from the tree, from shoulder to base. Grub out the roots in a radius at least 5 feet away from the tree. Do not attempt to pull vines above shoulder height out of the tree; they will die and decompose on their own — pulling them down from high branches can possibly damage the tree.

#### *Quick Tips for Removing Ivy and Clematis*

***"Lifesaver" tree ring:*** *Cut ivy at shoulder height and again at the tree base. Do not attempt to pull vines out of the tree. Roll ivy back away from the tree and into a log shape. Clear at least 5 feet back from each tree trunk.*

***Ivy bundle:*** *For small clumps of ivy, pull all vines out, wrap into a tight bundle, and dispose on a compost pile or hang on a branch where it will not come into contact with the ground.*

***Ivy log:*** *For large contiguous swaths of ivy, clip edges of 5- to 10-foot-wide sections, roll vines into a log, clip root connections at the end of the roll, and place the log on top of the compost pile to decompose.*

Remove dense ground patches of ivy and clematis by clipping the edges of the swaths, then continue clipping, digging, and rolling the tangled mat up into a log. The rolling method works better for ivy because it grows along the ground, and the vines and roots are more flexible. Clematis can grow up trees, down trees, and back up trees again, which requires following all the vines to make sure the plant is not in contact with the ground. Take care to cut around or gently lift ivy/clematis mats over existing native plants. If the ivy or clematis vines grow into thick, woody stems that are too large to dig out, Forest Stewards can request herbicide treatment through their program support staff. Ivy and clematis can be composted on-site.

### Garlic Mustard (*Alliaria petiolata*)

IMPORTANT: Garlic mustard is designated as a regulated noxious weed in King County. Please report all locations of garlic mustard that you identify to the City of Issaquah, or report them online at kingcounty.gov/weeds, selecting "Report a weed" from the dropdown menu — even if you have already removed the mustard.

Hand-pulling individual garlic mustard plants is effective if the entire root is removed. Flowering or seeding plants must be put in a bag and discarded in the garbage. Carefully and thoroughly clean off boots, clothes, and tools before leaving the area to avoid carrying the tiny seeds to new sites. Larger populations of garlic mustard will have to be managed by professional crews.

### Hedge Bindweed/Morning Glory (*Calystegia sepium*)

Hand-pull at least three times per year (early growing season, midsummer, and late summer) for at least three years. If keeping up with all the bindweed takes more time than you have available, you may need to prioritize clearing it from native plants first, or at minimum, clipping it away at their base as they are trying to establish. Covering bindweed with sheet mulch is also effective: mulch can help weaken the bindweed, slow regrowth, and make pulling more effective. Unless it is blooming, bindweed can be composted on-site. Shade is the best way to control it: plant conifers and other native plants for long-term bindweed suppression.

### Herb Robert, aka Stinky Bob (*Geranium robertianum*)

Hand-pulling individual plants is effective if the entire root is removed. Try to remove plants before the seeds form to prevent them from spreading further. Flowering or seeding plants must be put in a bag and discarded in the garbage. If Herb Robert is growing by itself, then sheet mulching can be an effective way to smother seeds and root fragments that are left behind. Carefully and thoroughly clean off boots, clothes, and tools before leaving the area to avoid carrying the tiny seeds to new sites.

### Himalayan Blackberry (*Rubus armeniacus* syn. *Rubus discolor*)

Blackberries have a large root mass in the first 6 to 18 inches of soil, and often have smaller roots that spread from the main root mass. All roots should be dug up as completely as possible. Blackberry canes and roots can be composted on-site.

Many species of birds nest in blackberry thickets. Before initiating blackberry removal during the early and primary nesting season (February to the end of July), make sure to watch for nesting activities. Phase removal over time, if possible, to minimize habitat loss.

### Knotweed (*Polygonum cuspidatum* and other species)

Application of foliar herbicide is the most effective way to eradicate knotweed. It must be performed by professional crews during dry periods from July to September.

Residents are highly discouraged from removing knotweed patches, as disturbance promotes growth and dispersal. Hand-removal of knotweed is impractical and could actually exacerbate the problem.

Any knotweed fragments should be disposed of in the garbage. Do not compost this plant on-site.

### Poison Hemlock (*Conium maculatum*)

IMPORTANT: Poison hemlock is designated as a regulated noxious weed in King County. Please report all locations of poison hemlock that you identify to the City of Issaquah, or report them online at kingcounty.gov/weeds, selecting "Report a weed" from the dropdown menu — even if you have already removed the hemlock.

If you are attempting to manually control poison hemlock, please note that all parts of this plant are toxic. You must wear gloves and long sleeves, and wash hands thoroughly after handling plants. Pull or dig up the entire plant, including the root. All parts of the plant should be disposed of in the garbage. Adding a layer of mulch to the area after it has been cleared will reduce germination of any seeds still present in the soil.

Removal of this plant is not appropriate for a volunteer event. Forest Stewards may request professional crew support to remove poison hemlock.

### Reed Canary Grass (*Phalaris arundinacea*)

Manual removal of reed canary grass is impractical except for the smallest of patches (1 to 4 square feet). Hand-dig when the ground is soft, making sure to remove all roots and rhizomes because any left in the soil will resprout. Roots and rhizomes can be composted on-site away from wet areas, so long as they are not in contact with the soil. Monitor the site for regrowth.

For areas where reed canary grass is dominant, one long-term control strategy is to shade it out. Shade won't eradicate the species, but it will control it and allow for a more structurally and genetically diverse site. Install sheet mulch with several layers of cardboard or burlap and 6 inches of wood-chip mulch. Do not install sheet mulch in areas where standing water is 6 inches or more in depth at any point in the year. Leave sheet mulch in place for at least one growing season. Monitor the edges of the mulch site for shoots coming up from lateral growth of rhizomes. Efficacy can be increased by removing aboveground plant material at, or just after, flowering; conduct this removal with hand tools, and time it prior to laying down the sheet mulch. Any removed aboveground plant material that hasn't gone to seed can be left on-site.

After at least one growing season, the area should be planted with native species. Plant layout should be dense over the entire site, or in a clump-gap or row pattern. Fast-growing species adapted to wet areas — such as black cottonwood, red alder, and several types of willow — should be installed initially. Once they become established, shade-tolerant species — such as western red cedar; thicket-forming species like red osier dogwood, snowberry, and Nootka rose; and fast-growing conifers such as Douglas and grand fir (placed along southerly and westerly edges) — should be secondarily planted.

### Scotch Broom (*Cytisus scoparius*)

Hand-pull or use a Pullerbear™ tool to extract smaller plants when the soil is moist in spring. Note that disturbing the soil may cause seeds to germinate, so the area should be monitored to control any new seedlings.

Cutting can be effective on older Scotch broom plants that have a stem diameter of 2 inches or more. Cut plants as close to the ground as possible in late summer to early fall, and monitor for new growth. Scotch broom can be composted on-site.

### Tansy Ragwort (*Jacobaea vulgaris*)

IMPORTANT: Tansy ragwort (pictured on page 95) is designated as a regulated noxious weed in King County. Please report all locations of tansy ragwort that you identify to the City of Issaquah or report them online at kingcounty.gov/weeds, selecting "Report a weed" from the dropdown menu — even if you have already removed the tansy. Note that tansy ragwort is often confused with an even more widespread nonregulated weed called common tansy (*Tanacetum vulgare*). Tansy ragwort flowers have outer petals, while common tansy just has button-like flowers with no outer petals.

The best management practices for removing tansy are a combination of control efforts. For small infestations, manual removal will be effective. Pull the plants after they bolt, but before they flower (typically in May through June) to prevent

seed spreading and when the soil is wet, such as after a rain, to ensure that all roots are fully removed. Tansy ragwort is toxic to humans and animals, so gloves and protective gear should be worn. Mowing is not effective on its own and should only be done to cut down tansy before it flowers for a second time in a season after being treated through some other method.

For larger infestations, selective herbicides (applied by professional crews) may be used following federal and state laws. Spray plants in the spring before they flower, and in the fall after seed germination. Biological control may be used in larger infestations as well, in conjunction with another nonchemical method. While effective at controlling tansy populations in the long run, biological controls may take up to six years to establish and show a significant impact. This method should not be used for smaller infestations or at sites where herbicide is also being used.

### Yellow Archangel (*Lamiastrum galeobdolon*)

Manual removal of yellow archangel is generally not effective: plants grow densely, sprout from root or stem fragments, grow easily among desirable vegetation, and are labor intensive to hand-pull. However, for very small populations (less than 10 square feet), try continuous hand-pulling and revisit the site monthly. Sift through the soil to ensure removal of all root and stem fragments; this is easiest in fall through early spring. All plant debris should be disposed of in the garbage.

Dense infestations may be controlled by sheet mulching. It is crucial to control any escaping plants, so regularly check for holes in the covering material. Stem fragments and roots can resprout if left in contact with wet ground.

### Yellow Flag Iris (*Iris pseudacorus*)

Manual removal can be effective for small infestations, especially for young plants that are not yet established. Manual removal of larger plants is difficult and may require sturdier tools or saws to remove the entire rhizome. Monitor the location after you have removed the plants — new leaves will show you where you missed any sections of rhizome. Precautions should be taken to protect your skin, as resins in the leaves and rhizomes can cause irritation. Dispose of all plant parts in the garbage. In most cases, controlling this species will require multiple methods over several years, potentially including cutting and herbicide treatment by professional crews.

PHOTO BY KING COUNTY NOXIOUS WEED CONTROL PROGRAM

# APPENDIX L: COMMUNITY FEEDBACK

**Summary of Responses to the Green Issaquah Partnership Community Survey**

We collected the following information from community members to help shape a successful program that meets community needs. The survey was distributed at a volunteer event and also posted online from November 8, 2019, to December 11, 2019.

Attendees: 75. Responses: 53.

QUESTION 1

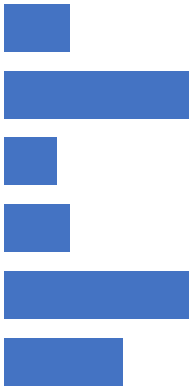
| **Which parks and open spaces do you most frequently visit? Select all that apply.** | % | Count |
|---|---|---|
| Timberlake Park | 2.0% | 1 |
| Pickering Barn and Trail | 26.0% | 13 |
| Squak Valley Park | 26.0% | 13 |
| Tradition Plateau | 42.0% | 21 |
| Confluence Park | 52.0% | 26 |
| Central Park & Open Space | 28.0% | 14 |
| Park Pointe | 32.0% | 16 |
| Rainier Trail | 36.0% | 18 |
| Other | 36.0% | 18 |

QUESTION 2

| **What factors do you think threaten our urban forests? Select all that apply.** | % | Count |
|---|---|---|
| Drought | 52.0% | 26 |
| Insect and disease outbreak | 64.0% | 32 |
| Spread of invasive species | 78.0% | 39 |
| Forest fragmentation & development | 88.0% | 44 |
| Climate change | 82.0% | 41 |
| Other | 22.0% | 11 |

QUESTION 3

| **What is the most important environmental and community health issue to you?** | % | Count |
|---|---|---|
| Air pollution | 9.8% | 5 |
| Water quality | 27.5% | 14 |
| Safe places for leisure | 7.8% | 4 |
| Fitness, nutrition and mental health | 9.8% | 5 |
| Wildlife protection | 27.5% | 14 |
| Other | 17.6% | 9 |



QUESTION 4

**When considering a 20-Year Guide to remove invasive plants and restore forested parklands, what kind of information would be important for residents and city staff to know?**

Answered: 40. Skipped: 13.

**Responses**

- *What are the biggest problems? What would be done to address them? How will this be paid for? How can non-profits be involved?*
- *That those spaces require constant upkeep. It's never ending. A healthy environment will support birds, and they will deposit seeds everywhere.*
- *Participation of all able bodies for a few hours a year would help immensely. In particular, as service hours for high school students.*
- *Education in invasive plants and how they can be successfully removed...preferably without chemicals. What is invasive?*
- *Where, when and how invasives are removed is important, as is the follow up to ensure that the removal was not a wasted effort. Shade, shade, shade!*
- *Where holly, ivy, and the few other invasives are which do not disappear (like blackberries) as canopies mature.*
- *Educate or provide incentives for individual land owners to remove invasive. Find incentives to reduce availability of invasive plants at local nurseries and greenhouses.*
- *Need to consider climate change issues in selection of plant materials and location of plantings.*
- *Creating signage so folks understand why a clearing is happening and talking about the benefits of future forests. Focusing on areas important for salmon and wildlife.*
- *Budget and milestones.*
- *Educate the community about invasive plants and their adverse impact on natural resources. It's especially important for landowners that are adjacent to open space.*
- *Engage with seniors who have lived in the area for a long time and view historical information, maps and photos to understand the landscape that existed prior to the recent growth and development that has occurred over the past 25 to 50 years and what has changed during that time.*
- *What is being removed and why and the benefits the removal will provide for the park lands. I think many people are in the dark about what is invasive and what happens if we don't do anything about it; so general education about the importance of the projects.*
- *What can we do as individuals*
- *How each piece of land affects the bigger picture - quality of drinking water, recreational uses, fish, etc.? Same for wildlife habitat. Health impacts, mental and physical, of interacting with natural areas. Especially when up against competing interests, like soccer fields. Everything affects everything.*
- *The source of the invasive plants and their impact/interplay with indigenous species and practical actions to both stop the invasion and remedy the damage done. If fundamental causes*

*(e.g. climate change) are at the heart of the incursion and this essentially w/o remedy, then how select species that can cohabit with the invasive plants.*

- *The causes and remedies (if they exist) of the degradation of forest park lands. Above comment applies*
- *What invasive species you are targeting.*
- *Volunteer coordinator; collaboration with schools; collaboration with other nonprofit*
- *Needs of wildlife displaced by development*
- *Clearly identify such areas and let citizens know what assistance we can provide.*
- *How commonly used chemicals and individual actions affect natural habitats.*
- *How to identity and remove invasive speciews from our own yards. And how to prevent the spread of invasive species.*
- *Cost estimate, milestones , budget source, management/who is overseeing*
- *How to identify and properly remove invasive plants*
- *Top priorities for residential behavior*
- *Slope stability, habitat impacts*
- *How forests (nature systems) support long term health & wellbeing; ecosystem resilience and adaptability in face of climate change; diversity - all of which in turn will support economic viability (if have to make that case too)*
- *Species that are most appropriate across a variety of future climate regimes.*
- *Where the invasive plants are located. Once the area is restored, need a plan to maintain the area restored so the effort isn't wasted.*
- *All residents (including unincorporated Issaquah addresses) should get an easy to read color flyer with PICTURES of the worst offenders/invasives, and WHY these plants are harming the ecosystem. They should be told HOW to eradicate/remove/control those species on their property, with references to any laws and regs. that may REQUIRE such control. I feel these rules/laws should be strengthened and enforced. People WILL help when they know the reason they are asked for their help, and if they know it's the law.*
- *I'm not at all plant savvy so more info in general!*
- *How they can get involved in public spaces and what they can do on their own private property to address the issues of invasive plants and forest/watershed health.*
- *Identity of the invasives (everyone knows Himalaya Blackberry, but others?);*
- *Proper removal techniques (NOT Roundup!);*
- *Emphasize it is our small part to slow climate change*
- *Funding sources for larger plots/projects*
- *Information on what invasive are, how to curb invasive plants, and how to rid them.*
- *What plants will grow and be successful in our changing climate.*
- *Why it's important and small steps they can take to help*
- *Know what and where invasive species are; what are best scientific methods to restore forests, which species will do best in future conditions.*
- *Educate the community about invasive plants and their adverse impact on natural resources. It's especially important for landowners that are adjacent to open space.*
- *The City should have a staff person dedicated to urban forest.*
- *How they can help.*
- *Have all lands owned by the city surveyed or somehow have accurate biological data on them and know how to manage them for long term health, 200 plus years.*
- *What areas can be left alone and are just fine and what recommended work needs to be done to keep them all healthy.*
- *Design a plan to get the work done and involve the residents in lots of possible volunteer work.*

QUESTION 5

| **Are you interested in volunteering to restore forests with the Green Issaquah Partnership?** | | % | Count |
|---|---|---|---|
| Yes |  | 77.6% | 38 |
| No |  | 22.4% | 11 |

QUESTION 6

| **If Yes, how often do you think you would be able to volunteer?** | | % | Count |
|---|---|---|---|
| Forest Steward (ongoing commitment — includes training and support) |  | 15.8% | 6 |
| Once/month |  | 18.4% | 7 |
| 3-4 times/year |  | 34.2% | 13 |
| 2 times/year |  | 26.3% | 10 |
| Once/year |  | 5.3% | 2 |

QUESTION 7

| **Why would you like to participate in a forest restoration volunteer event? Select all that apply.** | | % | Count |
|---|---|---|---|
| Service learning hours |  | 5.0% | 2 |
| Educational opportunity for children |  | 20.0% | 8 |
| Personal enrichment and responsibility |  | 67.5% | 27 |
| To give back to my community |  | 75.0% | 30 |
| To improve my parks and natural resources |  | 85.0% | 34 |
| To teach about the importance of restoration |  | 37.5% | 15 |
| Outdoor exercise |  | 47.5% | 19 |
| Photography |  | 2.5% | 1 |
| Other |  | 17.5% | 7 |

QUESTION 8

**What would make volunteering easier or more appealing and accessible for you?**

Answered: 36. Skipped: 17.

**Responses**

- *Provide options for individual work projects/times.*
- *My wife and children already volunteer with the Mountain to Sounds Greenway Trust some 20 hours each per year during tree planting season.*
- *Before and after pictures. Photo album on website. Follow up information on sites.*
- *Great snacks.*
- *Ability to work sites independently in own neighborhood on own timeline.*
- *Getting into less accessible areas, off-trail and away from habitations, where invasives are hiding.*
- *Regular drop in opportunities. Short duration opportunities so you don't have to commit to 8 hours in the rain.*
- *The city needs a volunteer coordinator or at least on website have a volunteer section that would direct people towards volunteer opportunities both by the city and with groups that the city supports such as the Food Bank and several environmental groups such as Mountains to Sound, Issaquah Alps and Friends of Lake Sammamish State Park.*
- *Evenings, weekends, opportunities to bring young kids along.*
- *It is extremely appealing and accessible already, I just have a busy schedule and a big family, as my children get older it would be easier for me to give more time.*
- *I have physical limitations and need to be involved more with planning and administration rather than physical labor.*
- *Opportunities in a less physical type of role such as a volunteer or guide/consultant due to age and physical limitations for age 65+.*
- *If there was some more diversity in the event times and dates; for example, a lot of the events I've gone to are solely on Saturdays. It would be nice to sprinkle in some Sunday options as Saturday can be booked out for me so then I don't even get to participate in as many as I'd like.*
- *Clear notifications, descriptions, instructions, level of strenuousness*
- *I cannot do manual labor, but I would like to contribute in other ways. Planning, organizing, promoting. I don't know what's involved with Forest steward, but it sounds appealing, esp. if it's in my neighborhood. (Talus)*
- *Volunteer coordinator to work with groups*
- *A sign up volunteer website and being notified at least two weeks in advance of when help is needed*
- *Ability to work around family commitments.*
- *Emails about training and event; weekend events*
- *Notification of events and projects, opportunities for involvement with children.*
- *A healthier me.*
- *Retirement*
- *Carpools*
- *I live in North Seattle - I volunteer in my local parks.*
- *Evening and weekend / alternate and flexible scheduling options for working adults.*
- *Every summer I have been removing the noxious weed tansy ragwort from the Issaquah area. I could use help finding tansy infestations and removing them.*
- *I am a senior who is handicapped, with a handicapped husband (and grandchildren) who require much of my time. Fortunately in the past I've been able to do a lot of volunteer restoration work, wildlife surveys, and such, over my many years. I regret to say that I cannot commit to anything at this time.*
- *It should be well planned and structured. Ideally offered several times per week or month!*
- *Adopt an area type programs so you can volunteer or coordinate work on a more flexible schedule*
- *Detailed descriptions of tasks from strenuous to light - to feel confident in my ability depending on conditioning and arthritis at the time.*
- *Brief, brief success stories, featuring individuals and teams*
- *Calendar of events on-line*
- *Clear work statement and plenty of shift times to select from.*
- *Being able to do something meaningful and be aware with plenty of notice to get it on my calendar*
- *Lots of events and opportunities so I can find something that works with my schedule.*
- *Equipment is available; prior notice with calendar of events; volunteer work isn't overly strenuous.*
- *I have physical limitations and need to be involved more with planning and administration rather than physical labor.*
- *Weekends.*
- *Have lots of work parties set up so people can pick and choose ones that fit their schedule*

QUESTION 9

**If you are an Issaquah resident, what is the most effective way to reach out to people in your neighborhood? (Please specify which neighborhood in your answer.)**

Answered: 32. Skipped: 21.

**Responses**

- *I live in the Grand Ridge Community near exit 20, outside Issaquah city limits but still with Issaquah addresses and schools. We have a community blog that can post any items of interest. We are under siege at Exit 20 by constant illegal activity: dumping of trash and vehicles, illegal squatting by Tent City 4, RV's, vans, and others; mail theft, trespassing, break ins, and more. Homelessness, and the problems they cause are a big problem.*
- *Physical signs.*
- *Issaquah as neighborhood. 1) Issaquah Alps Trails Club website 2) Announcements on nextdoor.com 3) Putting up signs at trailheads, including casual neighborhood trailheads*
- *Arrington Condos. Post flyer in mail room.*
- *I live in Old Town. Nextdoor is likely the best source right now and that is not great. I wish the city would include some city news in their water bills which are mailed six times a year and reach more homes than any other known communication source.*
- *Woods/Inneswood*
- *HOA emails and door to door*
- *I'm not an Issaquah resident. But the best way would be my email.*
- *e-mail*
- *Ridgewood Estates"*
- *Next Door Neighbor - Cougar Mountain*
- *Nextdoor! Then emails to the resident list (supplied by the HOA).*
- *Squak mtn. Email is probably most effective for me. Additionally, a web site (with instructions as to how to access) w/b helpful*
- *My neighborhood (Squeak mtn) is best reached by mailer.*
- *City web site, sometimes Seattle Times, flyers*
- *Squak Mountain. not sure other than some type of direct contact via email*
- *I live in Kelkari near Sycamore. Direct outreach and use of Nextdoor app have been effective here.*
- *In Klahanie through postings, newsletters, emails.*
- *Local websites and calendars, Eventbrite ,Volunteer Match/ SignUp Genius.*
- *Email and old-school fliers likely most reliable for my most immediate neighborhood. I'm in condo complex in old town core.*
- *Nextdoor (Talus)*
- *Word of mouth through neighbors... we live in a tightly knit neighborhood*
- *Email, possibly through cooperation with the Overdale Park HOA and their email list.*
- *Live in the Highlands. Not sure about this, but people are tech savvy while I am less so. Social media? Connections paper? Next Door website?*
- *I live near Issaquah Coffee Company and see a lot of community engagement opportunities posted there. Flyers or information at parks would be helpful as well.*
- *Not a specific neighborhood: I am off I-90 East, Exit 22 across from Preston - on the service road to Blue Sky RV Park - at the base of Tiger Mtn. Mailings are the most effective way to communicate.*
- *Olde Towne. Direct contact, fliers, and electronic.*
- *Social media*
- *Not an Issaquah resident*
- *e-mail*
- *Ridgewood Estates*
- *Next Door App*
- *Facebook*
- *HOA Email*
- *The Woods*
- *Current outreach gets to me, Issaquah notices*

QUESTION 10

**Are there any additional comments you wish to share?**

Answered: 19. Skipped: 34.

**Responses**

- *Issaquah MUST partner and collaborate with State Parks (Squak Mtn), King County Parks (Cougar Mtn, Squak Mtn, and Grand Ridge), and WADNR (Tiger Mtn) on any planned restoration activities. Leverage what combined agencies, resources, private entities, and non-profits can provide into*

*more bang for the buck. Issaquah cannot and should not try to do this in isolation without partnering with adjoining public lands managers.*

- *Get high schools involved!! High school athletic departments have many fit young people that can use community hours. Science departments, etc.*
- *What are the goals? Can there be a community thermometer for attaining those goals? (And they can't be offset by development just mowing trees down. For example if all the trees come down off of Providence Heights the public shouldn't have to do the work to offset those impacts.)*
- *Newcastle has a "weedwhacker" group that hunts invasives. If you need a contact, I can find one.*
- *Great start, thanks.*
- *We love nature, my children love to go to plant trees, I'm (and my children) looking forward to learning and help plant more trees!*
- *I do have experience with habitat restoration, stream stewardship, wildlife monitoring, and working with volunteers. I am currently a team leader in the Coexisting with Carnivores project. I am interested in furthering my involvement.*
- *Thank you for bringing a partnership with Forterra to Issaquah!*
- *We love all the opportunities to be involved but are miffed at how many trees are clear cut for development on a monthly basis, especially in the Sammamish area. Aren't there some mature tree retention requirements for the city and developers?*
- *I would be interested in participating on a task team but I am physically not able to participate in the removal / replanting.*
- *The continued clear cutting of land all in the name of the growth management act has to stop. Issaquah doesn't have the means to handle the booming influx of residents... inadequate and infrastructure falling apart, bursting schools and won't zone for building all levels of education, high density/compact housing that only magnifies our issues exponentially, cost of living (electric, gas, water, taxes) is far outpacing incomes...*
- *I am glad that Issaquah has joined the Green Cities Program with Forterra. I look forward to participating in volunteer restoration activities of our parks and open spaces.*
- *Just want to be kept in the loop re: developments.*
- *To offset climate change, it would be wonderful if lots of space could be designated to implement a tree-planting program. As a way to get children and families involved to become stewards of the Earth, etc.*
- *Love what the IATC is doing overall!*
- *Thank you!*
- *This is the #1 reason I live In Issaquah. We need to keep our forest lands and add to them. More tree canopy the better*

QUESTION 11

**To receive more information about progress and opportunities to get involved with the Green Issaquah Partnership, please provide your name and email address.**

Answered: 27. Skipped: 26.


**For more information about the Green Issaquah Partnership, please visit www.greenissaquah.org.**

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