

GREEN PUYALLUP PARTNERSHIP



20-Year Natural Open Spaces
Restoration Plan
May 2015



Acknowledgments

In 2004, the Green Seattle Partnership established a new method of evaluating and managing urban forests. This effort set the stage for engaging the public in ongoing stewardship of urban forests and natural open spaces, and was expanded into the cities of Everett, Kent, Kirkland, Redmond, and Tacoma, with the formation of the Green Everett Partnership, Green Kent Partnership, Green Kirkland Partnership, Green Redmond Partnership, and Green Tacoma Partnership. Partners developed the Green Puyallup Partnership based on these efforts, creating a plan to address the needs of the Puyallup community. The Washington State Department of Natural Resources and The Russell Family Foundation's Puyallup Watershed Initiative funded, in part, this citywide natural open spaces restoration plan.

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Green Puyallup Partnership 20-Year Natural Open Spaces Restoration Plan

Executive Summary

In 2014, the City of Puyallup, Pierce Conservation District, and Forterra formed a partnership to evaluate the condition of Puyallup's natural open spaces and develop a plan to help make Puyallup's vision of restoring and maintaining natural open spaces that support healthy ecosystems and waterways a reality. Puyallup is the second city in Pierce County to become a Green City Partnership and joins Everett, Kent, Kirkland, Redmond, Seattle, and Tacoma. Great collaboration comes out of the Green Cities Network. The Green Puyallup Partnership will both benefit from and contribute to this robust network of resources and expertise.

The Green Puyallup Partnership is building a sustainable network of healthy natural open spaces for the benefit and enjoyment of current and future generations by implementing a two-phased approach to restore and maintain 354 total acres. First, the Partnership aims to restore and maintain 100 acres of priority natural open spaces during the first 10 years of the Partnership. Second, through evaluation of work completed and information gathered during the first 10 years, the Green Puyallup Partnership will establish a course of action for restoration and maintenance of all identified natural open spaces. This ambitious task is important for the City of Puyallup and its natural open spaces, and is only possible with the help of an engaged community and volunteer leaders.

Puyallup's natural open spaces face the same kinds of pressures and problems as many urban forests, including fragmentation, an invasive-dominated understory that inhibits native species from regenerating, a declining forest overstory, and resource limitations on restoration and maintenance. These pressures diminish the benefits provided by valuable natural open spaces, such as reduced stormwater runoff, improved water and air quality, stronger property values and attractive communities, reduced greenhouse gases, increased habitat for native wildlife, and improved quality of life.

The Green Puyallup Partnership's vision is to restore and maintain natural open spaces that support healthy ecosystems and waterways through community stewardship. The envisioned program will also foster appreciation and understanding of the long-term benefits that natural open spaces provide to the City of Puyallup.

The city and its partners already contribute resources toward restoration and maintenance of natural open spaces, but projected costs to achieve long-term desired goals will require further investment from all partners, as well as increased

volunteer contributions. Volunteer contributions are a crucial component of the Green Puyallup Partnership. Solely using skilled field crews to effectively restore and maintain the city's natural open spaces — without volunteer and community involvement — can be more expensive and does not guarantee long-term success or community ownership. However, working side by side with Partnership staff, volunteers are forecasted to contribute about \$1.5 million in additional value to the Green Puyallup Partnership in the first 10 years, and projected volunteer efforts to assist in the restoration and maintenance of all 354 acres will contribute upwards of \$6.1 million.

After initial program discussions started in 2014, the Green Puyallup Partnership began organized efforts with people, organizations, and city staff interested in active natural open spaces restoration, maintenance, and stewardship in Puyallup. A successful Green Puyallup Partnership will be one that serves as a model for other cities and the future restoration and maintenance of Puyallup's valuable natural open spaces — including any additional city-owned natural open spaces that may be added to the program later.

Introduction

Puyallup's wealth of natural open spaces, parks, and waterways makes the city's neighborhoods active and vibrant, improves property values, aids in reducing flooding, and helps define the community. Many of these natural open spaces are forested, public-access areas. Puyallup's natural open spaces provide numerous services that benefit all areas of the city by cleaning the air, filtering the water, holding stormwater, and preventing erosion. Natural open spaces enhance neighborhoods and provide habitat for urban wildlife as well.

In 2014, the City of Puyallup, Pierce Conservation District (PCD), and Forterra partnered to develop a coordinated restoration, maintenance, and stewardship program called the Green Puyallup Partnership. The Partnership developed this 20-year plan to assess the conditions of Puyallup's natural open spaces comprehensively (i.e., land under current management of the city's Parks and Recreation Department). The plan also assesses partner coordination and capacity, promotes community participation, and establishes the long-term planning needed to support the Partnership's vision and goals.

The Green Puyallup Partnership aims to bring 100 acres of Puyallup's priority natural open space acres, forested natural open spaces, wetlands, and riparian areas into active restoration and maintenance during the next 10 years, and in the long term (10–20 years) establish a course of action to restore and maintain all identified natural open spaces. Although this is an ambitious task, restoration, maintenance, and stewardship are crucial for the health of the city's natural open spaces — and the city itself. The program is only possible with the help of an engaged and dedicated community that has an ownership stake in the Partnership's success. Similar Green City

Partnerships have already seen success in Everett, Kent, Kirkland, Redmond, Seattle, and Tacoma. Together, these partnerships are establishing one of the largest urban natural area restoration programs in the nation.

In 2005, Forterra launched the Cascade Agenda, a 100-year vision for conservation and economic growth in the Pacific Northwest, with a central focus on building livable urban communities. The City of Puyallup is a Cascade Agenda City, and recognizes the need to increase the level of care and attention given to its valuable natural open spaces. The Green Puyallup Partnership can play a key role in helping meet shared regional goals that consider environmental, social, and economic vitality.

The Need for a Green Puyallup Partnership

Historically, development was the largest threat to natural open spaces. Public agencies, land trusts, and nonprofits throughout the Puget Sound region work to reduce this threat by purchasing and conserving natural open space. Many conserved properties were set aside to allow nature to take its course with the goal of minimizing adverse environmental effects. People quickly learned, however, that urban natural open spaces face unique pressures, and that passive management is often inadequate to maintain a high quality of environmental health. Invasive species, litter, pollution, changes in surrounding land use, and fragmentation reduce natural open spaces' ability to thrive within cities. Urban natural open spaces are disappearing, and with them go critical services such as the reduction of stormwater runoff and absorption of greenhouse gases.

The dominance of nonnative plant species, such as Himalayan and evergreen blackberry, English ivy, Scotch broom, and bindweed, is reported to be a major cause of biodiversity loss and ecosystem degradation in natural open spaces (Pimentel et al. 2000; Soule 1991). Invasive weeds lack natural population control (e.g., predators and diseases) and are capable of rapid reproduction; these nonnative plants can quickly blanket the understory and prevent native plants from reseeding (Boersma et al. 2006). At the same time, invasive vines such as English ivy climb into treetops, where their leaves can block light from reaching a tree's leaves and the weight of their trunk-like vines can topple trees. The absence of native plants in the understory greatly reduces the habitat and food supply of native wildlife, and the next generation of native trees and plants is lost.

The fact that significant portions of trees in the Puget Sound region are relatively short-lived — mature bigleaf maples and red alders nearing the end of their life span — exacerbates the problem. As the maples and alders succumb to age, new seedlings are not present to replace them, resulting in a loss of forests over time and an overall decrease in natural open space health. Puyallup's natural open spaces can significantly benefit from restoration, maintenance, and stewardship to help reverse this trend and prevent major loss of habitat and ecological services.

Continued population growth anticipated throughout the Puget Sound region, including an additional 13,000-plus new Puyallup residents, will necessitate higher residential and business density (www.cityofpuyallup.org/business/economic-development/doing-business-in-puyallup/puyallup-statistics). One of the challenges facing the city is how to accommodate forecasted growth while maintaining a strong economy and exceptional quality of life. For example, high-density housing, including condominiums and multifamily developments, often results in reduced personal access to natural open space and the natural environment; therefore, protecting and enhancing Puyallup's current natural open spaces is very important.

Additionally, urban developments such as condominiums, townhouses, and office parks are considered more desirable when conveniently located near parks and natural open spaces and easily accessible by bike or on foot. Studies reveal that homes with views of urban forests can have up to 5% higher property values than homes that lack views of forest amenities (Tyrväinen and Miettinen 2000). This measurable value is due to the fact that natural open space is an important element of livable, attractive communities. Parks, trails, and natural open spaces give people who live in cities recreational opportunities and a connection to nature that can help sustain a vibrant urban life. Trees and natural open spaces are also associated with a variety of measurable public health benefits by providing people with access to nature and the amenities needed for exercise, both of which have links to stress reduction and physical wellness.

Benefits of a Green Puyallup Partnership

Caring for Puyallup's natural open spaces provides clear benefits. Research indicates that natural open spaces and urban forests give people a higher quality of life, create opportunities to improve physical and mental health, allow for enjoyment of nearby nature, and provide many ecosystem services (Dwyer et al. 1992). Natural open spaces help make the air and water cleaner, provide habitat for native wildlife, and create more livable and beautiful communities. In 1998, American Forests, a nonprofit citizens' conservation organization, analyzed the Puget Sound region's urban forests. The study revealed that trees in our region removed 38,990 tons of air pollution — a service that was then valued at \$166.5 million. The study also showed that these trees created a 2.9 billion-cubic-foot reduction in runoff, a service valued at \$5.9 billion (American Forests 1998).

In 2011, Earth Economics completed an ecological economic characterization of the Puyallup River Watershed. The report showed the ecosystem goods and services within the watershed generate at least \$526 million to \$5 billion in economic value per year; ecosystem services examined include habitat and biodiversity, water regulation and quality, soil retention, and recreation (Batker et al. 2011). If our forests and natural open spaces were lost, the dollar values provided would become the costs associated with building new infrastructure necessary to carry out equivalent functions.

As previously stated, natural open spaces help make water and stormwater cleaner. The Partnership will support current efforts by the city to comply with the National Pollutant Discharge Elimination Systems (NPDES) Municipal Stormwater Phase 2 Permit requirements. Specifically, the Partnership will support permit requirements associated with the core components of public education and outreach as well as public involvement through outreach, education, and stewardship opportunities that restore and maintain natural open spaces (in particular riparian areas) and allow for greater public input in decision-making processes regarding the Stormwater Management Program (Stormwater Management Program Update 2015). In addition, the Green Puyallup Partnership will help the city meet important Tree City USA requirements necessary for annual recertification.

Natural open spaces and urban forests also help combat climate change and the effects of air pollution. A city with abundant and healthy vegetation enjoys significantly higher air quality. Trees, as they grow, capture carbon dioxide through the process of photosynthesis and help remove soot and other pollutants through their leaves and branches. Trees store the carbon from the absorbed carbon dioxide in the woody mass of their branches and trunks, and release oxygen into the air. Conifers, specifically, can remove 50 pounds of particulate pollutants from the air per year (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 (Logvasi et al. 2008). 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 2001). Each acre of healthy, mature 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 4.7 tons of carbon dioxide per year, which means each acre of healthy forest removes carbon dioxide emissions for approximately 234 vehicles (Environmental Protection Agency 2014).

While invasive plants such as English ivy and Himalayan and evergreen blackberry also carry out photosynthesis to sequester carbon and create oxygen, these plants are shorter lived and contain less biomass than mature conifers. This makes invasive plants less effective at removing carbon dioxide from the atmosphere and storing it. Additionally, invasive plants often do not supply adequate habitat for local native wildlife and are much less effective at providing other ecosystem services in comparison to healthy native Northwest forest communities. For example, while some birds will nest in blackberry bushes, it takes a variety of native plants to provide nesting opportunities for all our local bird species (Marzluff 2000). The monocultures that invasive plants typically create do not foster the diverse assemblage of interrelating native species that keep natural open spaces healthy and stable.

Natural open spaces within an urban setting also contribute to a community's public health and overall livability, and provide opportunities for recreational activities such as using trails, viewing wildlife, and participating in educational and cultural experiences. Trails through natural open spaces allow for physical exercise such as hiking and walking, as well as passive recreation activities such as bird-watching, viewing educational signage, or simply observing the natural environment. Living within half a mile of a natural open space appears to help reduce obesity rates, and the presence of natural open spaces can lower blood pressure and decrease the risk of heart disease (Jennings and Gaither 2015). Experiences in nature provide a respite from the pressures of city living, aid in stress reduction and depression, help people learn more about the environment and local natural history, and further their connection to, understanding of, and appreciation for natural open spaces. In addition to supporting an individual's physical and mental health, natural open spaces provide opportunities for community building and increased neighborhood cohesion as people of different backgrounds recreate together and participate in community events.

Appendix A provides an overview of the ecological and social benefits provided by natural open spaces. Research is still needed to quantify the economic and ecosystem services provided by natural open spaces specific to the City of Puyallup. However, drawing from the wide body of knowledge and related studies outlined here, one can surmise that the cost of doing nothing would be high and have negative effects on the city's environmental, economic, and social well-being.

I. The Challenge

Natural open spaces throughout the Puget Sound region are threatened by decades of development and invasion from aggressive nonnative plant species. Throughout the 19th and 20th centuries, the region's natural resources were deeply affected by urbanization, forest clearing, agricultural development, and road, dam, and railroad construction. In many urban, suburban, and rural communities, natural open spaces are left in an unsustainable condition in which native plant communities and healthy ecological functions are displaced by monocultures of exotic invasive species and compacted and eroded soils. The result is what biologists call an ecological "dead zone," buried by ivy, blackberry, and other invasive plants.

Puyallup's Natural Open Spaces

The City of Puyallup lies along the Puyallup River in the lower Puyallup-White River Watershed. Its land use is primarily agricultural, commercial, industrial, and low-density residential (Puyallup Shoreline Master Program 2015). The city owns and manages approximately 370 acres of natural open space that includes forests, trails, wetlands, streams, shorelines, buffers, and open water, representing about 4% of the city's total land base. From nearly 80 acres at Wildwood Park to 6 acres at Manorwood Park,

Puyallup's publicly owned natural open spaces provide habitat for aquatic and terrestrial plants and animals, and maintain natural ecological processes within a highly developed setting.

For the purposes of this plan, natural open spaces are defined as the portion of parks and open spaces with forested plant communities that have greater than 25% tree canopy and are not mowed or landscaped. The plan also encompasses open spaces with less than 25% tree canopy — from riparian and wetland buffer areas dominated by woody shrubs to forest edges dominated by invasive species. Open water areas, such as those found in Dead Man's Pond, DeCoursey Park, and Bradley Lake Park, are included in the Partnership's overall scope of work, but not targeted in the habitat analysis outlined in this plan. Restoration and maintenance of aquatic vegetation will be addressed in site-specific stewardship plans in the future. Therefore, out of the 370 acres mapped for the project, 354 acres are the focus of the habitat assessment.

There are some areas administered by the City of Puyallup that are not part of the Green Puyallup Partnership project. Park areas that include ball fields, playgrounds, beaches, orchards, or open fields provide important open space benefits, but are not considered appropriate for forest and natural area restoration. Stormwater detention ponds and hardscaped portions of parks, such as parking lots and hard courts, are also excluded from the project area (Figure 1).

Defining the Project Area

Included in the Green Puyallup Partnership project area:

- Forests
- Meadows
- Wetlands
- Streams
- Shorelines
- Buffers
- Aquatic vegetation
- Easements on private property

NOT included in the Green Puyallup Partnership project area:

- Ball fields
- Playgrounds
- Beaches
- Orchards
- Landscaped gardens
- Open fields
- Mowed stormwater detention ponds
- Hardscaped portions of parks and open spaces e.g., parking lots and hard courts
- Private property without easements




Figure 1. Defining the project area

History and Impact

Historically, large, long-lived conifer forests dominated the Pacific Northwest. The forests included Douglas-fir, western redcedar, grand fir, and western hemlock trees. Conifer forests covered much of the landmass and extended throughout the Puget Sound region. The Puyallup River Basin was home to a mosaic of upland conifer, riparian, forested wetland, and emergent wetland plant communities.

Drawn to the river valley's rich soils and flat landscape, which were ideal for farming, early settlers of Puyallup cleared land for logging, industrial development, and railroads; channelized and piped rivers and streams; and drained and filled wetlands (Puyallup River Watershed Assessment 2014). While today's Puyallup landscape would be nearly unrecognizable to those settlers, it is still home to incredibly rich natural resources and natural open spaces in need of conservation and stewardship.

Some of the natural open spaces originally cleared due to logging, agriculture, residential development, and industry have been recolonized by short-lived, fast-growing native deciduous species such as bigleaf maple, black cottonwood, willow, and red alder. With a healthy seed bank in the soil and without further disturbance, western redcedar and Douglas-fir eventually reestablish and move the forested habitats back to a predisturbance condition. This process, known as succession,

typically takes about 100 to 150 years in the Pacific Northwest, in areas where ideal growing conditions for trees and plants exist.

Challenges arise when human-generated disturbances, such as the introduction of invasive plant species, prohibit the regeneration of native vegetation. The Green Puyallup Partnership aims to remove the invasive plants that suppress the growth of native trees and understory, and replant with native shrubs, herbs, and trees, allowing conifers to form the canopy in drier upland areas, and an array of native trees, shrubs, ground cover, and emergent plants to restore wetlands. The Partnership will use the Pacific Northwest's historical habitat conditions, specifically those found in the lowland Puget Sound region, as the reference habitat types for restoring and maintaining Puyallup's natural open spaces.

Surrounded by the city's built environment, each acre of Puyallup's natural open spaces contributes to the community's overall quality of life. In fact, with projected population increases and the subsequent pressure for continued development, the green infrastructure provided by healthy natural open spaces becomes even more crucial to water quality, air quality, and stormwater control. Upland forest and native riparian habitat across all of Puyallup's open spaces serves to abate polluted stormwater runoff and protect water quality through interception, transpiration, and infiltration of rain during storm events. In addition, healthy networks of soils and native vegetation take up harmful chemicals such as metals, organic compounds, fuels, and solvents (Moore et al. 2014).

The Threats

Natural open spaces in urban areas face unique pressures and problems that require specific attention. There are five basic problems preventing natural open spaces from sustaining themselves as native habitat:

- Fragmentation
- Declining habitat quality
- Invasive species
- Native vegetation struggling to regenerate
- Illegal activity

FRAGMENTATION

Habitat fragmentation is a problem common to urban environments and occurs when contiguous open spaces are divided, often by development, landscaping, sports fields, and roads. This decreases valuable internal habitat areas and increases "edge effects" along the exterior, thereby increasing the habitat's exposure to human impacts. Edge effects refer to the transition between two vastly different habitat types and its effects on the plant and animal communities in the remaining isolated open space. A greater proportion of edge increases a forest's or wetland's susceptibility to

encroachment by invasive species from adjacent landscaped areas and the likelihood of water-quality issues due to polluted runoff (Brabec 2000). Habitats for birds, amphibians, and mammals become isolated from each other with the loss of connectivity through natural open spaces or connecting corridors. Due to this unique pressure on natural open spaces in urbanized environments, restoration and maintenance of these areas is distinct from that of large swaths of rural forests, for example, and requires continuous vigilance against the spread of invasive species and other edge effects.

DECLINING HABITAT QUALITY

Several factors contribute to the loss of Puyallup's habitats in natural open spaces. Compared with the region's native forest composition, deciduous trees make up more of Puyallup's forest canopy than is typical in a healthy Northwest forest. Early-colonizing deciduous tree species help establish a forest in disturbed areas, such as after the logging activity that occurred throughout the Puget Sound in the late 1800s to early 1900s, and again in the mid-1900s. Deciduous bigleaf maples, cottonwoods, and alders now compose more than half of Puyallup's forest overstory. Under natural conditions, longer-lived conifers typically replace deciduous trees as die-off occurs. However, Puyallup's natural open spaces no longer grow under natural conditions.

The high proportion of deciduous trees in Puyallup's upland forests means there will be a pronounced decline in the tree canopy in the near future. Over the years, the conifer seed bank was lost through logging and development. Many deciduous trees — both native and nonnative — are nearing the end of their natural life spans. Dying deciduous trees allow more sunlight to reach the ground, resulting in perfect growing conditions for aggressive invasive species to flourish. The loss of tree canopy allows invasive plants to become the dominant species in many parts of Puyallup's natural open spaces, inhibiting the growth of saplings. Without intervention to help ensure that enough young native trees are present in the understory to make up the next generation of canopy, this plan's technical analysis projects that the natural death of these deciduous trees could lead to a loss of a third or more of Puyallup's forest overstory (Figure 2).

Additionally, past removal of vegetation and channelization along Puyallup's streams and wetlands resulted in a complete loss of native species cover. Large portions of the Puyallup River and Puyallup's other creeks are now buried under a canopy of invasive species such as blackberry, ivy, or reed canary grass. The loss of native vegetation along waterways results in significant impacts on stream temperatures and water quality, and negatively affects aquatic species, including threatened salmon.

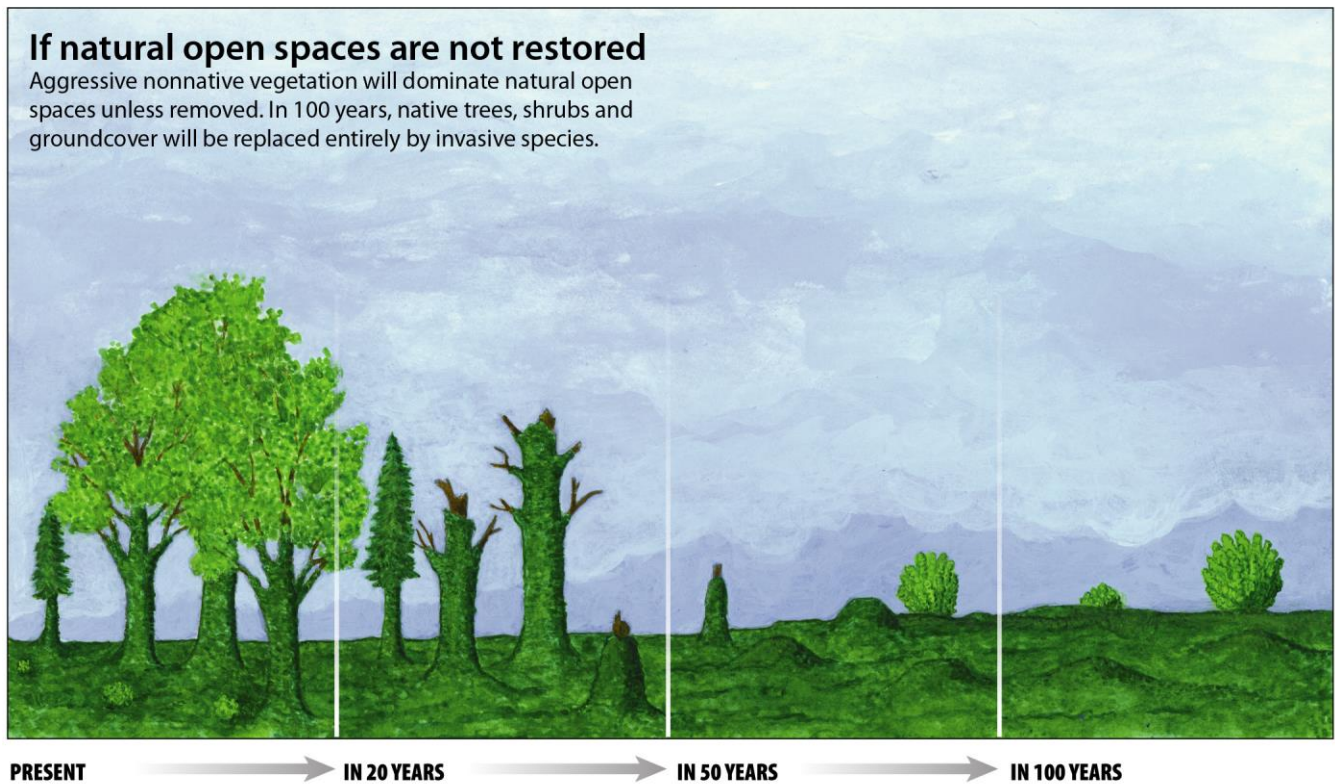


Figure 2. If natural open spaces are not restored

INVASIVE SPECIES

Invasive Plants

Invasive plants now outcompete native understory plants in many of Puyallup's natural open spaces. Aggressive, nonnative shrubs and vines cover the ground, blocking sunlight from, and competing for nutrients with, the native species. Robust 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 establishing along creeks and gulches, which are found in a significant portion of Puyallup's natural open spaces. Currently, Himalayan blackberry is the dominant invasive in more than 50% of Puyallup's natural open spaces, with English ivy and reed canary grass both dominating in over a third of the total acres.

English ivy can kill a healthy deciduous tree within 20 years by spreading up from the understory into the tree canopy. Ivy can spread easily from residential landscapes into

nearby parks, becoming a serious problem, as experienced by many other cities across the region. Once established, ivy requires an intense investment of time and resources to remove. Where English ivy is in the early stages of blanketing forest floors and trees in Puyallup, there exists the opportunity to remove the existing early growth and prevent further spread.

The native understory is an important food source for native Pacific Northwest wildlife and provides much-needed cover and shelter from predators and the elements. In addition to blackberry, reed canary grass, and ivy, other invasive species, such as Scotch broom, English holly, and morning glory, grow in the understory, crowding out ferns, shrubs, and other native plants. As invasive species begin to dominate the understory, 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.

Blankets of blackberry on stream banks displace native riparian vegetation. Lack of riparian tree cover also decreases shade along creeks, causing the water temperature to rise. In some areas, such as Clarks Creek, decreased shade and increased water temperature have allowed aquatic plant species like common waterweed (*Elodea canadensis*) to flourish in the creek bed. The altered vegetation reduces the amount of dissolved oxygen that the water can provide, which impairs water quality and degrades salmon habitat in Clarks Creek and other Puyallup water bodies (Boersma et al. 2006).

In addition, environmental benefits such as stormwater retention, erosion control, and carbon sequestration are greatly decreased when invasive species displace 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 natural open spaces overrun with sprawling thickets of blackberry and engulfed in ivy.

Invasive Insects

Native insect activity is a natural part of a healthy forest ecosystem. In fact, insects such as the native Douglas-fir beetle are a needed food source for wildlife and continue natural ecological processes (Zobrist 2011). However, even small infestations of exotic, invasive insects, in the context of the small, fragmented, and oftentimes stressed forest stands found in our urban environments, can negatively affect the sustainability and resilience of Puyallup's trees and forests.

Exotic, invasive insects can have catastrophic effects on a region's natural resources and do not contribute to the natural ecological processes found in healthy open spaces. For example, states from Michigan to Colorado have seen urban and rural forests decimated by the emerald ash borer. This wood-boring insect targets ash trees — a deciduous hardwood species. These borers, first documented in Michigan in 2002,

have now killed millions of ash trees in 22 states and two Canadian provinces (Hermes et al. 2014).

Another wood-borer, the Asian citrus long-horned beetle (*Anoplorophera chinensis*) — a species native to Southeast Asia — was documented in a Washington State nursery in 2001 and 1,000 trees were removed from an area infected by this pest in Tukwila (Boersma et al. 2006). Although the eradication was successful and a population of these beetles does not yet exist in our region, Puyallup and its surrounding areas still face the risk of introduction. Wood-boring beetles have been documented in the northeastern U.S. and California since 1996. The Asian long-horned beetle (*Anoplorophera glabripennis*) and the Asian citrus long-horned beetle, which arrives on wood pallets from Asia, is known to attack and kill maple trees and other deciduous hardwoods (Haack et al. 2010).

Also documented in the Pacific Northwest and Puyallup are outbreaks of Asian and European gypsy moths, 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 — that forage by defoliating millions of acres of forest — have weakened trees and degraded wildlife habitat. Weakened trees then succumb to other pests or disease. In the Pacific Northwest, gypsy moths are known to attack red alder, Douglas-fir, and western hemlock (Boersma et al. 2006).

To protect Puyallup's natural open spaces, the Green Puyallup Partnership will need to stay abreast of potential invasive insect outbreaks in the region. Information is available to staff and habitat stewards through the Washington Invasive Species Council and USDA Animal and Plant Health Inspection Service. The Green City Partnerships, with funding from the USDA Forest Service, have developed a monitoring protocol for Asian long-horned beetle species. This monitoring protocol is specifically designed for citizen scientists and volunteers to assist in detection and could be offered as training for Puyallup's habitat stewards. The Green Puyallup Partnership should monitor each natural open space for invasive insects and other forest health threats as part of detailed site-specific stewardship plans.

NATIVE TREES STRUGGLING TO REGENERATE

Native-tree-canopy regeneration — especially of conifers — is greatly limited in Puyallup's natural open spaces for several reasons. The landscape-scale loss of native conifer trees due to residential and commercial development has reduced the native seed bank. At the same time, invasive plants have reduced native-tree regeneration by outcompeting or smothering those tree seedlings that do grow. Removal of nonnative invasive plants and planting native trees, shrubs, and ground covers can help the process of native-tree regeneration move forward.

ILLEGAL ACTIVITY

In addition to the indirect effects of human development, illegal activity has a direct impact on urban natural open spaces as well. Dumped garbage is a common problem in parks and natural open spaces throughout the city. Garbage can leach chemicals into the ground, spread invasive species, become a hazard for wildlife, and smother understory vegetation. Trees are damaged and cut for views or firewood, or in acts of vandalism. Encroachments onto public land from adjoining private property and encampments bring any number of problems for natural open spaces, including landscaping, vegetation removal, built structures, domestic animals, and more garbage, as well as safety concerns.

While addressing all types of illegal activity will require sensitivity, the issue of homeless encampments is undoubtedly among the most complex. Additionally, the sanctuary from built environments that natural open spaces provide can also be a refuge for other forms of illegal activity, such as drug use and violent crime. This is an unfortunate reality of open space management, especially in an urban setting, that challenges many communities. When enough illegal activity takes place, natural open spaces can become known more for illegal pursuits than for the valuable benefits they provide. Reversing this reputation takes a concerted effort to bring more attention and activity in general to such areas. Problems can often arise when people think of undeveloped natural open spaces as “empty” or “abandoned” property.

However, as an important aspect of responsibly caring for natural open spaces, and for public spaces in general, addressing illegal activity provides significant opportunities for community engagement. Restoration projects led by the community help reclaim areas as positive public spaces for everyone by bringing more watchful attention to an area and increasing a sense of public ownership and responsibility. Expanding public awareness and building a self-sustaining, robust, and active volunteer Habitat Steward Program with ownership and valuation of natural open spaces is therefore one of the main intended outcomes of the Green Puyallup Partnership.

Resource Limitations on Natural Open Spaces Restoration and Maintenance

Natural open space has historically received limited resources for restoration and maintenance. The idea that natural open spaces could take care of themselves tended to discourage allocating sufficient funds for planting native species or removing invasive plants. Many natural open spaces in urban areas across the Northwest were left to benign neglect under the assumption that the spaces were self-sustaining, and without the understanding that these spaces are susceptible to changing conditions and outside influence. Passive management has directly led to declining health in unsupported urban forests and other natural open spaces.

To reverse this trend, the 20-year plan recommends additional investment in the restoration and maintenance of natural open spaces. Natural succession cannot occur without a conifer seed base and healthy understory, both of which are currently missing or greatly impaired in Puyallup's natural open spaces. Trees are now recognized as city and community assets — or infrastructure — and need to be maintained as such with attendant planning and budgeting. Unfortunately, the level of need exceeds current staffing and funding. By continuing to engage the community in a more structured effort to manage natural open spaces, this plan seeks to leverage a volunteer match to target unmet need.

CURRENT STAFFING

The Puyallup Development Services Planning Division reviews and approves landscape plans, administers private critical-area plans, and oversees the mitigation-plan review process and permitting for the city's street tree ordinance. Currently, the division has three full-time employees, with one primary permit planner who also serves the city's arborist. This employee coordinates restoration plantings, the new Green Puyallup Habitat Steward Program, and street-tree-planting efforts; and also manages the Washington Conservation Corps (WCC) crew, which the city shares with PCD.

The shared WCC crew provided about 27 days in 2015 to support natural open space restoration and maintenance; also, Puyallup successfully received multiple WCC grants from the Washington Department of Natural Resources. In 2014–15, the city hosted and served as the base of operations for the Washington Department of Natural Resources WCC crew, and in return received three full months of crew time in addition to the days contracted through the shared crew with PCD. Puyallup's Parks Maintenance Division currently has seven full-time employees; this division supports natural open space maintenance on a case-by-case basis through pickup of invasive species debris, transporting materials, and providing tools and equipment. The Parks Maintenance Division typically has six seasonal employees, none of whom are dedicated to natural open space restoration and maintenance. Collectively, Parks Maintenance staff is responsible for operations, maintenance, and administration of Puyallup's park grounds, facilities, and many of its landscaped areas.

The Public Works Engineering Division houses the Stormwater Management Section, which manages the city's NPDES Municipal Stormwater Phase 2 Permit. Staff participation in the Partnership furthers Phase 2 Permit requirements and stormwater-related capital projects.

Two additional partners that make up the Green Puyallup Partnership include the PCD and Forterra. PCD will be the primary partner to support and train participants of the Green Puyallup Habitat Steward Program. Currently, PCD allocates 0.15 FTE (full-time equivalent) staff time to City of Puyallup projects. PCD manages more than 150 volunteers annually in Puyallup's natural open spaces. Forterra has five staff members

in the Green Cities Department with 1 FTE focused on all South Sound Green Cities (which include Kent, Puyallup, and Tacoma to date), as well as overall management of the Green Cities Network. After initial launch, Forterra can provide general administrative and technical restoration support, and keep each Green City Partnership connected through the Green Cities Network. However, additional staffing support through Forterra is dependent on grant-, contract-, or sponsor-funded projects, as well as level of need from the Green City Partnership.

Additional staff and community involvement will be needed to supplement current staffing levels within the City of Puyallup in order to address all the restoration and maintenance needs of Puyallup's natural open spaces. In the interim, it is critical that habitat stewards have knowledge and skill sets that can accommodate minimal oversight.

FUNDING

The City of Puyallup Parks and Facilities Division Capital Improvements Program list includes an annual budget of \$20,000 allocated toward a percentage of the WCC crew cost, tree planting, and plant purchases for habitat stewards, as well as some equipment and materials cost. As a Tree City USA, Puyallup will allocate \$2 per capita to its tree budget. With an estimated population of 38,609 (United States Census Bureau 2013), approximately \$77,218 will be made available for tree management in the city. This money could be allocated to both landscaped trees and trees planted in natural open spaces. One of the necessary tasks subsequent to the finalization of the Green Puyallup Partnership 20-year plan is to identify what percentage of city resources such as these may be available for promoting and supporting the Partnership's activities.

Occasional grants for natural open space restoration are available from such programs and organizations as the Conservation Futures Program, Washington Wildlife and Recreation Program, Washington Department of Natural Resources, and PCD's Green Partnership Fund. PCD currently holds a National Fish and Wildlife Foundation grant for planting efforts along Meeker Creek for fall 2015. Forterra is providing grant funding, including a Washington Department of Natural Resources Community Forestry Assistance Grant and Puyallup Watershed Initiative Forest Roundtable Community of Interest funding, to launch the Green Puyallup Partnership. The funds will be used to develop the 20-Year Restoration Plan, site-level stewardship plans, and year-one restoration efforts. While most of the grant funding is adequate for specific, one-time projects, these grants do not typically fund ongoing activities that will allow Puyallup to carry out a long-term stewardship program.

COMMUNITY INVESTMENT

Puyallup residents share a rich history of civic involvement in the life of the greater community. Community volunteers are active in natural open space restoration projects at Meeker Creek and Silver Creek, and buffer enhancement through the city's Streamside Planting Program. Volunteers are also active through PCD's Water Quality Program and participate at restoration events along Meeker Creek, Silver Creek, and Clarks Creek. The city's Development Services Planning Division regularly partners with PCD and Public Works Engineering Division staff to conduct restoration and natural open space planting events with volunteers. Together with PCD and the Public Works Engineering Division, the city logged 280 volunteer hours during eight different natural open space restoration events in 2014. At the 2014 Independent Sector estimated volunteer value for Washington State (\$27.54 per hour; www.independentsector.org/volunteer_time), that was a significant leverage to Puyallup's funding.

However, with 370 acres of natural open spaces to manage, invasive species growth is quickly outpacing these efforts in many areas of Puyallup. Volunteer hours must increase significantly if partners aim to reverse the decline of Puyallup's natural open spaces during the next 20 years. Making available a citywide network of information and resources will support a growing volunteer base. With long-term community investment, Puyallup's natural open spaces can be sustained long into the future as high-quality capital assets.

II. Meeting the Challenge: The Green Puyallup Partnership

The Vision

The Green Puyallup Partnership's vision is to restore and maintain natural open spaces to support healthy ecosystems and waterways through community stewardship. The envisioned program will also foster appreciation and understanding of the long-term benefits that natural open spaces provide to the City of Puyallup. Sustainable natural open spaces, specifically forests, will contain a multi-aged canopy of trees, where invasive species pose a low threat, and a forest floor alive with native plant species that provide habitat for diverse native wildlife (Figure 3). If taken care of, natural open spaces are an important asset that can serve the community in many ways. Forest growth builds soil, improves air and water quality, retains stormwater, and helps mitigate greenhouse gas emissions.

City staff identified a need for a natural open spaces assessment and a cohesive, long-term plan that would further and strengthen restoration, maintenance, and stewardship efforts across the city. Additionally, staff recognized the need to leverage

resources with interested community members and groups to restore, maintain, and steward the city’s natural open spaces. Although the city has several natural open space restoration projects under way that utilize volunteers and community stewardship, greater programmatic development has proved difficult with the available staff capacity. In 2014, three founding partners came together — the City of Puyallup, PCD, and Forterra — to develop a volunteer-based stewardship program, conduct a natural open spaces assessment, and create a 20-year natural open spaces restoration plan. Funded work commenced in summer 2014 with a grant awarded through the Washington Department of Natural Resources Community Forestry Assistance Grant program. Upon beginning this work, Puyallup became the second Pierce County Green City Partnership.

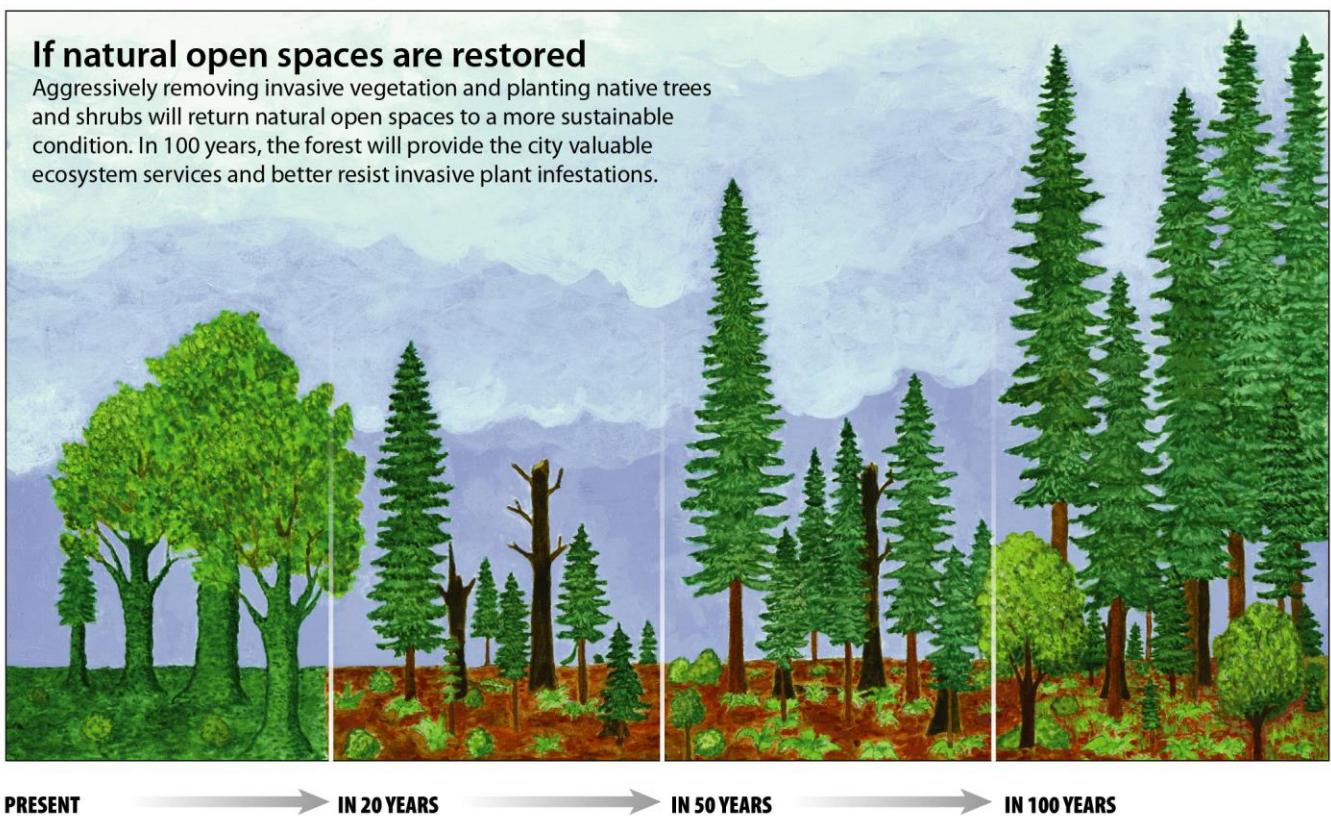


Figure 3. If natural open spaces are restored

Outcomes

Achievement of the Green Puyallup Partnership’s long-term vision is important and beneficial in a variety of ways. The Partnership will help preserve, restore, and maintain Puyallup’s natural open spaces with their many benefits, while at the same time educating and inspiring the community to support the city in caring for these spaces. Specifically, partners anticipate that during the next 20 years, the following outcomes will occur:

- 1) Development and implementation of a two-phase approach to Puyallup's natural open spaces: to restore and maintain 100 acres of priority natural open space during the first 10 years of the Partnership, and to establish a course of action for restoration and maintenance of all identified natural open spaces.
- 2) Improvements to the diversity and health of the city's natural open spaces.
- 3) Protection of natural open spaces that provide ecological and public benefits.
- 4) Establishment and maintenance of community capacity for long-term stewardship.
- 5) Establishment of resources to ensure sustainability for long-term maintenance.

Goals

For the Green Puyallup Partnership's vision and outcomes to succeed, several goals — short-, mid-, and long-term — must be achieved during the next 20 years. The following goals, along with benchmarks, were developed based on current natural open space conditions; city and partner staff capacity to support restoration, maintenance, and stewardship efforts; and the experience of other similar-size Green City Partnerships. Monitoring and tracking the program's success is described in more detail in chapter V, "Adaptive Management."

Short-Term Goals (1–5 years)

- 1) Identify priority natural open spaces for restoration and maintenance, and develop stewardship plans for each site that identify the type of work, location, conduct, sequencing, frequency, and expected outcomes (metrics).
- 2) Continue to develop, support, and implement a Habitat Steward Program that recruits, trains, and retains a growing number of dedicated volunteers.
- 3) Create and implement a public outreach and engagement plan to educate and involve the community in habitat restoration, maintenance, and stewardship.
- 4) Provide periodic training opportunities for habitat stewards to help ensure their efforts benefit from natural open space stewardship best practices.
- 5) Establish a long-term management structure to oversee administration of the Partnership.
- 6) Develop and deliver an annual status report to the community.
- 7) Celebrate the Partnership's successes.

Midterm Goals (6–10 years)

- 1) Complete prioritization of initial 100 acres for restoration and maintenance, and seek habitat stewards for the highest-priority sites. Expand the Habitat Steward Program to at least 50% of natural open spaces identified in the 20-Year Natural Open Spaces Restoration Plan.
- 2) Provide periodic training opportunities for habitat stewards to help ensure their efforts benefit from natural open space stewardship best practices.
- 3) Update the habitat assessment to include additional natural open spaces acquired by the city.
- 4) Expand the Green Puyallup Partnership to include organizations and groups that can assist in achieving the vision of the 20-Year Natural Open Spaces Restoration Plan.
- 5) Develop a long-term management structure to provide administrative support for all Partnership objectives.
- 6) Establish resources to sustain the Partnership and ensure long-term maintenance.
- 7) Develop and deliver an annual status report to the community.
- 8) Celebrate the Partnership's successes.

Long-Term Goals (11–20 years)

- 1) Expand the Habitat Steward Program to all natural open spaces identified in the 20-Year Natural Open Spaces Restoration Plan and additional natural open spaces acquired by the city.
- 2) Provide periodic training opportunities for habitat stewards to help ensure their efforts benefit from natural open space stewardship best practices.
- 3) Begin long-term maintenance of the initial 100 acres. Update the 20-Year Natural Open Spaces Restoration Plan to establish a course of action for restoration and maintenance of all identified natural open spaces.¹

¹ The 20-Year Natural Open Spaces Restoration Plan identifies 354 total acres for restoration and maintenance. The Green Puyallup Partnership plans to restore and maintain 100 acres during the first 10 years of the Partnership, and the plan update laid out in the Long-Term Goals (11–20 years) should establish a course of action to restore and maintain the remaining 254 acres.

- 4) Develop and deliver an annual status report and a midterm status report (10-year review) to the community. Host a midterm (10-year) community open house.
- 5) Celebrate the Partnership's successes.

The Structure

Based on the experience of the six other Green City Partnerships, the following section describes a management structure model modified for the Green Puyallup Partnership (Table 1). The proposed structure will support thousands of community volunteers, city and partner staff, and skilled field crews during the Partnership's long-term implementation and allow for achievement of identified goals. In the Partnership's first two years, a primary task is the establishment of a long-term management structure and solidification of partner roles and responsibilities. The management structure may include a Partnership Management Team to help guide the program's planning and implementation to achieve set goals. All three program areas (field, community, and resources) should be part of the Partnership Management Team process, 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 maintenance results on the ground. As community support becomes established, staff can reallocate time to the field component, especially for volunteer management and coordination of work completed by habitat stewards and skilled field crews.

Partner staff will help facilitate implementation work, which may include coordinating resources, communications, and outreach, and general program support across the Partnership. During the near-term (1–5 years), the Partnership Management Team will provide regular updates to the Parks, Recreation, and Senior Advisory Board, which reviews and assesses the recreational needs and operations of Puyallup Activity Center programs, as well as provides recommendations on beautification and management of the city's natural open spaces, including parks, the cemetery, and recreational areas and facilities. The city's Parks and Recreation Department, specifically the Parks Maintenance Division, should provide some level of oversight also, since the division is responsible for programs such as parks and trails maintenance, enhancement of parks and public lands, management of parks projects, the street tree program, and parks and building maintenance, to name a few.

The Partnership may also consider seeking additional near-term funding and resources to aid in achieving program goals. Identification and pursuit of various funding sources by all partners will garner the widest support base and lay the groundwork necessary for long-term, sustainable funding exploration. If the city ever decides to pursue options for supplemental public funding strategies or significant corporate sponsorship, the Partnership may benefit from establishing some type of Community Advisory

Committee. The committee could include community members and representatives from major donors and local corporate sponsors, along with city, PCD, and Forterra representation. A Community Advisory Committee could help advance larger Partnership goals, provide guidance regarding budgets and funding priorities, and garner greater community support.

The proposed management structure is designed to provide resources and processes that support, track, and evaluate on-the-ground fieldwork undertaken by volunteers, habitat stewards, and skilled field crews. Without advance planning and a strong structure, Green Puyallup Partnership field and community work will not be as successful, efficient, and organized as is needed to achieve the identified goals during the next 20 years.

Roles and Responsibilities

Partnership staff will include members of the following city departments, agencies, and organizations.

City of Puyallup

Staff from the divisions of Planning, Public Works Engineering, and Parks Maintenance will likely play a role during the implementation of the Green Puyallup Partnership. Staff from the identified divisions should work closely to ensure that Partnership goals and larger city requirements and certifications (e.g., NPDES Municipal Stormwater Phase 2 Permit and Tree City USA) progress appropriately. City staff will support volunteer-based, habitat steward, and skilled field crew efforts by providing materials, equipment, and supervision when necessary and as resources (funds and staff time) allow. Identified division and partner staff should work together to make sure fieldwork is completed correctly, record-keeping and tracking are accurate, and annual goals and site prioritization are set based on outlined 20-Year Plan benchmarks. City and partner staff have access to and should use Forterra resources developed through other Green City Partnership work, including best management practices, monitoring protocols, and habitat steward field guides to facilitate the program's implementation. Additionally, city and partner staff should work together and with other divisions to promote and publicize the Partnership's activities when appropriate opportunities arise.

Planning Division

High-level Green Puyallup Partnership direction and prioritization, at least initially, will come primarily from the city planner and arborist, who will help coordinate restoration plantings, the Habitat Steward Program, and street and park tree-planting efforts. In addition, this employee will review and approve landscape plans; administer private critical-area and mitigation plan review, approval, and monitoring; and oversee permitting for the city's street tree ordinance. Another component of restoration and maintenance efforts is the use of skilled field crews, and this city employee will manage skilled field crew operations and projects. Planning Division staff will continue

to serve as the main Partnership representative from the city with support and input from Parks Maintenance and Public Works Engineering staff.

Planning Division staff have already completed the initial Forest Landscape Assessment Tool (FLAT) analysis of the Partnership's natural open spaces, and staff should continue assessment updates as needed in the future or as the city acquires new natural open spaces. The knowledge gained by completing the FLAT analysis and everyday job responsibilities makes this employee the ideal person to provide project prioritization and guidance to the Partnership.

Parks and Recreation Department – Parks Maintenance Division

As stated earlier, the Parks Maintenance Division has seven full-time employees; Parks Maintenance supports natural open spaces maintenance through invasive species debris pickup, materials transportation, and distribution of tools and equipment. Parks Maintenance will continue to support restoration and maintenance efforts as described above, and will provide additional support for volunteer-based restoration and maintenance events as resources (funds and staff time) allow. When possible, Parks Maintenance should coordinate with other city and partner staff to align work with Partnership goals and benchmarks to further priorities for all involved.

Public Works Engineering Division

One responsibility of the Public Works Engineering Division is stormwater management, including managing the city's NPDES Municipal Stormwater Permit, implementing stormwater-related capital projects, and providing technical assistance to other city departments. Public Works engineering staff participation in the Partnership will support NPDES Municipal Stormwater Phase 2 Permit requirements, specifically public education and outreach and public involvement, and further current programs such as the Streamside Planting Program, Rain Garden Program, and Low Impact Development (LID) retrofits. The Partnership provides a great opportunity for city and partner staff to work together to strengthen and enhance current and future programs as well as meet set requirements.

Pierce Conservation District

PCD is a nonregulatory division of state government, working with Pierce County landowners to help manage natural resources since 1949. Staff work focuses on assisting property owners with water-quality protection, fish and wildlife habitat improvements, and resource conservation while sustaining a vital agricultural community. PCD is an active partner in the Green Tacoma Partnership, is very familiar with the Green City Partnerships approach, and has a long history of supporting and managing volunteer-based restoration and maintenance work.

PCD is the primary partner responsible for the Habitat Steward Program, including recruitment, training, and general support. Currently, PCD staff assist in management of volunteer-based restoration and maintenance work on Puyallup natural open

spaces, and partner on the city's Rain Garden Program. PCD also manages a skilled field crew shared across county projects, including work on Puyallup natural open spaces. Occasionally, PCD hosts workshops and trainings on a range of topics that may be of interest to Partnership participants. If there is a need or interest from the Partnership, PCD will work to organize workshops to address specific topics that will benefit staff and participants.

In addition, PCD operates a grant program called the Green Partnership Fund; the city and Forterra are eligible to apply for funding that would further Partnership implementation. The program provides grants up to \$10,000 annually, and prioritizes on-the-ground, action-oriented projects that align with Partnership goals.

Nonprofit Organizations

Forterra

Forterra is the state's largest conservation and community-building organization working to create great communities and conserve great lands. Forterra's Green Cities Department supports all Green City Partnerships in some way, and works to keep all Partnerships connected through the Green Cities Network. The Green Cities Network provides quarterly focus groups open to all Partnership staff; distributes training, grant, and other appropriate announcements via the Network listserv; and offers technical and general assistance through web-based and in-person methods.

Grant funding from the Washington State Department of Natural Resources and The Russell Family Foundation's Puyallup Watershed Initiative, as well as in-kind contributions from partner staff, allowed Forterra to organize, coordinate, and produce the Green Puyallup Partnership 20-Year Natural Open Spaces Restoration Plan. Forterra worked with partner staff to assess current capacity for restoration, maintenance, and stewardship efforts, and to begin identification of applicable policies, funding sources, and community members and groups to engage in the Partnership.

As a partner, Forterra will continue to work with the Partnership and community to articulate and advance the goals and vision of the Green Puyallup Partnership. In order to achieve Partnership goals and benchmarks, Forterra will work closely with partner staff to implement restoration, maintenance, and stewardship activities in priority natural open spaces and assist in the development of individual site stewardship plans as funding and needs dictate. Forterra will also advise on plan implementation and contribute to annual plan development through participation in the proposed Partnership Management Team. Lastly, Forterra may provide additional skilled field crews, program management, outreach, marketing, development, and greater connection to and coordination with the regional Green Cities Network, if needed, through possible future grants or contract funding.

Other Organizations

The Partnership intends to look for opportunities to collaborate with various organizations that share common goals. Reaching out to nonprofit organizations and community groups that serve the Puyallup area can only strengthen and leverage community support for the Partnership. Nonprofit organizations and community groups to consider collaborating with include the Lions Club, junior and high school service clubs, “Friends of” groups such as Friends of the Riverwalk Trail and Friends of DeCoursey Park, Washington Native Plant Society (South Sound Chapter), Tahoma Audubon Society, and Puyallup Historical Hatchery Foundation.

Regional organizations with skilled field crews such as EarthCorps, The Student Conservation Association, and the WCC play a significant role in natural open space restoration and maintenance in the Pacific Northwest. These organizations provide hands-on learning and job-training opportunities for participants and offer high quality, skilled field crews. For the Green Puyallup Partnership, the groups mentioned may supplement work performed by current partners in the following capacities:

1. Organize, recruit, support, lead, and/or train community volunteers.
2. Facilitate involvement of other youth, civic, business, and community organizations.
3. Perform restoration work in areas that volunteers cannot serve, or in areas where the city identifies the need for supplemental work.

Volunteers

Community volunteers provide the core labor for restoration and maintenance of Green Puyallup Partnership natural open spaces. Volunteers bolster community interest and support for local natural open spaces through advocacy. The Partnership is responsible for working with volunteers and habitat stewards to provide field and stewardship training and site planning that will ensure community efforts provide the greatest benefit possible. Developing committed repeat volunteers may lead to interest in greater levels of Partnership participation, such as joining the Habitat Steward Program. An active and educated group of habitat stewards is essential to expanding the Partnership’s capacity to work in multiple natural open spaces simultaneously. Recruitment of individual volunteers and groups will support habitat stewards with restoration and maintenance efforts.

Skilled Field Crews

Skilled field crews, such as WCC crews, are an additional resource that partners may hire as needed and as the budget allows. Skilled field crews should focus on steep slopes and other difficult sites not appropriate for volunteers, or projects that require technical expertise not traditionally found in volunteers. A limited number of regional

firms provide skilled field crew services, but partner staff typically have access to several skilled field crew options. Currently, the city uses WCC crews on natural open space restoration and maintenance efforts.

Funders and Sponsors

Corporate sponsors, foundations, private donors, and other grant-making entities are key partners and stakeholders in the Green Puyallup Partnership. Grants, sponsorships, and donations may help address any funding gaps associated with implementing the Partnership. Corporate sponsors will have opportunities to support the Partnership beyond financial donations, as many corporations offer employees chances to volunteer on community projects. Partner staff should invite corporations and local businesses to participate in large volunteer restoration and maintenance events, which provides a substantial volunteer labor resource. Also, sponsors may be asked to make other contributions as appropriate. For example, partner staff may ask organizations to help defray expenses by donating event supplies, coffee and snacks, or services such as graphic design, advertising, or event planning. In return, sponsors 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 open spaces across the City of Puyallup. Private lands serve as vital connectors between fragmented public natural open spaces. Many of the pressures on Puyallup's natural open spaces are related to private landowners' actions, which can either enhance surrounding public natural open spaces or lead to their degradation.

Landscaping choices or lack of maintenance on private property is a major source of invasive plants that spread to public natural open spaces. Illegal dumping of yard waste debris in public natural open spaces also leads to the spread of invasive plants and smothers healthy plant communities. Puyallup landowners who live adjacent to natural open spaces should be encouraged to be more active in the stewardship of their land. 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. Working with landowners through education and outreach programs will help the Partnership generate a community that cares about the well-being of natural open spaces, both on their own lands and in Puyallup's public natural open spaces. Engaging landowners as invested stakeholders could mobilize an important corps of advocates and volunteers to reverse the trend and improve the health of their property and public natural open spaces.

Table 1. Proposed future management structure

GUIDE	Community Advisory Committee <i>Provide oversight and advisory guidance with respect to larger Partnership goals and resource allocations. The proposed Community Advisory Committee could be made up of representatives from all stakeholders, including the public, who serve in an advisory role to further the Partnership Management Team's work.</i>			
PLAN	Partnership Management Team* <i>Creates work plans, tracks accomplishments, oversees general program direction, and manages Partnership's resource allocations. The proposed Partnership Management Team includes staff responsible for enabling the work in the four program areas below.</i>			
	Field: <i>Plans, oversees, and tracks fieldwork, best management practices, and restoration training for volunteer sites and professional crews. Coordinates requests for tools, materials, and assistance.</i>	Community: <i>Plans outreach and marketing strategies for recruitment and retention of community volunteers and habitat stewards.</i>	Resource: <i>Explores and pursues grants and fund-raising opportunities.</i>	Administration: <i>Plans and oversees the Partnership, develops and implements data management procedures, and compiles an annual summary report.</i>
IMPLEMENT	Public		Nonprofits	Private
	<p>City of Puyallup, WCC, and PCD</p> <ul style="list-style-type: none"> • Management • Skilled field crews 	<p>Greater Puyallup Community</p> <ul style="list-style-type: none"> • Volunteers • Habitat stewards 	<ul style="list-style-type: none"> • Forterra • Other nonprofit partners 	<ul style="list-style-type: none"> • Contractors and consultants • Local business partners • Property owners

**During the near term (1–5 years), or until the proposed Community Advisor Committee forms, the Partnership Management Team should provide regular updates to the Parks, Recreation, and Senior Advisory Board.*

III. Habitat Assessment

Fragmented and disturbed by development, as well as affected by invasive species, Puyallup's natural open spaces are like most urban and suburban open spaces that face numerous challenges to ecological restoration and management. Planners, field staff, and decision makers require solid environmental information on which to base restoration and maintenance actions to accomplish effective and efficient management. Armed with clear, systematically collected data, the Partnership will be able to understand on-the-ground conditions, identify strategies and resources needed to accomplish work, and set priorities.

If disturbance did not occur, mature evergreen coniferous trees would dominate most of Puyallup's forested natural open spaces, providing a medium- to high-density canopy of mixed age classes and species diversity. High-quality forest stands without invasive species serve as one of the reference plant communities used for this analysis. Other reference communities include forested, shrub-dominated, or emergent wetlands that support dominant native plant species such as black cottonwood, willow and other shrubs, and native wetland species.

Methods

The Partnership's habitat assessment focused on the 354 acres of natural open space owned and managed by the City of Puyallup. The parcels included in the Partnership's scope are 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. While street rights-of-way and landscaped parks provide important natural open space benefits and should be targeted for maintenance, this type of space was not included in the current scope of work.

During the fall of 2014, city staff collected baseline ecological data using a rapid-assessment data collection protocol called the Forest Landscape Assessment Tool (FLAT) developed by the Green Cities Research Alliance (for more information, see www.fs.fed.us/pnw/research/gcra, "Urban Landscape Assessment"). FLAT is based on the "tree-riage" model originally developed by the Green Seattle Partnership. The model, based on the medical triage concept, uses habitat composition and invasive species cover as its two parameters to prioritize restoration (Ciecko et al. in press).

The FLAT adaptation builds on the existing framework of the tree-iage model to characterize additional habitat attributes, including stocking, tree age and size class, and forest health threat indicators. Attributes relating to forest health include low tree-canopy vigor, root rot, mistletoe and bare soils due to erosion. Also, documented was the presence of regenerating trees (canopy species less than 20 feet in height) as they play an important role in the long-term sustainability of the forest or natural open space. In addition, each stand was deemed “plantable” or “not plantable” based on whether site conditions were appropriate for tree seedling establishment. Finally, the Puyallup assessment accounted for the presence of large woody debris and snags.

Rapid-assessment methodologies, such as FLAT, record the overall condition at any one site and on a landscape or city scale. The data serves as a high-level baseline, which partner staff can use to conduct finer-scale, site-specific restoration planning; partners should complete site-by-site analysis as work progresses to help ensure the most appropriate restoration practices and species composition for each site. Green Puyallup partners will develop more-detailed site-level stewardship plans to further assess planting conditions and outline management recommendations as implementation of the 20-year plan occurs.

Prior to field data collection, forest stands within Puyallup’s natural open spaces were classified through digital orthophoto interpretation, dividing each stand into one of five categories: forested, natural, open water, hardscaped, or landscaped. The initial stand-type delineations were ground-verified in the field, and if necessary, the delineations were corrected or the boundaries were adjusted in the Geographic Information System (GIS). The Green Puyallup Partnership refers to delineated stands as Habitat Management Units (HMUs). All HMUs receive unique numbers used for field verification and data tracking. Hardscaped and landscaped areas not suitable for active native vegetation restoration and maintenance were removed from the total acreage targeted by the Partnership. Mapped open water (16 acres) is included in the total acreage for Partnership management (370 acres). However, the habitat assessment, tree-iage categories, and best practices defined in the plan do not include attributes for aquatic habitat; restoration and maintenance strategies for open water should be addressed in future site-specific stewardship plans.

In the field, surveying of each HMU captured information on primary and secondary overstory species and size class, as well as primary and secondary understory species. “Primary” refers to those species most abundant in the HMU, and “secondary” refers to the second-most-abundant species in the HMU. See Appendix C for the FLAT-modified data collection flowchart for the tree-iage habitat assessment model.

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

HIGH

HMUs with more than 25% native tree canopy cover, in which evergreen species and/or madrones make up more than 50% of the total canopy.

OR, HMUs with more than 25% native tree canopy in partially inundated wetlands that can support 1%–50% evergreen canopy.

OR, HMUs in frequently inundated wetlands that cannot support evergreen/madrone canopy.

MEDIUM

HMUs with more than 25% native tree canopy cover, in which evergreen species and/or madrones make up between 1% and 50% of the total canopy.

OR, HMUs with less than 25% native tree canopy cover, in partially inundated wetlands that can support 1%–50% evergreen/madrone canopy.

LOW

HMUs with less than 25% native tree canopy cover.

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

In addition, each HMU received one of the following invasive cover threat values:

HIGH: HMUs with more than 50% invasive species cover.

MEDIUM: HMUs with between 5% and 50% invasive species cover.

LOW: HMUs with less than 5% invasive species cover.

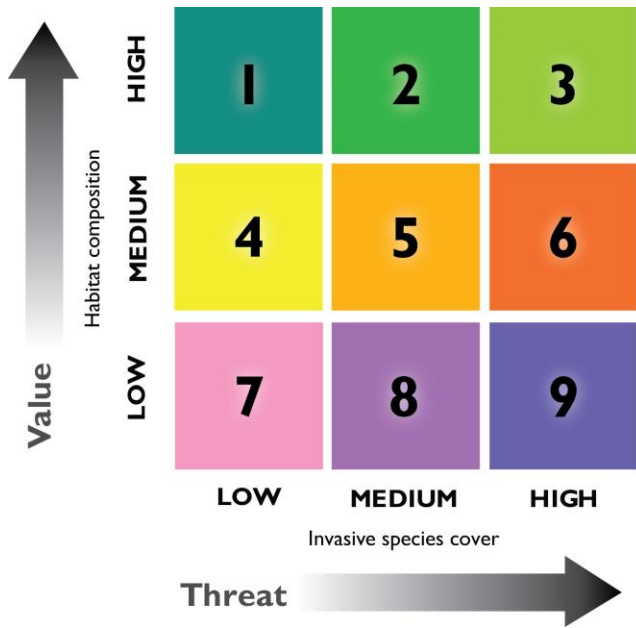


Figure 4. Tree-iage legend

After assigning habitat composition and invasive species cover values, a matrix system determined priority rating for each HMU (Figure 4). For example, an HMU that appears in category 3 scored high for habitat value and high for invasive cover threat. HMUs 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 this data was collected to provide a broad view of the habitat conditions of Puyallup’s natural open spaces. Data collection occurred at the management unit scale. Due to varying sizes of HMUs (ranging from 0.1 acre to 15 acres), results presented here

use average conditions associated with each HMU. Small pockets within HMUs may differ from the average across the stand. The plan uses the term “HMU acre” when referring to specific data in a given area. Keeping in mind the purpose of the FLAT analysis, this assessment will help prioritize restoration efforts during the next 20 years. The data gathered also serves as a baseline to gauge effectiveness of restoration efforts and future assessment of the long-term health of Puyallup’s natural open spaces.

Results

Tree-iage Matrix

From the data gathered on all HMUs during the habitat assessment, a picture of Puyallup’s natural open spaces begins to form. Figure 5 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 (354 acres) currently has low, medium, or high habitat value, and how much currently has low, medium, or high threat from invasive species. Table 2 outlines the percent of acres found in each tree-iage category.

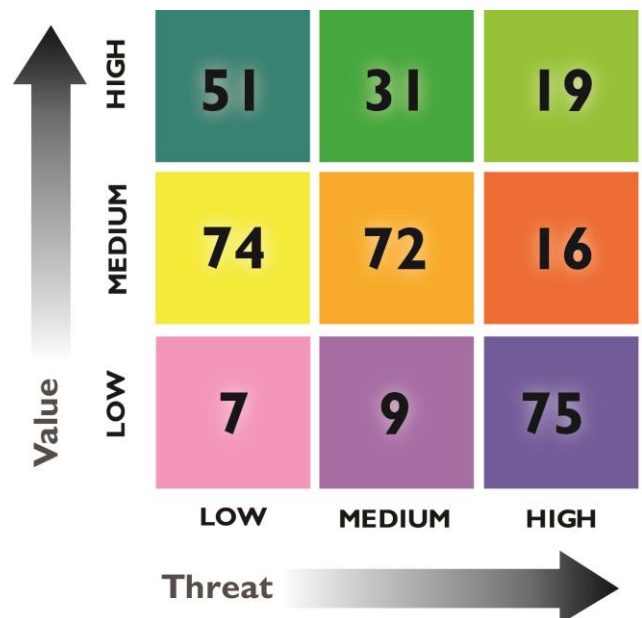


Figure 5. Project acres across tree-iage categories

Fourteen percent of the project area in Puyallup's natural open spaces is in exceptional condition (tree-iage category 1) with high-value habitat and low invasive cover threat. Looking only at the first axis of the tree-iage matrix-dominant tree or habitat composition, categories 1, 2, and 3 combined represent 29% of the acreage. Just under half of the acres have medium canopy composition (46% in categories 4, 5, and 6). Finally, 26% of the forest falls into the low-value habitat range (categories 7, 8, and 9).

The second axis of the tree-iage matrix is the threat from invasive species, based on the percent of the HMU covered by invasive species. Thirty-three percent of Puyallup's natural open spaces have a high invasive species threat (categories 3, 6, and 9). Thirty-one percent of the project area falls in the medium category (2, 5, and 8) for invasive species threat, and 37% have low invasive species threat (1, 4, and 7). Appendix D lists the tree-iage categories within each natural open space.

Table 2. HMU acres by tree-iage category and percent of project area

Tree-iage Category	HMU Acres	Percent of Project Area
1	51	14%
2	31	9%
3	19	5%
4	74	21%
5	72	20%
6	16	5%
7	7	2%
8	9	3%
9	75	21%
Total Tree-iage Acres	354	100%

Overstory Species

The FLAT results show Puyallup's natural open spaces dominated by stands of deciduous overstory species. A closer look at the data shows that Puyallup has a large amount of mature bigleaf maple and red alder as both primary and secondary overstory species. Additional primary overstory species include mature black cottonwood, Douglas-fir, and western redcedar, which is the most prevalent secondary overstory species (Figure 6). The dominance of black cottonwood, red alder, and western redcedar are indicative of the moist-to-wet conditions found across the program area.

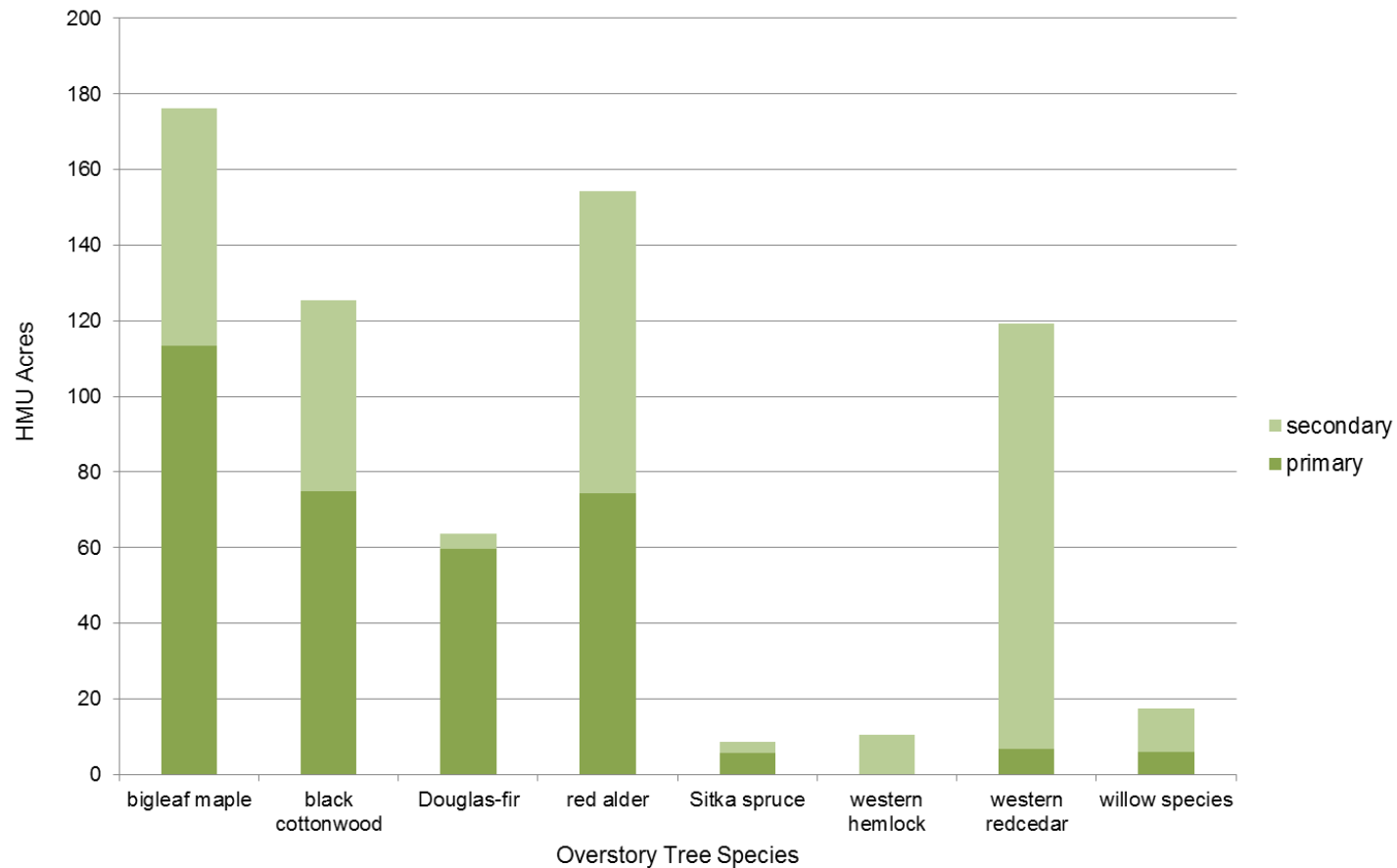


Figure 6. Overstory tree species per HMU acre

Regenerating Overstory Species

The top five regenerating tree species present are bigleaf maple, black cottonwood, red alder, western redcedar, and, to a lesser extent, Douglas-fir. Regenerating trees are those that will be future overstory species (Figure 7). Levels of conifer regeneration across the program area are low, with western redcedar occurring in 31% and Douglas-fir occurring in 7% of the project area. Bigleaf maple accounts for 56% of regenerating species with red alder at 33%.

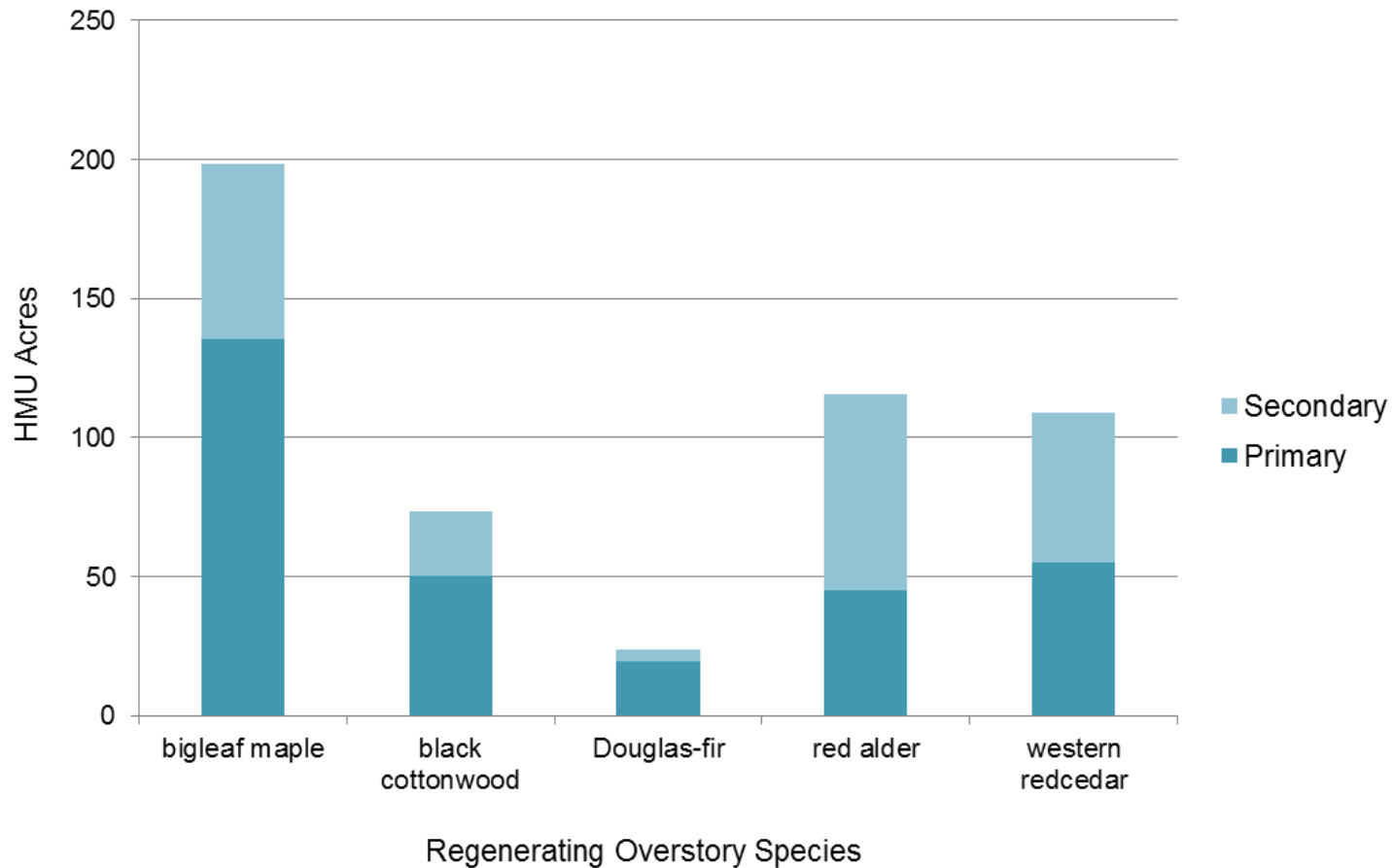


Figure 7. Regenerating overstory tree species per HMU acre

Understory Species

Native vegetation found in the understory of Puyallup's natural open spaces consists primarily of sword fern, salmonberry, Indian plum, and snowberry (Figure 8). The species makeup of the understory, particularly the high number of acres of salmonberry, is consistent with the wet soils expected in the Puyallup river basin.

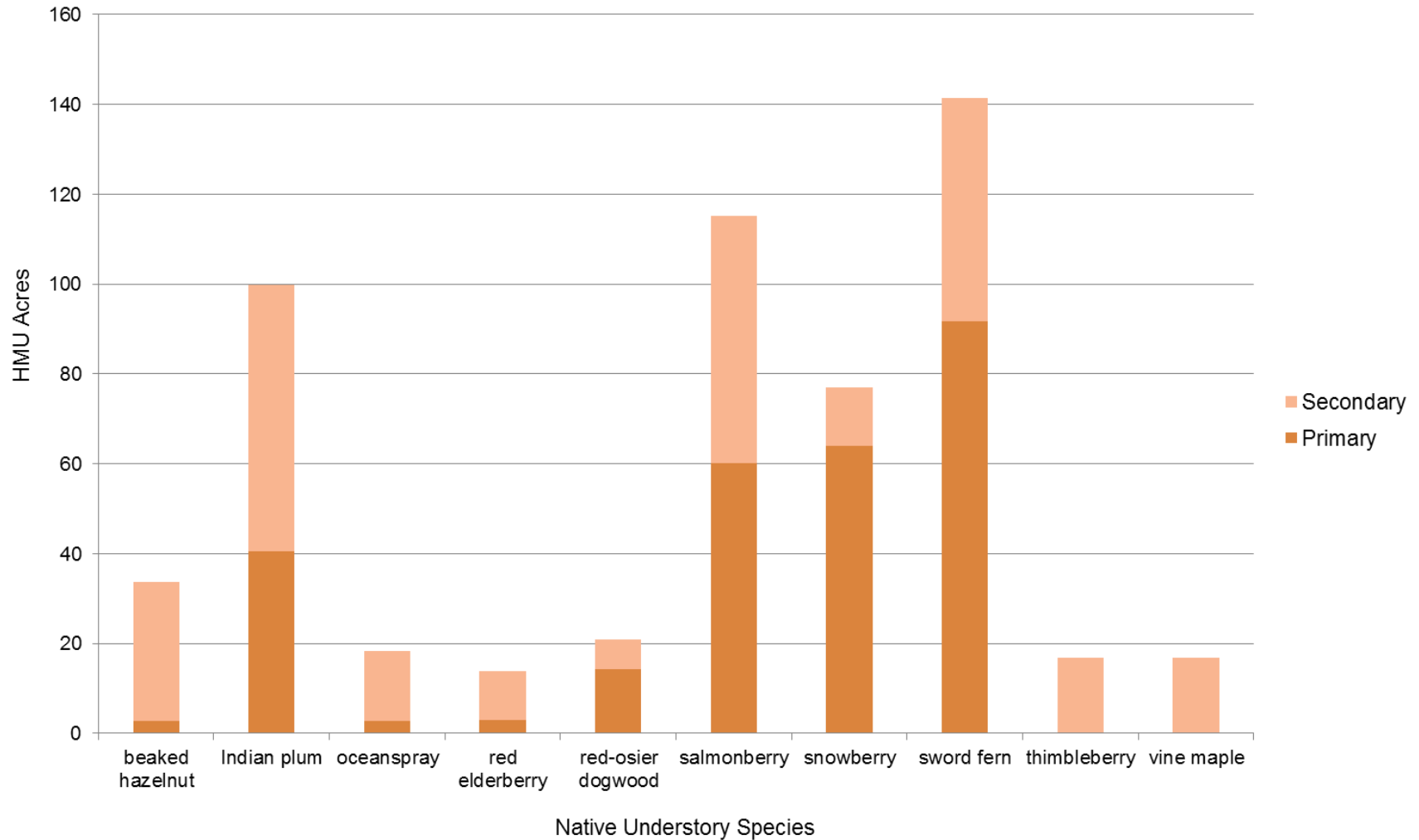


Figure 8. Native understory species per HMU acre

Invasive Species

As indicated by the number of acres with medium and high invasive species cover — 73% — invasive species are ubiquitous throughout most HMUs. The assessment documented the top five most prevalent invasive species across all HMUs (Figure 9). For example, Himalayan blackberry is present in 61% of the program area. English ivy and reed canary grass are at 36% and 34%, respectively. English holly is present in 25% of the HMUs.

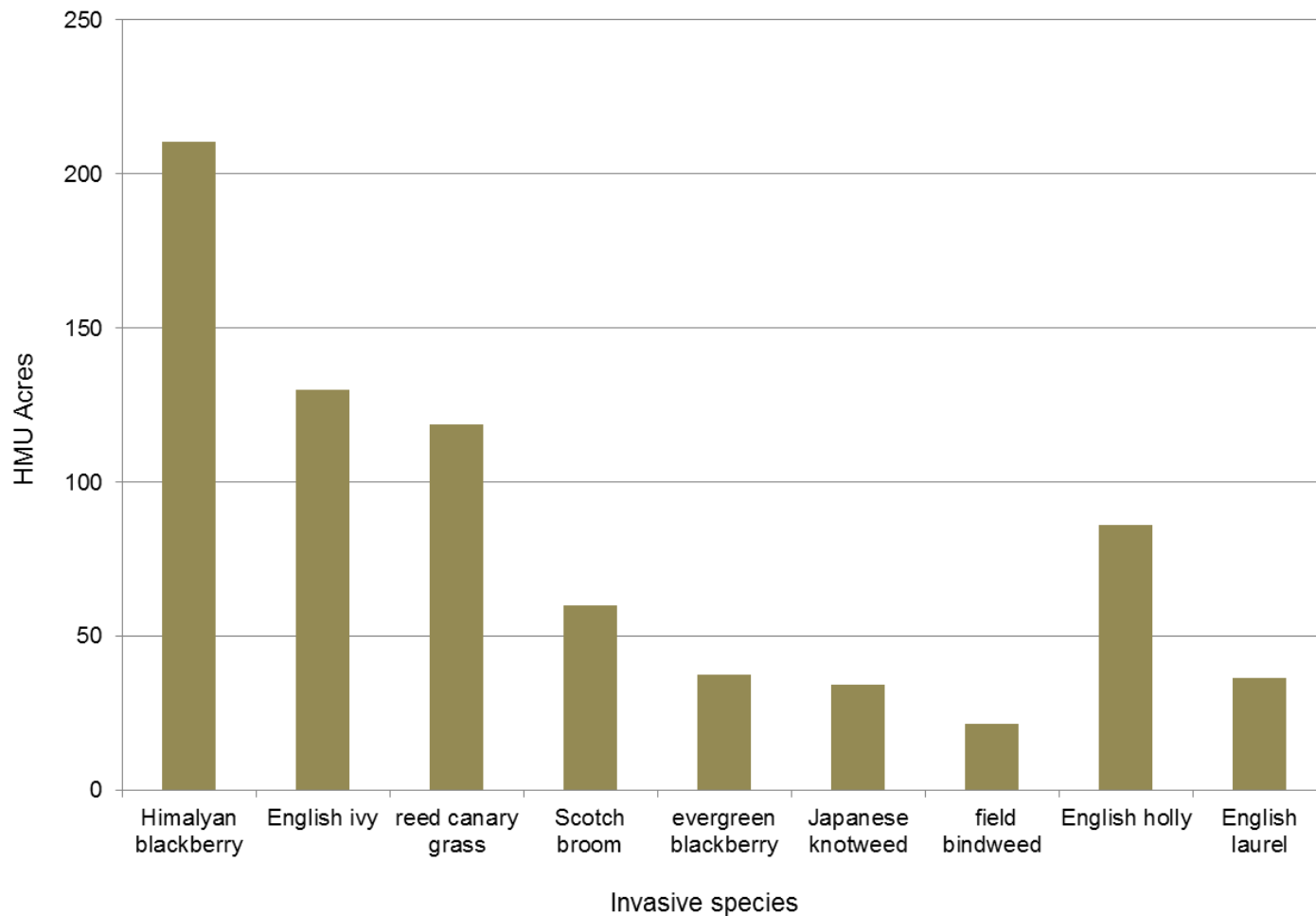


Figure 9. Most common invasive species per HMU acre

During the plan's 20 years, the Green Puyallup Partnership should monitor and periodically collect restoration site data to evaluate changes in acreage among the tree-age categories. As restoration continues, individual sites will receive additional detailed analysis to address needs. See Appendix C for site-specific descriptions of conditions in each natural open space.

IV. Implementation

As in the other Green City Partnerships, a Balanced Scorecard approach is used to develop and adapt the Green Puyallup Partnership implementation strategy (see Table 5). The Balanced Scorecard is a widely used business tool that both helps develop a strategy and monitor strategy progress through completion.

The Balanced Scorecard helps define and align the efforts of complex organizations to achieve targeted outcomes. With the identified metrics, the Partnership can track the success of various activities and set benchmarks during the plan's 20-year course. The traditional private sector scorecard balances profits, customer satisfaction, and employee welfare by listing goals and quantifying measures that indicate if actions meet the goals. Its layers focus on increasing shareholder value. For the Green Puyallup Partnership, the layers are modified to reflect the ultimate goal of a healthy and sustainable network of natural open spaces. The layers include the plan's key elements: field, community, and resources.

- The FIELD element looks at how on-the-ground strategies can be carried out to restore and maintain 354 acres of natural open spaces through Green Puyallup Partnership efforts.²
- 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 RESOURCE element examines how sufficient financial, staff, and volunteer resources will be garnered to implement the plan.

The plan's guiding structure and administration element, described in chapter II, "Meeting the Challenge," is also included in the benchmarks, as it provides the overall structure for the Partnership, ensures that objectives in the three main program elements are moving forward, and stresses the importance of clear organizational

² The Green Puyallup Partnership aims to restore and maintain 354 total acres of natural open space, and plans to restore and maintain 100 acres during the first 10 years of the Partnership.

structure and communication among partners — key elements to every successful partnership.

The objectives within each element have reciprocal relationships. For example, volunteers are critical to accomplishing fieldwork, while demonstrating progress in fieldwork is essential to motivating and retaining volunteers. Similarly, the Partnership needs community support to secure the financial and volunteer resources to restore and monitor sites in the long term. By looking at the complete picture in layers that build on each other, the Partnership can coordinate efforts across various work areas so that activities are interconnected and mutually supportive.

The ability of managers to track progress during the next 20 years will allow for early identification of challenges. In response, managers can modify or adapt the program to address and resolve challenges. See chapter V, “Adaptive Management,” for further discussion regarding the balanced scorecard and adaptive management.

FIELD

Fieldwork is at the heart of the Green Puyallup Partnership and builds upon efforts already under way by PCD and the City of Puyallup. Active management of field sites will include restoration, maintenance, and monitoring. The work will target removing invasive plants and establishing native vegetation as appropriate. Partners will use the citywide habitat assessment of Puyallup natural open spaces to characterize baseline ecological site conditions, prioritize restoration efforts, and guide goal development.

Field Objective 1: Prioritize Natural Open Spaces

Tree-iage analysis results show there are 354 acres of natural open spaces in Puyallup in need of various levels of restoration, maintenance, and long-term stewardship. There are 24 natural open spaces included in the tree-iage analysis, and some sites contain an average of two to three different tree-iage categories, each requiring a different suite of restoration prescriptions. To maximize resources, the Green Puyallup Partnership should prioritize restoration efforts based on the ecological condition of the natural open space and the interest and investment from the community (Figure 10). Prioritization is also important to help ensure the Partnership distributes restoration efforts equitably throughout the city. Green Puyallup Partnership staff will identify priority natural open spaces and develop comprehensive stewardship plans for each site. In addition, the Partnership will recruit and train habitat stewards to assist in leading on-site stewardship.

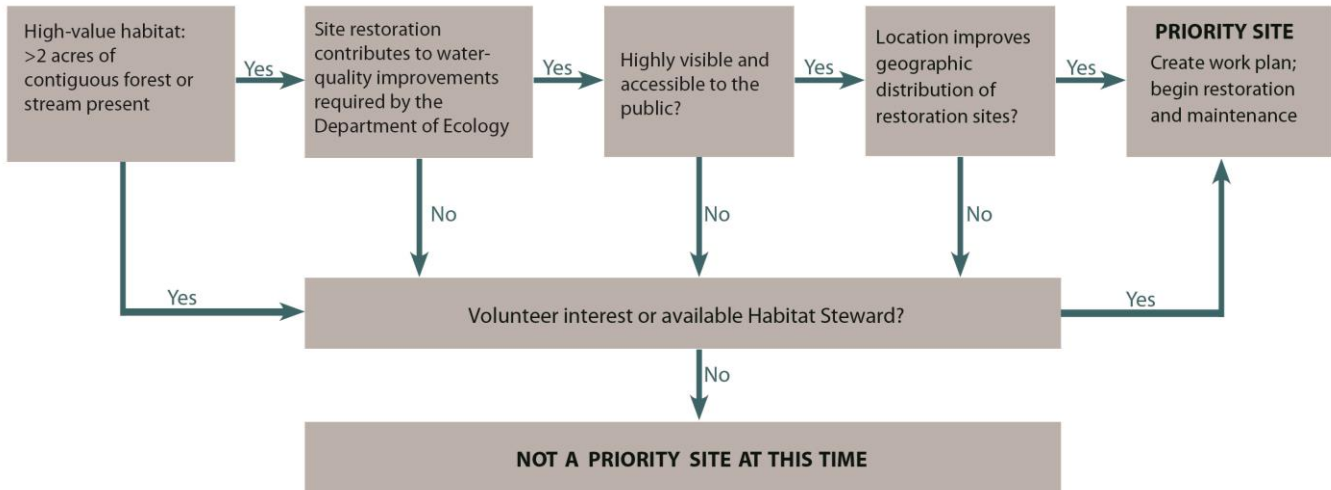


Figure 10. Decision tree for prioritizing restoration sites

Field Objective 2: Prioritize Restoration and Maintenance within Natural Open Spaces

After prioritizing the natural open spaces, partners will develop individual natural open space stewardship plans to prioritize restoration and maintenance efforts on each site. Partners can apply the tree-age model within a specific natural open space to help prioritize restoration and maintenance of HMUs. Enrollment of conifer stands with few to no invasive plants (tree-age category 1) into ongoing monitoring and maintenance should occur as quickly as possible. Partners should also consider other high-value forest stands, including conifer-dominated tree-age categories 2 and 3, as high priorities for protection and restoration.

Other factors to consider include the presence of wetlands, streams, or shorelines, as well as restoration required to meet water-quality requirements through the Department of Ecology (i.e., Total Maximum Daily Load requirements). Providing maintenance for sites that recently underwent significant restoration work should be a priority as well. Work on other tree-age categories or other desired habitat types can take place as resources become available.

Parks with current restoration in progress are considered active Green Puyallup Partnership sites and will have priority support and monitoring by staff. In order to initiate 100 acres of priority natural open spaces into restoration and maintenance during the first 10 years of the Partnership, the plan includes suggested annual fieldwork acreage goals (see Appendix G). When partners establish the course of action to restore and maintain all identified natural open spaces, similar annual fieldwork acreage goals should be set to ensure adequate progress toward restoration and maintenance of 354 total acres.

In the first year, as partners emphasize community outreach and resource marshaling, a strong base of active sites is planned, with a goal of enrolling five new acres in 2015. The acreage goals gradually increase during the next 10 years, reaching a peak of 15 acres per year, while continuing restoration, maintenance, and monitoring across natural open spaces already active. The suggested rate supports the target of initiating restoration and maintenance of 100 acres of priority natural open spaces during the first 10 years of the Partnership.

In 2020, partners should evaluate and update the natural open space and HMU selection processes to help ensure the Partnership meets program and community goals. See the strategic plan and benchmarks in Table 6 for more detail.

Field Objective 3: Restoration Implementation

Best management practices (BMPs) for restoration are considered the most effective methods to maximize ecological benefits by creating high-quality, high-functioning habitats. The Green Puyallup Partnership will use the same four-phase approach used successfully in the other Green City Partnerships.

BMPs

As restoration ecologists complete more projects in urban environments, more is learned about what does and does not work. National and international projects help inform and guide BMPs for Puyallup's fieldwork and all Green City Partnerships. BMPs include site planning, invasive control methods, planting and plant establishment, and volunteer management. Field experience and best available science help improve techniques now and in the future. Partners will assess and update BMPs as needed.

In 2012, the Green Seattle Partnership created a *Forest Steward Field Guide* of BMPs suitable for volunteer work. The Green Puyallup Partnership will adapt this field guide for Puyallup's Habitat Steward Program.

Program staff and volunteer habitat stewards will receive training in the prescribed Green City Partnership BMPs to ensure staff and volunteers across the Green Cities Network use consistent techniques. Supplemental course work and training programs are recommended for all staff involved in restoration and maintenance of Puyallup's natural open spaces.

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 is highly successful. The approach recognizes that restoration activities fall into four major phases and that, at some sites, it takes several years to move through all the phases:

- 1) Invasive plant removal
- 2) Secondary invasive removal and planting
- 3) Plant establishment
- 4) Long-term monitoring and maintenance

Since habitat health varies from site to site and some work is ongoing, not every site will start at phase 1. Each site, however, will need to receive an on-the-ground assessment before work begins in the appropriate phase. The four-phase approach also provides ranges of labor investment needed to accomplish each phase, allowing for estimates of cost and time per acre (Table 3).

Table 3. The four-phase approach to restoration fieldwork

Phase	Tasks	Range of Labor Investment (hours/acre)	Estimated Volunteer Match Required (hours/acre)
1	Invasive plant removal	50–1,400	700
2	Secondary invasive removal and planting	50–200/year for up to 3 years	100
3	Plant establishment	25–100/year for up to 3 years	40
4	Long-term monitoring and maintenance	0–20 annually	5

Phase 1. Invasive Plant Removal

The first phase aims to clear the site of invasive plants, focusing on small areas at a time in order to help ensure thoroughness and minimize regrowth. Specific removal techniques will vary by species and habitat type, and initial removal may take more than a year.

Major invasive plant reduction is required on sites with 50% or greater invasive cover (high threat from invasive species: tree-iaage 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 and maintenance. Areas with 5% to 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 on 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 becoming a larger problem.

Phase 2. Secondary Invasive Removal and Planting

Before planting, a second round of invasive removal is done to target any regrowth before it spreads, and to clear the site for establishment of young native plants. Staff will work with each site on a case-by-case basis to develop an appropriate plant palette and work plan.

For example, forested habitats with more than 50% conifer canopy cover (tree-iage categories 1, 2, and 3) will require the least amount of 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% conifer cover (tree-iage categories 4, 5, and 6) will generally be filled in 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 of course vary depending on the habitat type and target native plant population. Most phase 2 planting projects are appropriate for community volunteers. The *Puyallup Habitat Steward Field Guide* will provide volunteer-appropriate BMPs once a planting plan is established.

Phase 3. Plant Establishment

This phase repeats invasive plant removal and includes weeding, mulching, and watering until newly planted natives are sufficiently established. Most plants require at least three years of establishment care to help ensure their survival. Although native plants have adapted to the area's dry summer climate, installed container and transplanted plants both experience shock, which affects root and shoot health. Sites may stay in phase 3 for up to three years.

Phase 4. Long-term Monitoring and Maintenance

The final phase is long-term site stewardship, including monitoring by volunteers and professionals to provide information for ongoing site 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. Maintenance will typically consist of spot-removal of invasive regrowth and occasional planting where survivorship of existing plants may be low. Individual volunteers or small quarterly or annual work parties can easily take care of any needs that come up, as long as action is prompt to prevent spread of the problem. The number of acres in phase 4 should grow every year, with the goal that all 354 acres will eventually be in active restoration and maintenance and graduate to phase 4.

Without ongoing, long-term volunteer investment in monitoring and maintenance of areas in restoration, Puyallup's natural areas will fall back into neglect. For that reason, pairing volunteer commitment with other city resources is necessary. Comparing work against the best available science aids in defining optimal plant stock and sizes, watering regimes, soil preparation, and other natural open space restoration techniques.

Monitoring will be conducted more frequently in the early phases of the program as the Partnership discovers how the sites respond to restoration. Habitat management units that currently have less than 5% invasive cover and more than 50% native conifer forest cover or healthy wetland vegetation (tree-iage category 1) may already be in phase 4 and suitable for active restoration and maintenance. Others may need some preliminary restoration in phases 1 through 3.

In 2012, the Green City Partnerships developed a Regional Standardized Monitoring Program in order to understand the success, value, and effectiveness of restoration activities throughout the partnerships. The protocols provide replicable baseline and long-term data collection procedures, in order to measure future changes in site characteristics. Recorded information shows the composition and structure of a site, which can serve as an important indicator of overall habitat health. As the Green Puyallup Partnership grows, monitoring protocols and training will be made available as restoration efforts progress and additional resources become available.

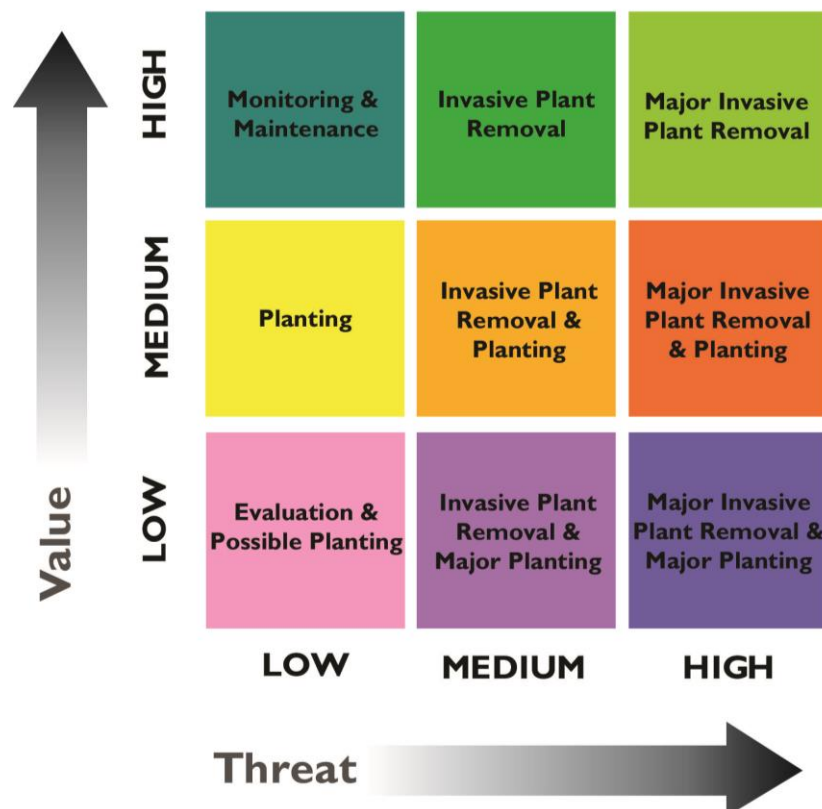


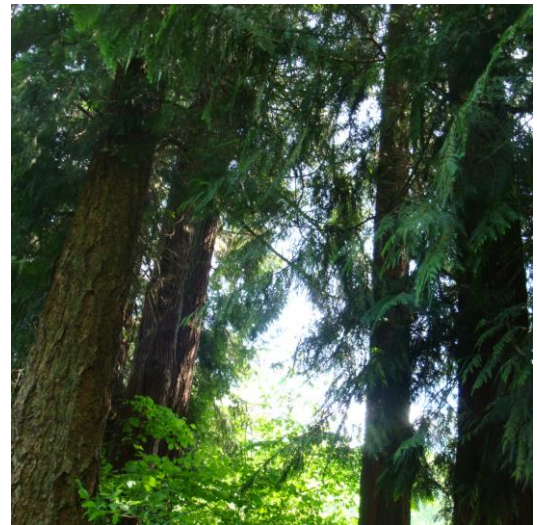
Figure 11. Restoration strategies and tree-iage categories

Application to the Tree-age Categories

The four-phase approach can be applied to the tree-age categories as shown in Figure 11. Each tree-age category can be assigned appropriate management strategies.

Tree-age Category 1: High Habitat Composition, Low Invasive Threat ***Acres in project area: 51***

Condition: This category contains the healthiest forest areas in the Puyallup system of natural open spaces. 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%.

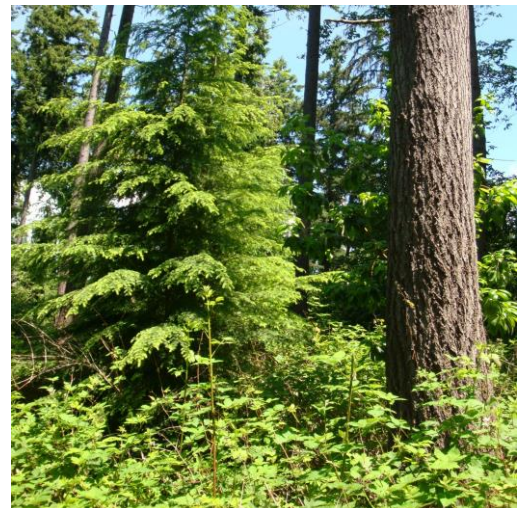


Management Strategy: Monitoring and Maintenance

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

Tree-age Category 2: High Habitat Composition, Medium Invasive Threat ***Acres in project area: 31***

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



A habitat 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. However, the forest would

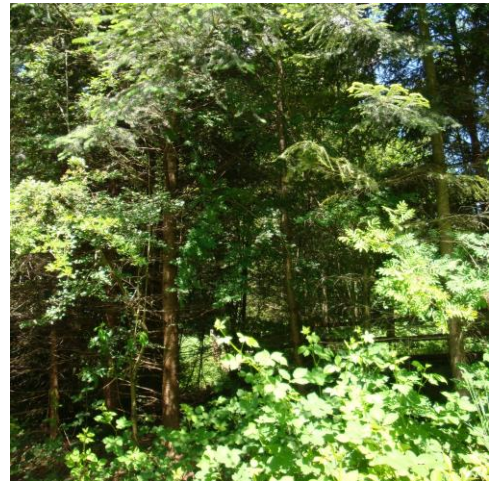
persist in good condition if mitigation of threats occurs in a timely manner.

Management Strategy: Invasive Plant Removal

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 these areas is a very high priority for the first five years.

Tree-age Category 3: High Habitat Composition, High Invasive Threat
Acres in project area: 19

Condition: As in categories 1 and 2, habitats 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. Habitats in this category are in a high-risk situation and contain many desirable trees or ecologically valuable species. If restored and maintained, habitats in this category can completely recover and persist in the long term.

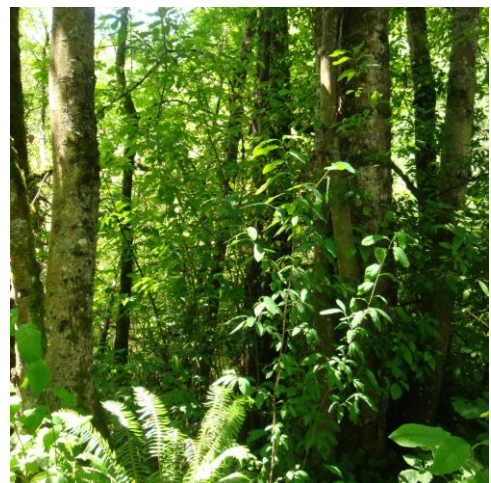


Management Strategy: Major Invasive Plant Removal

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

Tree-age Category 4: Medium Habitat Composition, Low Invasive Threat
Acres in project area: 74

Condition: Forests assigned a medium habitat 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 native wetland vegetation. Category 4 areas have low levels of invasive plants covering less than 5% of the HMU.



Management Strategy: Planting

We expect planting in these areas to consist of

infilling with native species and establishing conifers to be recruited into 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 a conifer forest by the addition of appropriate trees.

Addressing category 4 habitats 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: 72

Condition: Areas in this category have greater than 5% but less than 50% invasive cover. Invasive growth in these areas is expected to be patchy with diffuse edges. These areas are estimated to have greater than 25% native upper canopy cover but less than 50% upper canopy coniferous or broadleaf 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 areas have between 5% and 50% cover by invasive plants. These habitats 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 these areas will undergo some planned restoration work in the first five years, aggressive efforts are required throughout the life of the Green Puyallup Partnership.

Tree-iage Category 6: Medium Habitat Composition, High Invasive Threat
Acres in project area: 16

Condition: These areas 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. Invasive plants cover more than 50% of the area.



If remediation is prompt, partially degraded habitats (by a high-level risk factor) that retain important plant elements may still have potential for recovery. Because these stands are at greater risk than category 5 habitats, 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 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-age Category 7: Low Habitat Composition, Low Invasive Threat

Acres in project area: 7

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 in category 7 forests.

Open spaces in this category may include recent acquisitions, areas with large canopy gaps (perhaps due to windthrow or die-off of mature deciduous trees), sites of recent landslides, unstable slopes, sites with large amounts of fill, and/or areas dominated by nonnative 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 low levels of invasive plants, restoration may be quite cost-effective in some of the category 7 forests. Evaluation of sites in this category will determine whether appropriate conditions and timing exist to move the natural open space toward a more native forest and what the appropriate composition may be. In some cases, it may be desirable to remove nonnative 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: 9**

Condition: Areas that are estimated to have less than 25% native overstory 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 complement.



Management Strategy: Invasive Plant Removal and Major Planting

Restoration efforts in these areas require a large investment of time and resources. This is not a priority category for the first five years, although direction of some work here should occur. The Partnership will support efforts that contain the spread of invasive plants, try out new techniques, or help 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: 75**

Condition: Areas estimated to have less than 25% native upper 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 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. This is not a priority category for the first five years, although direction of some work here should occur. The Partnership will support

efforts that contain the spread of invasive plants, try out new techniques, or bolster enthusiastic community-led efforts.

Field Objective 4: Ongoing Monitoring and Maintenance

The sustainability of Puyallup's natural open spaces hinges on ongoing maintenance. As each habitat management unit moves through the process of restoration (phases 1 through 3), it enters into monitoring and maintenance: phase 4. For a complete discussion on field monitoring, see chapter V, "Adaptive Management."

COMMUNITY

Community volunteers are an essential component of lasting success in any stewardship program. Volunteers are the Partnership's motivators, fundraisers, and inspirational force advocating for resources and support necessary to achieve set goals. Volunteers complete much of the physical restoration and maintenance work, and field efforts rely on their commitment to meet Partnership goals and benchmarks. The Green Puyallup Partnership will work to educate, engage, and motivate the community to create an active, inclusive, and supportive volunteer base. Partner staff worked together and used lessons learned from other Green City Partnerships to shape the Green Puyallup Partnership's vision, outcomes, goals, and benchmarks.

The community program area includes the following objectives:

- Expand the Green Puyallup Partnership Habitat Steward Program.
- Create and implement a public outreach and engagement plan to educate and involve the community.
- Identify and engage diverse community groups.
- Appreciate volunteers and celebrate Partnership successes.
- Engage and educate private landowners.
- Encourage businesses and organizations to help further Partnership goals.

Community Objective 1: *Expand the Green Puyallup Partnership Habitat Steward Program.*

The intent of the Habitat Steward Program is to build an educated, engaged, and active volunteer base around restoration, maintenance, and stewardship of Puyallup's natural open spaces. The program provides volunteers with an opportunity to take on more responsibilities, expand their skill set, tackle larger challenges associated with restoration and maintenance, and receive support and guidance to complete multiyear projects. The Partnership launched the Habitat Steward Program in 2014, and now has three habitat stewards at Meeker Creek and Silver Creek (upper site). In the first five years, the Partnership hopes to recruit, train, and retain about 10 active volunteer habitat stewards (adding approximately one to two new habitat stewards per year); these stewards will be trained in natural open space restoration BMPs, volunteer management, and reporting, as well as supported with needed resources,

guidance, and partner staff expertise. Habitat stewards will lead other volunteers in the field and serve as Partnership supporters in the community.

Habitat stewards will have the opportunity to do the following:

- Attend regular trainings and workshops, as resources allow.
- Serve as key contacts for Green Puyallup Partnership projects at their selected natural open space.
- Organize and lead volunteer events and activities at their selected natural open space.
- Coordinate with partner staff to ensure the successful implementation of site-specific stewardship plans.
- Request tools, materials, and assistance, as needed.
- Track and report progress on restoration activities via the Partnership's work log.

Connecting with the area's existing volunteer network through city- and PCD-led restoration and maintenance events is a top priority, as is reaching out to neighborhood associations, existing nonprofit organizations — such as United Way of Pierce County and the South Sound Chapter of the Washington Native Plant Society — and local community groups. Partner staff will also recruit from a growing list of volunteers who attend Green Puyallup Partnership restoration and maintenance events, and individuals who sign up to learn more about the Partnership at outreach events such as the Washington State Fair.

Partner staff understand that serving as a habitat steward is a big commitment, and that some people may want more responsibility than a regular volunteer, but not as much as a habitat steward. The Partnership should explore the creation of a support steward category for volunteers. Support stewards should receive some level of training around natural open space restoration BMPs and volunteer management. Support stewards, like habitat stewards, will help build community and create a culture of caring for Puyallup's natural open spaces.

Support stewards could have the opportunity to do the following:

- Engage people with nearby nature through fun, positive community events, such as leading walks through natural open spaces.
- Assist habitat stewards at different natural open spaces throughout the city.
- Provide care for young street trees and native plants to help make the city and natural open spaces more walkable, attractive, and healthy.

Community Objective 2: *Create and implement a public outreach and engagement plan to educate and involve the community.*

For the public

Partners should develop outreach materials to help spread the word about the Green Puyallup Partnership's vision and goals, as well as explain how to get involved and why the program work is important. The materials should highlight the benefits of natural open spaces, the current state of and challenges facing Puyallup's natural open spaces, and solutions to restoring and maintaining those spaces. Outreach materials should inspire both community participation and confidence in the Partnership's restoration, maintenance, and stewardship plans. The messaging should be simple, appealing, and motivating, and consider the needs of current and potential future participants and partners (e.g., homeowners, local agencies, schools, businesses, and community organizations). All partner staff should have the opportunity to review and provide input on Green Puyallup Partnership outreach materials, such as a brochure.

Partner staff have initiated development of outreach materials with the creation of a Green Puyallup Partnership logo and initial discussions about a website. Partner staff should also consider helpful materials such as a *Habitat Steward Field Guide*, volunteer and habitat steward recruitment flyers, a central contact email (e.g., information@greenpuyallup.org), and a basic presentation that partner staff could use to engage new groups and promote the Partnership. Additional materials may include stickers, habitat steward T-shirts, event posters for big events such as Green Puyallup Day, banners, A-frame event signs, restoration site H-stake signs, training and education materials, and an outreach kit. The Partnership should continually explore new cost-effective ways to reach audiences, including considering a comprehensive online presence. Social media should play a significant role in volunteer recruitment and promoting the Partnership; other Green City Partnerships have had success promoting their Partnerships and connecting with new audiences through social media outlets.

For the media

The Green Puyallup Partnership should engage the media to help achieve program goals. Partners should utilize various media outlets to publicize volunteer events or information on the Partnership's progress. Some local media outlets include the *Puyallup Herald* newspaper, neighborhood association newsletters, citywide publications, and local television programming such as Pierce County TV. The Green Puyallup Partnership website should provide additional information about the program's management techniques, volunteer events, problems with invasive plants, and the benefits of trees and native plants.

As people discover and better understand the challenges facing Puyallup's natural open spaces, they will realize that the solution requires a significant investment of both volunteer time and resources to restore, maintain, and steward these precious spaces.

Increased public interest in natural open space restoration and stewardship can have the beneficial effect of helping raise private dollars as a match to public funding for ongoing restoration and maintenance.

Community Objective 3: *Identify and engage diverse community groups.*

In recent years, city and PCD staff welcomed many different groups to volunteer on restoration and maintenance projects. The Green Puyallup Partnership will continue to engage the community in natural open space restoration and maintenance through business volunteer days, neighborhood associations, Girl and Boy Scouts of America, Lions Club, faith-based organizations, youth groups, and community service and school groups. In order to expand the program, the Partnership should work to reach new groups of volunteers.

Activities available for consideration by the Partnership to foster engagement include the following:

- Organize, advertise, and host work parties.
- Promote the Habitat Steward Program, which allows community members or groups to take on greater leadership at selected natural open spaces.
- Host outreach booths at public events.
- Post informational signs in local natural open spaces where restoration and maintenance are occurring.
- Meet with community groups, businesses, homeowners' associations, civic organizations, schools, youth groups, and nonprofits to educate them about the Partnership and seek volunteer support.
- Build upon popular existing events such as Arbor Day, Earth Day, and National Trails Day celebrations and United Way Day of Caring to attract local employers and large groups of volunteers.
- Use online networking (e.g., Facebook, Twitter, Meetup.com) to reach out to individuals or groups with outdoor or stewardship interests, and to publicize upcoming restoration events and the Partnership's approach to restoration.
- Work with teachers to organize field-trip opportunities with hands-on, outdoor stewardship-based educational activities. Support school-based relationships and encourage participating students to volunteer at natural open spaces with their families.
- Inform schools about service-learning potential for students.

Community Objective 4: *Appreciate volunteers and celebrate Partnership successes.*

The Green Puyallup Partnership should work to support and retain existing volunteers, and recruit new individuals and volunteer groups. Recognizing volunteer accomplishments, appreciating volunteer contributions, and seeking volunteer feedback will improve and strengthen the Partnership.

The Partnership should celebrate volunteers' achievements and emphasize the crucial role volunteers play in restoring and maintaining Puyallup's natural open spaces. Partner staff could publish recognition of outstanding efforts and service on the future Green Puyallup Partnership website and potentially submit for publication in local media. Each volunteer, if desired, could also become a Forterra volunteer, which entitles them to invitations to special events, stewardship work parties, member hikes, and tours of conserved lands, as well as a subscription to Forterra's magazine, which provides information on conservation and stewardship projects throughout the region.

The Partnership could host an annual recognition event for habitat stewards to acknowledge and commend the great work and commitment of Habitat Steward Program participants. This type of recognition event is a great way for partner staff and habitat stewards to get to know each other better and share experiences. Volunteers are a valuable resource and crucial for completing on-the-ground Partnership goals. Consistent with the Partnership's adaptive management approach, volunteers should be asked to provide input to help adjust annual work plans and goals. The Partnership should also seek habitat steward advice on which BMPs work well and which may need reassessment.

Community Objective 5: *Engage and educate private landowners.*

While stewardship of public natural open spaces is an important step toward protecting habitat for wildlife, improving water quality, and providing public recreation opportunities, private lands cover a greater portion of Puyallup. Activities that occur on private lands can greatly degrade the condition of the city's public natural open spaces despite best efforts to restore, maintain, and steward these areas. For instance, English ivy growing as a border plant in a landowner's backyard can quickly escape into a natural open space either by spreading beyond the property line or by birds dispersing the seeds. Many invasive species also spread with illegal dumping of yard waste in natural open spaces. In fact, these are the most common ways natural open spaces become infested with invasive species.

Alternatively, landowners can be a great resource for their neighborhood natural open spaces by engaging their neighbors, schools, community groups, clubs, and businesses to help support the Partnership's efforts. Private land can also be a main source for retaining trees and expanding current natural open spaces. Privately owned natural open spaces in good health can serve as important buffers to adjacent public natural open spaces and can mitigate edge effects.

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

- Develop mailings and handouts to inform them about the problems facing natural open spaces, the solution offered through the Partnership, the benefits of removing invasive species from their properties (in addition to the

natural open spaces) and replacing them with native or noninvasive ornamental species, and how to get involved in the Partnership.

- Provide information about active natural open space restoration and maintenance and the Green Puyallup Partnership on the city's and future Partnership's websites, in park kiosks, and in neighborhood newsletters and local newspapers.
- Connect private landowners with programs such as the National Wildlife Federation's Certified Wildlife Habitat Program or Schoolyard Project.
- Train landowners in BMPs through the Habitat Steward Program.
- Create and promote a natural-open-space-friendly plant list for developers and landowners, which discourages invasive species and promotes native or noninvasive species and tree retention.

Community Objective 6: *Encourage businesses and organizations to help further Partnership goals.*

Business contributions to the Green Puyallup Partnership can include:

- Employee participation in Partnership events
- Cash donations
- Opportunities to sponsor volunteer events
- In-kind contributions (such as equipment, native plants, materials, and food for volunteer events)
- A pledge to refrain from planting or selling invasive plants
- Landscape supply businesses should be encouraged to adjust the mix of the plants they sell, based on the Pierce County Noxious Weed list authored by the Pierce County Noxious Weed Control Board. The Partnership could provide education on invasive plants and suitable alternatives, and seek opportunities to convey the Partnership message at local garden fairs and clubs.

The Partnership should seek business participation; the recruitment of corporate sponsors to hold employee stewardship events at Green Puyallup Partnership sites is an important element for program success. In some cases, corporate sponsors may also be in a position to contribute supplies and materials necessary for stewardship events. In turn, the Partnership could offer incentives such as special recognition and publicity for supporting the Partnership.

RESOURCES

Funding, staff capacity, volunteer contributions, and resources will affect the Green Puyallup Partnership's ability to restore, maintain, and steward the 354 acres assessed and identified in this plan. The city and partners already contribute resources toward restoration and maintenance of natural open spaces, but projected costs to achieve long-term desired goals will require additional investment from all partners as well as

continued growth in volunteer contributions. Partners forecast volunteers will contribute about \$1.5 million in additional value to the Green Puyallup Partnership in the first 10 years, and projected volunteer efforts to initiate restoration and maintenance on all 354 acres will contribute upwards of \$6.1 million. Partners should explore various funding sources to meet the anticipated funding needs over the next 20 years; public resources, corporate partners, foundations, grants, and private donors all may play an important role in funding.

In order to achieve the proposed goal of initiating restoration and maintenance on 100 acres of priority natural open spaces during the next 10 years, the Partnership anticipates reaching about 8,850 volunteer hours per year in 2024, when the program aims to begin efforts on 15 new acres and continue restoration and maintenance on the 85 acres already active. As partners lay out a course of action for restoration and maintenance of all identified natural open spaces, volunteer hour contributions should increase as the volume of acres in various phases of restoration and maintenance grows. Volunteer work may range from a single, dedicated individual to a neighborhood group, large community or school group, or business. Volunteer efforts are essential to accomplishing work objectives and building citywide community support. The growing contribution of volunteer time is integral to long-term stewardship, maintenance, and monitoring of all 354 acres. After partners meet proposed 10-year goals, as well as establish the plan for enrollment and begin restoration efforts of all 354 acres of natural open spaces, the Partnership should continue support in order to maintain the critical natural open spaces work completed for long-term community enjoyment and citywide benefits provided by healthy ecosystems and waterways.

Supporting and maintaining the anticipated high level of volunteer contributions and fieldwork requires great resources (funding, staff time, and materials). Partners should explore and consider allocating additional resources for volunteer recruitment, coordination, training, and recognition. The ability to provide additional resources will help keep volunteer productivity high and help ensure positive stewardship experiences.

The resources program area comprises the following eight objectives:

- Estimate total program costs.
- Continue current partner participation levels.
- Develop sustainable, long-term funding.
- Review and update current programs and policies to improve stewardship.
- Provide sufficient staff to support Partnership program areas (field, community, resources, and administration).
- Deploy skilled field crews as appropriate and needed.
- Increase volunteer engagement to a cumulative total of 53,000 hours during the next 10 years.

- Increase productivity by providing support and materials to volunteers and habitat stewards.

Table 4. Projected average restoration cost estimates per acre, per tree-iage category (in 2015 dollars)

Tree-iage Category	Acres per Tree-iage Category	Average Restoration Cost/Acre
1	51	\$8,200
2	31	\$14,500
3	19	\$18,800
4	74	\$13,800
5	72	\$18,600
6	16	\$22,900
7	7	\$17,500
8	9	\$25,900
9	75	\$30,200
Total	354	

Resources Objective 1: *Estimate total program costs.*

In 2005, the Green Seattle Partnership estimated the costs of restoring 2,500 acres of forested parks and natural areas for a 20-year period. The Green Seattle Partnership relied on estimates of past costs for removing invasive species, replanting, and ongoing maintenance, and estimates for staff needs and costs associated with additional fieldwork, materials, planning, program design and management, funding development, outreach and marketing, and field and office overhead. The Green Puyallup Partnership's projected cost model estimates began with the Green Seattle Partnership's original estimates, adjusted to current costs associated with restoration-related activities. Given that Puyallup's natural open space system is smaller than Seattle's, the Green Puyallup Partnership will require lower overall field costs, fewer staff, and lower overhead than the Green Seattle Partnership. For this plan, all cost estimates and leveraged volunteer values are listed in 2015 dollars.

The calculated average cost per acre going through the four phases of restoration and ongoing maintenance uses a cost model that enrolls a percentage of acres from each tree-iage category every year during the next 20 years (Table 4). The model estimates that initiating restoration and maintenance on all 354 acres will cost from \$8,200 per acre for tree-iage category 1 acres to \$30,200 per acre for tree-iage

category 9 acres. The model used produces estimates that include projected program and administrative staff costs plus field supplies and support, and a built-in field and staff time overhead to capture some of the additional costs associated with doing business. The costs per tree-age category are estimates for the Green Puyallup Partnership and consistent with other Green City Partnerships, and should be adjusted for use in other areas and program durations.

The cost per acre for each tree-age category is the projected total estimated cost from the time restoration and maintenance begins until the end of the program. Partners should expect a higher staff time investment in the first few years of the Partnership in comparison to subsequent years to account for program setup and volunteer recruitment; staff time investment in outreach and organizational components should decrease as the program becomes more established.

Each year partners should develop an annual budget projection as part of the annual Green Puyallup Partnership work plan; the budget projection should consider expenses associated with staff time, field expenses, and overhead needed to recruit and support volunteers and successfully begin restoration efforts on new acres as well as maintain work completed on acres previously active. For example, the cost model accounts for the proposed five new acres in 2015 with subsequent planting, plant establishment, and maintenance during the full 20 years of the plan. The Partnership should add additional new acres each year; the cost model accounts for the various restoration phases and maintenance of the total accumulation of acres. Effectively restoring and maintaining the assessed natural open spaces may require additional resources, but expenses related to implementation of the Green Puyallup Partnership are less costly than losing critical natural open spaces that support healthy ecosystems and waterways benefiting community members, wildlife, and regional economy.

Resources Objective 2: *Continue current partner participation levels.*

Partners (City of Puyallup, PCD, and Forterra) currently provide support through division and department funding, in-kind staff time and resources, and grant funds (varies by partner organization). Partners should continue to participate at similar levels in the near term, and should investigate additional funding sources to help reach the proposed target of restoring and maintaining 354 acres of Puyallup's natural open spaces.

Resources Objective 3: *Develop sustainable, long-term funding.*

Current funding levels are not sufficient to restore and maintain the identified 354 acres of natural open space across the city. In 2014, Forterra received a grant from the Washington Department of Natural Resources and The Russell Family Foundation's Puyallup Watershed Initiative to help jump-start the Green Puyallup Partnership and develop the 20-Year Natural Open Spaces Restoration Plan; both grants will expire in

2015. In addition to current funding sources, the Green Puyallup Partnership should commit to seeking other funding to meet program goals. An active, informed, and engaged group of partners and program supporters should work to identify and pursue various funding opportunities.

To meet proposed goals for restoring and maintaining 100 acres during the first 10 years of the Partnership and laying out a course of action for all identified natural open spaces, the Green Puyallup Partnership cost model forecasts a need to increase resource allocations over time. As previously stated, costs tend to decrease after the initial program establishment period. After all 354 acres undergo restoration, proposed costs should solely support ongoing maintenance and monitoring. Over the next few years, partners should explore options and possibly begin laying groundwork to establish sustainable, long-term funding to meet the Partnership's projected funding needs.

The Partnership should consider evaluating several possible funding mechanisms, either separately or in combination, such as the following:

- Applying for grants from federal, state, and local entities such as the PCD, Washington State Recreation and Conservation Office, Washington State Department of Natural Resources, Washington State Conservation Commission, and U.S. Forest Service Urban and Community Forestry Program.
- Reallocating or increasing funding for natural open spaces restoration and maintenance through City of Puyallup departmental and division budgets.
- Investigating establishment of a financial nexus between restoration and maintenance of natural open spaces and stormwater management infrastructure or other ecosystem services related to utility infrastructure.
- Advocating for separate state and federal discretionary funding for natural open spaces restoration and maintenance.
- Developing market-based mechanisms, if determined feasible (carbon credits and stormwater mitigation).
- Exploring successful public-funding mechanisms from other cities that support park and natural open spaces improvements, such as a parks bond.
- Procuring contributions from local corporations and businesses.
- Setting up a process for financial contributions from the public, if volunteering is not an option.

Resources Objective 4: *Review and update current programs and policies to improve stewardship.*

The Partnership should consider the following recommendations that would likely have a positive effect on stewardship.

- Develop a recommended plant list for all public properties that includes suitable native plants and excludes all invasive plants.
- Use language from the City of Puyallup Comprehensive Plan demonstrating alignment between Partnership and city goals to leverage funding from various sources.
- Coordinate restoration, stewardship, outreach, and educational efforts across appropriate city departments, divisions, and programs to maximize volunteers, resources, funding, and staffing capacity.
- Explore possible future expansion of the Green Puyallup Partnership model to additional natural open spaces acquired by the city.

Resources Objective 5: *Provide sufficient staff to support Partnership program areas (field, community, resources, and administration).*

FIELD

Current partner capacity alone cannot meet the restoration and maintenance needs of all 354 acres. Volunteer efforts and community leadership will play a major component in helping fill the gap. As more volunteers come onboard to further Partnership efforts, partner staff, especially city staff, should continue to serve a lead role in evaluating and prioritizing the restoration, maintenance, and stewardship of Puyallup's natural open spaces. Besides current partner staff, the Partnership will likely need to complete some fieldwork with skilled field crews, in particular sites or tasks not appropriate for volunteers (e.g., steep slopes or technical restoration work). In the first couple of years, partners should hold trainings in restoration BMPs and volunteer management for any additional staff that may support Partnership work. Staff trainings will help ensure that all partner staff are up to speed with the same techniques and approaches taught to habitat stewards, in addition to skilled-field-crew-specific practices that volunteers are not permitted to perform.

COMMUNITY

In 2014, volunteers contributed nearly 300 hours of volunteer time completing restoration and maintenance work on Puyallup natural open spaces; the Partnership seeks to expand volunteer efforts and understands that volunteers will serve a key role in the Green Puyallup Partnership's success. Partner staff does not currently have a dedicated volunteer coordinator, although the Partnership has some staff capacity to administer, coordinate, and track volunteer and habitat steward restoration and maintenance activities.

As the Green Puyallup Partnership continues to increase volunteer participation, experience from other Green City Partnerships suggests that at least one full-time employee should be dedicated to managing and coordinating volunteer-based restoration and maintenance efforts. The position should track volunteer time and work

completed, recognize volunteer achievements, recruit additional volunteers, help coordinate volunteer-based events, and possibly administer the Habitat Steward Program as well. Forterra can provide partners with advice and guidance — gleaned from launching six other Green City Partnerships — on implementing larger volunteer-based restoration work. Partners may maintain the current structure outlined in this plan, or explore different options to provide greater support as the Partnership grows.

A core component of Partnership and volunteer-based restoration is the Habitat Steward Program. As of 2014, the Partnership has three active habitat stewards; the first cohort of community members stepped forward to attend an orientation and training, and committed to advancing restoration and maintenance efforts at two Green Puyallup Partnership natural open spaces.

The Partnership should continue to recruit, train, and retain additional volunteers interested in a higher level of commitment than attending occasional volunteer events. Habitat stewards will allow the Partnership to increase on-the-ground community leadership and therefore build partner capacity to initiate restoration and maintenance in more natural open spaces. Habitat stewards will lead volunteer events, assist with creation of activity work plans, track restoration progress, and could apply for small grants to further efforts at their natural open space. The program will also keep regular volunteers interested by providing a challenging and diverse array of work, and increased ownership of the results.

Success of the Habitat Steward Program depends upon partner staff ability to coordinate the program, including training new habitat stewards, working with participants to develop work plans, coordinating efforts with other partner staff, and keeping track of accomplishments in relation to Partnership goals. The Partnership could incorporate the identified responsibilities into the duties of the volunteer coordinator mentioned previously, or investigate alternative options.

In order to recruit volunteers and habitat stewards, in addition to building awareness and interest about the Partnership, partner staff time devoted to education and outreach is critical to reach proposed goals. Partner staff should commit a portion of time to Green Puyallup Partnership outreach and education to connect with the broader Puyallup community. Partners should coordinate with the city's department responsible for public information to take advantage of outreach opportunities that exist through appropriate publications and products. The Partnership should create and implement a communications and marketing plan or approach that aligns with and enhances outreach and education work. Outreach, education, communications, and marketing efforts will increase Partnership visibility, build the needed volunteer base and community awareness, and increase the potential for generating additional program funding by reaching a wider audience.

RESOURCES AND ADMINISTRATION

Stable funding is crucial to supporting the Partnership's efforts. Partners should identify and solidify how funds and resources should be secured and administered. If funding comes from many small sources, program management may be intensive; deriving funding from one or a few larger sources may alleviate some management work. Additional administrative tasks to consider are monitoring and tracking, creating and distributing annual summary reports, facilitating the Partnership Management Team, and pursuing new funding sources.

Resources Objective 6: *Deploy skilled field crews as appropriate and needed.*

As previously mentioned, the Partnership will likely need skilled field crews to complete restoration and maintenance on priority natural open spaces that lack sufficient volunteer support, sites with difficult conditions that are unsafe or inappropriate for volunteers, or sites that require work deemed unsuitable for volunteers. Some natural open spaces containing extreme invasive plant infestations, steep slopes, riparian areas, and wetlands may be better suited for skilled field crews.

The Partnership will seek to contract with organizations that focus on natural open spaces restoration, maintenance, and stewardship. The following activities will support this objective:

- Partners will continue to work on key program management efforts, building volunteer support, and recruiting and training habitat stewards.
- The Partnership should consider prioritizing the hiring of nonprofit crews (such as WCC, The Student Conservation Association, and EarthCorps), as needed, for fieldwork at challenging sites and occasionally for volunteer management at large events.
- The Partnership should consider using private landscaping and habitat restoration companies (commercial crews) for highly technical projects, as resources and need dictate.

Resources Objective 7: *Increase volunteer engagement to a cumulative total of about 53,000 hours during the next 10 years.*

In 10 years, forecasted volunteer contributions should surpass 53,000 hours total, valued at about \$1.5 million, based on the 2013 Independent Sector valuation of a volunteer hour at \$27.54 in Washington State. To put this number in perspective, if every Puyallup resident contributed about 1.5 hours during the first 10 years of the Partnership, the Green Puyallup Partnership would achieve its proposed restoration and maintenance goals of 100 acres of priority natural open spaces.

The Green Puyallup Partnership will need to provide several ways for volunteers to participate. Partners should host a variety of large volunteer events in conjunction with

community, school, and business groups. Habitat stewards can organize and host regular work parties that volunteers can attend freely as their schedule permits. Restoration and maintenance activities with volunteers may include large invasive plant removal work, planting native species, and monitoring past efforts.

The Partnership should provide opportunities for individuals of varying physical ability, as well as individuals and groups with specific time commitments, to increase programmatic inclusivity and encourage greater volunteerism. Volunteers unable or uninterested in doing physical fieldwork may be interested in event photography, database and administrative work, outreach and education, fundraising, volunteer and sponsor recruitment, or bringing snacks and beverages to events. Partners should invite volunteers who participate in one-day events with a business or community group to continue participating at ongoing, regular work parties. Frequent volunteers may be interested in becoming habitat stewards as a way to increase their involvement. Keeping existing volunteers motivated is important, and partners can inspire volunteers by connecting work completed at one site to efforts at other Green Puyallup Partnership sites, thus showing the greater impact of individual volunteer contributions.

Diversity within the Partnership can strengthen restoration and maintenance efforts and build community. An important component of outreach and education efforts will involve connecting with neighborhoods and groups that traditionally do not participate in environmental restoration or stewardship activities. Working with local community groups, organizations, schools, and businesses may facilitate and progress outreach efforts to target groups. The Partnership should explore developing relationships that help direct youth in need of completing community service requirements.

Resources Objective 8: *Increase productivity by providing support and materials to volunteers and habitat stewards.*

Green Puyallup Partnership projects will involve community groups, individual volunteers, nonprofits, professional contractors, and, at times, City of Puyallup, PCD, and Forterra staff. The Partnership should help volunteer groups identify restoration and maintenance needs, obtain materials and tools, develop site-specific activity plans, conduct BMP trainings, coordinate large events, and write grant applications. Fieldwork efficiency can increase by creating clear lines of communication, coordination, easy access to resources, and ample support.

The Partnership should consider providing the following resources:

- New habitat steward orientations, periodic training opportunities, and a *Green Puyallup Partnership Habitat Steward Field Guide*.
- Project monitoring and documentation to assess and track restoration efforts.
- Outreach materials and assistance in recruiting volunteers.

- Restoration materials such as plants, mulch, and tools, as resources allow.
- Networking opportunities for habitat stewards to share experiences and learn from work conducted at different natural open spaces.
- Help with maintenance and tasks deemed inappropriate for volunteers.

V. Adaptive Management

The Green Puyallup Partnership's primary goal is to reestablish and maintain healthy, sustainable natural open spaces. The Partnership is an intensive, one-time intervention to restore the health of Puyallup's native habitats through community action, volunteer effort, and strategic restoration planning. In the future, after all 354 acres undergo restoration, labor and funding needs can be reduced to a maintenance and monitoring level. Only careful management of resources can achieve the goal of healthy natural open spaces.

Natural open spaces are complex ecosystems influenced both by natural factors and by the human systems that surround them. Human systems that affect and ultimately must care for these ecosystems are equally as complex. Any strategy to restore and maintain natural open spaces must systematically address all of the factors that affect the health of identified areas. In response to this complexity, development of an

adaptive management model occurred. Adaptive management systematically improves management policies and practices. It is a repeating cycle of six steps: problem assessment, strategy development, implementation, monitoring, evaluation, and strategy adjustment (Figure 12). 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.

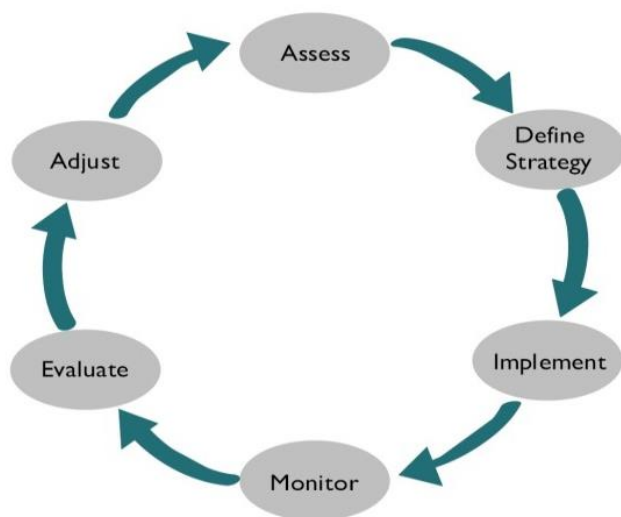


Figure 12. Adaptive management framework cycle

This section describes how the Partnership will apply adaptive management and the Balanced Scorecard approach to track and monitor progress, distribute resources, and report on the Partnership's success. The Balanced Scorecard approach to strategy development and monitoring helps assess all aspects of the program (fieldwork, community, resources, and administration) necessary to reach the goal of enrolling all 354 acres in restoration. Simply monitoring the outcomes of fieldwork would not allow staff to anticipate problems and adjust other parts of the program.

The Balanced Scorecard allows staff to track the resources and community support necessary for accomplishing the fieldwork.

Measuring Success

Two types of information will help in analyzing the Green Puyallup Partnership's effectiveness: program monitoring and field monitoring. Monitoring allows for improvement in the Partnership programs' design and performance by measuring the effectiveness of strategies and techniques used. The results of monitoring are fed back into Partnership planning and methodology to increase effectiveness. Monitoring and evaluation will also provide accountability to funding sources and supporters, and helps ensure progress towards set goals and benchmarks. For additional information, see Table 6, "Near- and Long-term Strategic Plan and Benchmarks."

Program Monitoring Plan

At the close of each year, Green Puyallup Partnership staff will collect data on Balanced Scorecard measures and track progress toward the annual work plan goals and benchmarks. Development of data management systems will allow for recording of pertinent information throughout the year for easy summation of progress at year's end. For example, entering data on volunteer events into a database will allow for tracking of the total number of participants, total volunteer hours, and potentially the number of times an individual volunteers per year depending on the database setup.

Table 5 shows the Balanced Scorecard for the four primary program elements of implementing the 20-year plan: field, community, resources, and administration. By measuring progress toward each objective, one can assess the effectiveness of the strategies described in chapter IV, "Implementation." Throughout the life of the plan, the effectiveness of program strategies needs to be tracked, and, through adaptive management, adjustments should be made when necessary.

Field Monitoring Plan

As the restoration and maintenance program proceeds, conducting routine monitoring of restoration sites is essential to track the condition and health of restored sites and overall gauge progress. Success will rely on developing and refining effective strategies to remove and control invasive plants.

To monitor fieldwork, tracking should occur as active restoration begins on each of the 354 acres. Devoting volunteer and skilled field crew time to revisiting sites previously worked on and assessing ongoing needs of the sites should be a priority as a natural open space moves through the four phases of restoration. Puyallup's natural open spaces 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 is carried out indefinitely.

As the Partnership enrolls more acres in restoration, tracking can become complicated. Managing data entry and paperwork as the program grows has proven to be expensive in other Green Cities. To increase efficiency, restoration progress can be tracked using an online database called CEDAR, which was developed specifically for Green City Partnerships to collect work metrics from staff, contractors, and habitat stewards. CEDAR is also connected to an existing GIS map called the Interactive Habitat Map (currently housed on the EarthCorps' website), which shows all acres in active restoration. In coordination with the city's Information Technology Department, and if judged appropriate for use in the Green Puyallup Partnership, there would be an upfront investment to get all restoration sites set up on CEDAR and the Interactive Habitat Map, with some annual costs to keep the system up to date. Currently, the Green Seattle and Green Tacoma Partnerships use CEDAR. In 2015, Forterra will evaluate the costs of adding additional cities and provide that as an option to the Green Puyallup Partnership as resources allow. Moving to an online tracking system like CEDAR will allow the different project partners to supplement on-the-ground monitoring with a spatial tracking system to guide work plans and direct resources effectively each year.

Table 5. Balanced Scorecard

OBJECTIVE		MEASURE
Restore and maintain 354 acres of natural open spaces		# of acres in restoration to annual goal
Field: Initiate restoration and maintenance on 100 acres of priority natural open spaces by 2024; establish a long-term course of action to enroll all identified natural open spaces		
Evaluate	Evaluate conditions and prioritize sites for restoration using tree-iage model	# sites evaluated, prioritized
Plan	Develop annual work plan for each active Park	Annual work plan completed identifying specific restoration to be implemented at each active natural open space.
Implement	Implement restoration projects optimizing ecological function, using the four-phase approach	- # of acres entered into restoration and maintenance - Best practices evaluated annually and updated as needed
Monitor	- Establish monitoring program - Monitor and maintain sites over the long term	- Annual monitoring report - # of acres entered into Phase-4 work - Maintenance is performed as indicated
Community: An informed, involved, and active civic community supports the Green Puyallup Partnership		
Residents	Educate and engage community about problem and solution through Green Puyallup Partnership	Outreach and education program materials developed and distributed
	Community supports and desires active management of natural open spaces through widespread understanding of the issue and support of Green Puyallup Partnership as solution	- % of residents volunteering each year - # of return volunteers
	Encourage businesses to contribute to program goals	- # of businesses supporting program through sponsorship, in-kind contributions, or volunteer events - # of businesses supporting volunteer events
Volunteers	Engage youth and community organizations in restoration and monitoring	- # of groups participating in events - # of hours contributed
	Recruit and train habitat stewards in volunteer management and BMPs	- # of active habitat stewards - # of habitat steward events
	Demonstrate appreciation for volunteers and seek input into program	- # of volunteer suggestions implemented - # of volunteer recognition activities

Table 5 continued. Balanced Scorecard

Resources: Sufficient resources are available to actively manage sites and provide long-term maintenance		
Financial	Continue current municipal funding	\$ budgeted and sourced to meet management requirements
	Develop long-term, stable public funding source	Mechanisms in place sufficient to meet projected needs
Paid Staff & Labor	Provide sufficient staff to support fieldwork, volunteer management, and Partnership programs	- # staff/crew dedicated to supporting the program - % of requests for crew/staff assistance completed
	Deploy skilled field crews for priority sites lacking volunteer support or sites with difficult conditions	- # of acres in restoration due to crew/staff - % of skilled field crews trained in BMPs
Volunteer Labor	Increase number of volunteer hours to 4,500 per year by 2019 and 8,850 by 2024	- # of hours to annual goal - Estimated value of volunteer contribution
	Increase productivity by providing support and materials to volunteers	- \$ and hours/acre enrolled - Staff cost per volunteer hour - # of tool/material requests processed
Administration		
Management Structure	Develop management structure comprised of primary Partners to provide oversight of three main 20-Year Plan elements.	- Management structure in place to meet administrative needs - Partners attend monthly meetings
Annual Work Plans	Develop annual work plans as communication tool and guide for all partners and stakeholders	Work plans developed collaboratively among partners to achieve plan objectives
Annual Reports	Public-facing report to stakeholders that provides accomplishments and updates on Partnership activities	Annual Reports distributed to the general public, Parks Board, City Council, and all Partnership stakeholders

Resources Distribution

Funding for the Green Puyallup Partnership will come from a variety of sources and partners. Funding through the City of Puyallup will primarily come in the form of staff time from the Planning and Public Works Engineering Divisions. Additional resources will come annually from PCD to manage the new Habitat Steward Program and restoration activities, and Forterra will provide initial resources to initiate restoration and maintenance activities, develop site-specific stewardship plans, and provide opportunities through the Green Cities Network. The Partnership should allocate funds for the four program areas — field, community, resources, and administration — proportions will change during the next 20 years to help ensure that the Partnership achieves its proposed goals.

At the front end, partners should consider directing resources toward recruiting and supporting habitat stewards and volunteers, along with demonstrating on-the-ground results and success in the field. Partners should focus on activities that build public interest and awareness of the Green Puyallup Partnership and form critical relationships with supporters. These activities will ramp up during the first five years (2015–2020) as volunteer efforts grow. Increased visibility and recognition can lead to higher levels of public and private funding, corporate and individual donations, and greater volunteer contributions. Once the Partnership establishes a strong volunteer base, partners may consider shifting some resources to provide more field support for restoration and maintenance projects.

As funding allows in the future, partners should consider expanding the natural open spaces budget to include funding for Partnership staff time (to support volunteers, coordinate events, and program administration), project materials and resources, and skilled field crews. Adding skilled field crews and/or dedicated field staff can bolster volunteer efforts and significantly further work toward achieving program goals.

Table 6. Near- and long-term strategic plan and benchmarks

	2015	2016	2017	2018	2019
Field	Initiate restoration and maintenance on three natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces and continue efforts on at least four total natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces and continue efforts on at least five total natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces and continue efforts on at least six total natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces and continue efforts on at least seven total natural open spaces
	Initiate restoration and maintenance on five acres	Initiate restoration and maintenance on five new acres and continue efforts on 10 cumulative acres	Initiate restoration and maintenance on five new acres and continue efforts on 15 cumulative acres	Initiate restoration and maintenance on seven new acres and continue efforts on 22 cumulative acres	Initiate restoration and maintenance on nine new acres and continue efforts on 31 cumulative acres
	Create stewardship plans for three priority natural open spaces	Identify two to three new priority natural open spaces and develop stewardship plans	Identify two to three new priority natural open spaces and develop stewardship plans.	Identify two to three new priority natural open spaces and develop stewardship plans	Identify two to three new priority natural open spaces and develop stewardship plans
	Establish tool and resource request protocol for volunteer habitat stewards and GPP staff Begin restoration monitoring plan development	Finalize restoration monitoring plan to track on-the-ground restoration progress	Monitor progress	Monitor progress	Monitor progress
	Evaluate and update the Green Cities program BMPs as needed and deemed appropriate by partners	Seek feedback on BMPs from staff and volunteers; evaluate and update as necessary	Seek feedback on BMPs from staff and volunteers; evaluate and update as necessary	Seek feedback on BMPs from staff and volunteers; evaluate and update as necessary	Seek feedback on BMPs from staff and volunteers; evaluate and update as necessary

Table 6 continued. Near- and long-term strategic plan and benchmarks

	2015	2016	2017	2018	2019
Community	Recruit and manage ~ 1,800 volunteer hours (~600 volunteers)	Recruit and manage ~2,400 volunteer hours (~800 volunteers)	Recruit and manage ~2,700 volunteer hours (~900 volunteers)	Recruit and manage ~3,600 volunteer hours (~1,200 volunteers)	Recruit and manage ~4,500 volunteer hours (~1,500 volunteers)
	Plan and host first Green Puyallup Day and volunteer appreciation event	Plan and host Green Puyallup Day and volunteer appreciation event	Plan and host Green Puyallup Day and volunteer appreciation event	Plan and host Green Puyallup Day and volunteer appreciation event	Plan and host Green Puyallup Day and volunteer appreciation event
	Three active habitat stewards	Four to five total active habitat stewards	Six to seven total active habitat stewards	Eight to nine total active habitat stewards	Nine to ten total active habitat stewards
	Recruit and train support stewards	Recruit and train support stewards	Recruit and train support stewards	Recruit and train support stewards	Recruit and train support stewards
	Host one Habitat Steward Orientation, plus trainings and continuing education workshops for habitat stewards	Host one Habitat Steward Orientation, plus trainings and continuing education workshops for habitat stewards	Host one Habitat Steward Orientation, plus trainings and continuing education workshops for habitat stewards	Host one Habitat Steward Orientation, plus trainings and continuing education workshops for habitat stewards	Host one Habitat Steward Orientation, plus trainings and continuing education workshops for habitat stewards
	Develop brochure, restoration site signs, and other branded outreach and promotional items Publicize in local media	Develop outreach kit, kiosk poster, and media campaign focused on success stories and branding	Media outreach focused on success stories involving habitat stewards, volunteers, and corporate participation Work with schools to develop youth steward opportunities	Media outreach focused on benefits and ecosystem services provided by healthy natural open spaces Evaluate youth steward opportunities and adapt as necessary	Media outreach focused on outcomes from first five years
	Develop brochure, restoration site signs, and other branded outreach and promotional items and publicize in local media	Develop outreach kit, kiosk poster, and media campaign focused on success stories and branding	Media outreach focused on success stories involving habitat stewards, volunteers, and corporate participation Work with schools to develop youth steward opportunities	Media outreach focused on benefits and ecosystem services provided by healthy natural open spaces Evaluate youth steward opportunities	Media outreach focused on outcomes from first 5 years

Table 6 continued. Near- and long-term strategic plan and benchmarks

	2015	2016	2017	2018	2019
Resources	Maintain partner funding and resource contributions	Maintain partner funding and resource contributions	Maintain partner funding and resource contributions	Maintain partner funding and resource contributions	Maintain partner funding and resource contributions
	Identify and pursue additional funding sources and avenues for resource contributions	Identify and pursue additional funding sources and avenues for resource contributions	Identify and pursue additional funding sources and avenues for resource contributions	Identify and pursue additional funding sources and avenues for resource contributions	Identify and pursue additional funding sources and avenues for resource contributions
	Recruit one to two local businesses to contribute or volunteer with Green Puyallup Day	Develop corporate and local business engagement plan	Implement corporate engagement plan Three to four total businesses supporting Habitat Steward projects and at least one sponsorship	Evaluate corporate engagement plan and adapt as necessary Five total businesses supporting Habitat Steward projects and at least two sponsorships	Expand the Green Puyallup Partnership to include organizations and groups that can assist with the achievement of the 20-year plan's vision
Administration	Develop long-term management structure Hold monthly Partnership Management Team Meetings	Finalize plans for management structure Hold monthly Partnership Management Team Meetings	Hold monthly Partnership Management Team Meetings	Establish working Community Advisory Committee Hold monthly Partnership Management Team Meetings	Hold monthly Partnership Management Team Meetings
	Develop data management and reporting plan using database or CEDAR online system	Finalize and implement data management plan Continue to report and record both field and volunteer data	Continue to report and record both field and volunteer data	Continue to report and record both field and volunteer data	Continue to report and record both field and volunteer data
	Publish and distribute 20-year management plan	Write 2015 annual report	Write 2016 annual report	Write 2017 annual report	Write 2018 annual report
	Develop 2016 work plan	Develop 2017 work plan	Develop 2018 work plan	Develop 2019 work plan	Develop 2020 work plan

Table 6 continued. Near- and long-term strategic plan and benchmarks

	2020–2024	2025–2029	2030–2034
Field	Initiate restoration and maintenance on one to two new natural open spaces per year and by 2024 continue efforts on at least 12 total natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces per year and by 2029 continue efforts on at least 17 total natural open spaces	Initiate restoration and maintenance on one to two new natural open spaces per year and by 2034 begin efforts on all 24 identified natural open spaces
	Initiate restoration and maintenance on 69 new acres, bringing the cumulative total to 100 acres in 10 years	Establish long-term course of action to initiate restoration and maintenance on all identified natural open spaces Continue adding new acres in initial restoration and maintenance annually	Continue implementing long-term plan to initiate restoration and maintenance on all identified natural open spaces Continue adding new acres in initial restoration and maintenance annually
	Identify two to three new priority natural open spaces per year and develop stewardship plans (approximately 10 total)	Identify three new priority natural open spaces over five years and develop stewardship plans	Continue implementation of all 24 natural open space stewardship plans
	Continue restoration and maintenance on all previously enrolled acres	Continue restoration and maintenance on all previously enrolled acres	Continue restoration and maintenance on all previously enrolled acres
	Update habitat assessment to include land added to restoration project area for natural open spaces	Update habitat assessment	
Community	Expand the Habitat Steward Program to at least 50% of identified natural open spaces	Expand the Habitat Steward Program to at least 75% of identified natural open spaces	Expand the Habitat Steward Program to 100% of identified natural open spaces
	Recruit and manage between 5,700 to 8,850 volunteer hours (1,900 to 2,950 volunteers) per year by 2024	Establish long-term course of action to initiate restoration and maintenance on all identified natural open spaces Continue to increase annual volunteer contributions	Continue implementing long-term plan to initiate restoration and maintenance on all identified natural open spaces Continue to increase annual volunteer contributions

Table 6 continued. Near- and long-term strategic plan and benchmarks

Resources	Reevaluate program costs based on first five years of fieldwork	Evaluate and update methodology	Evaluate and update methodology
	Establish public funding base	Sustain public funding base	Ensure proper funding base for long-term maintenance and monitoring of all acres once 20-year plan is completed
Administration	Create five-year implementation plan	<p>Revise five-year implementation plan</p> <p>Develop and deliver to the community a mid-plan status report.</p>	<p>As appropriate, expand the Habitat Steward Program to city-owned land under the management of others</p> <p>Complete 20-year progress report</p>

Reporting and Sharing Knowledge

The Green Puyallup Partnership's progress will be reported annually to partners, members, and the public. Partners should adjust annual work plans in response to available funding, monitoring results, and emerging knowledge of successful techniques.

Partnership staff will be encouraged to utilize and develop effective methods to restore and maintain natural open spaces. Staff will also utilize inventive outreach strategies and network with regional restoration groups, which will provide an opportunity for staff to share information and learn from other agencies. As a member of the Green Cities Network, the Green Puyallup Partnership will have opportunities to share successes and challenges with other cities (Everett, Kent, Kirkland, Redmond, Seattle, and Tacoma) dedicated to a similar goal and vision. Written materials, including this 20-year plan and the *Green Puyallup Habitat Steward Field Guide*, to be developed in the next year, will be posted on the future Green Puyallup Partnership website, and all parties using these resources will be asked to give feedback on the Partnership's methods and materials.

VI. Conclusion

Partners intend to use the Green Puyallup Partnership's 20-Year Natural Open Spaces Restoration Plan as a tool, resource, and road map to guide the Partnership in the proposed restoration, maintenance, and stewardship of 354 acres of valuable natural open spaces within the City of Puyallup. Natural open spaces assessed in the plan will continue to face pressures and threats such as fragmentation, invasive species that prevent native species from regenerating, declining native plant and tree diversity, and general resource limitations for restoration, maintenance, and stewardship activities. Pressures and threats to Puyallup's natural open spaces diminish the important benefits they provide, such as reduced stormwater runoff, improved water and air quality, stronger property values and attractive communities, reduced greenhouse gases, increased habitat for native wildlife, and improved quality of life. The Green Puyallup Partnership has the great opportunity build a sustainable network of healthy natural open spaces that provide community benefits for current and future generations.

This plan offers a snapshot of the ecological state of the city's natural open spaces, using the FLAT analysis approach and tree-age model to rank current conditions. Ecological data collected through the FLAT analysis occurred at the management unit scale, delivering average conditions associated with natural open spaces. Utilizing current partner staff capacity and volunteer contributions, information gained about the natural open spaces, and guidance from launching other Green City Partnerships, partners formed a program vision, outcomes, and goals. In addition, the plan

acknowledges associated costs related to restoring, maintaining, and stewarding all 354 acres, and anticipated leveraged volunteer contributions.

Partners understand that limited resources (funding and staff time) will require effective, efficient, and priority-driven restoration and maintenance activities, and coordinated efforts that further other city programs and requirements (e.g., NPDES Municipal Stormwater Phase 2 Permit and Tree City USA). Achieving the proposed goals will require exploration of sustainable, long-term funding options from various sources, which will allow the program to grow and support long-term stewardship. Partners should consider the Green Puyallup Partnership 20-Year Natural Open Spaces Restoration Plan as a living document that will evolve as new ecological data becomes available, the Habitat Steward Program and volunteer contributions grow, and partners secure new funding sources. Working together, partners and community members can restore, maintain, and steward Puyallup's natural open spaces that support healthy ecosystems and waterways.

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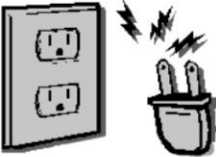

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VIII. Appendices

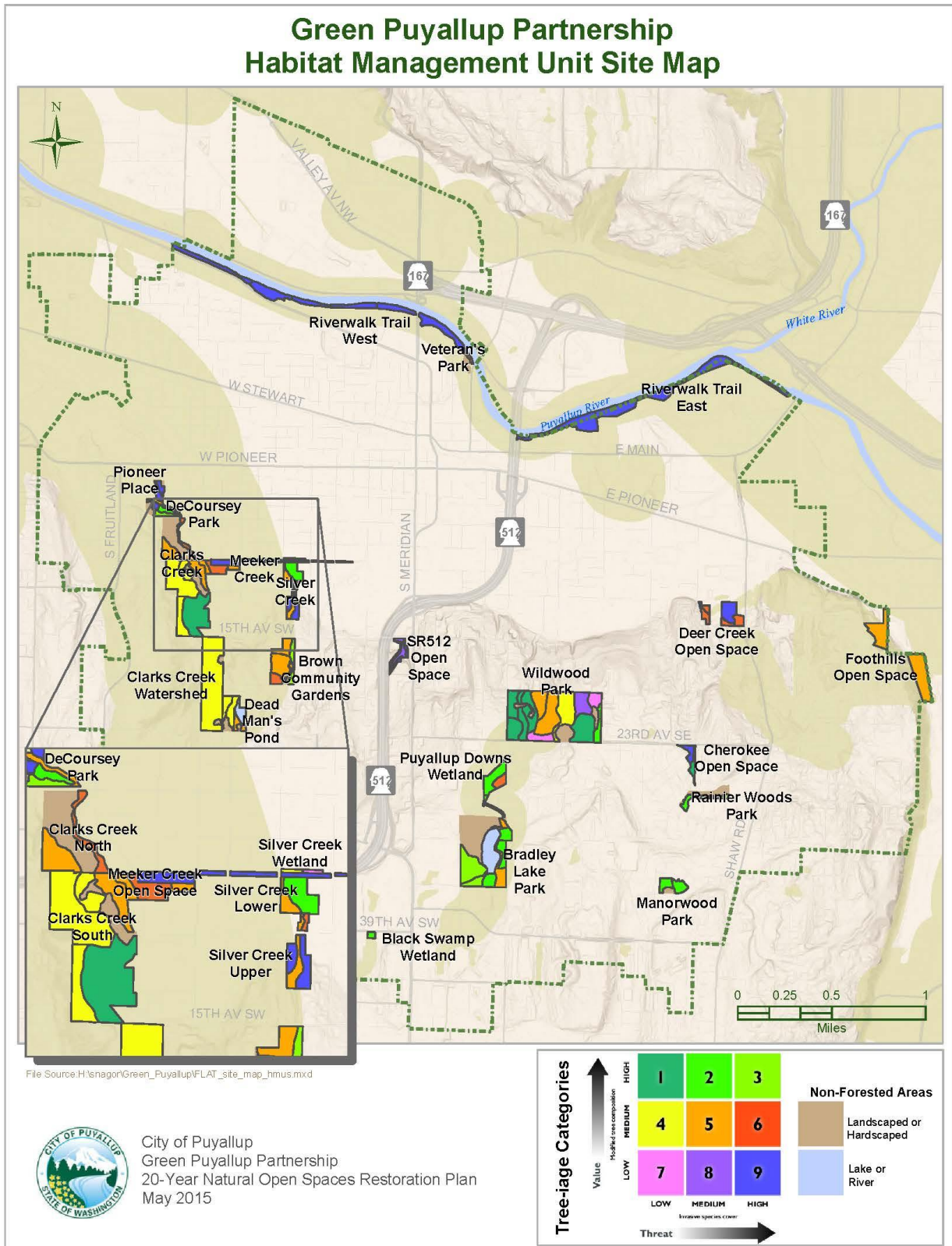
Appendix A: The Ecological and Social Benefits of Natural Open Spaces

	<p>Reduce Stormwater Runoff</p>	<p>Tree canopies reduce the rate at which rain falls to the earth. Water enters the ground more slowly under trees and is better absorbed and filtered into groundwater than when it runs off paved and nonporous surfaces. Since conifers and other evergreen plants grow year-round, more water moves up from the ground, through plant tissues, and into the atmosphere as water vapor. Urban forests can reduce annual stormwater runoff by 2%-7%, and a mature tree can store 50-100 gallons of water during large storms (Fazio 2012). Green streets, rain barrels, and tree planting are estimated to be 3-6 times more effective in managing stormwater per \$1,000 invested than conventional methods (Foster et al. 2011).</p>
	<p>Improve Water Quality</p>	<p>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. Forested buffers around streams have been shown to reduce sediment and nutrient pollution levels (Osborne and Kovacic 1993).</p>
	<p>Reduce Erosion</p>	<p>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 (Xiao et al. 1998).</p>
	<p>Improve Air Quality</p>	<p>Plant leaves absorb carbon dioxide and produce oxygen through photosynthesis. The surfaces of leaves trap airborne dust and soot (McPherson et al. 1994), removing millions of pounds of air pollutants annually from the air in a city (American Forests 2001).</p>
	<p>Provide Wildlife Habitat</p>	<p>Native wildlife has unique requirements for food and shelter. Although raccoons and crows adapt well to urban environments, many native species do not. They require a variety of plants and multiple layers of canopy to forage and nest. Healthy urban forests under restoration have been demonstrated to increase species diversity (Ruiz-Jaén and Aide 2006).</p>
	<p>Reduce Energy Use and Combat Climate Change</p>	<p>A 25-foot tree reduces annual heating and cooling costs of a typical residence by an average of 8%-12% (University of Washington 1998). Trees absorb carbon dioxide and store the carbon in woody tissues, reducing the amount of carbon dioxide in the atmosphere. Urban forests have the capacity to lower energy consumption in urban environments by lowering ambient temperatures and to create microclimates conducive to air movement. Lowering energy consumption reduces electricity use and the amount of carbon dioxide emitted into the atmosphere from power plants (Nowak and Crane 2001). Each year, an acre of trees absorbs the amount of carbon produced by driving a car for 26,000 miles (Nowak et al. 2002).</p>
	<p>Boost Local and Regional Economy</p>	<p>Urban forestry supports job creation and retention, resulting in added individual income and increased local, state, and federal taxes (CalFire 2011). Homes that border urban forests may be valued at up to 5% more than comparable homes farther from parks (Tyrväinen and Miettinen 2000), and street trees add value to homes as well (Donovan and Butry 2010). Forested parklands provide residential properties with an adjacent natural area for walking and passive recreation activities such as bird-watching.</p>

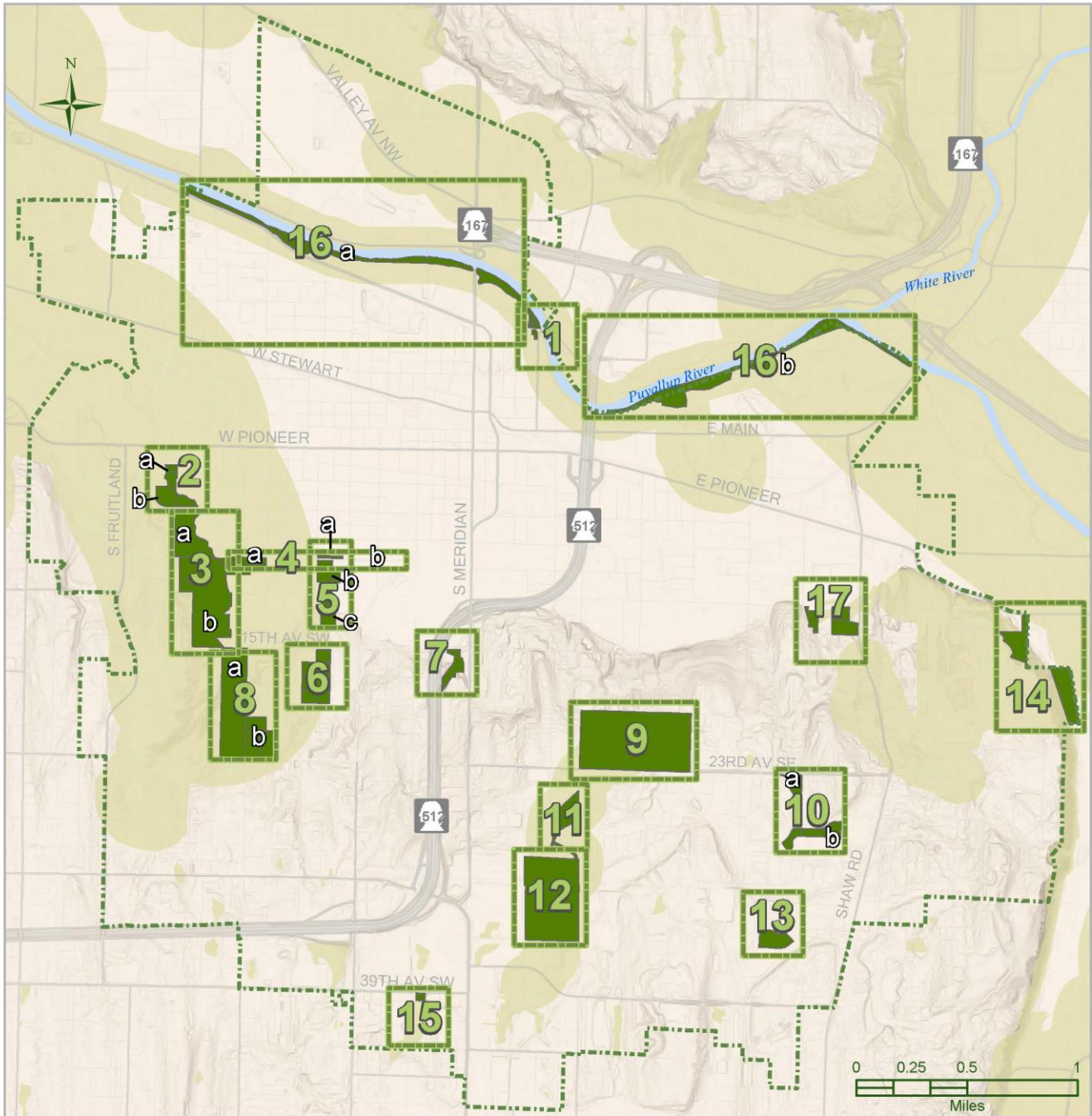
Appendix A continued: The Ecological and Social Benefits of Natural Open Spaces

	<p>Buffer Noise</p>	<p>Tree canopies dampen sound by intercepting sound waves (Herrington 1974). Noise buffers composed of trees and shrubs can reduce 50% of noise detectable by the human ear (USDA 1998), including high-frequency noise, which is most distressing to people (McPherson et al. 2001).</p>
	<p>Community Building</p>	<p>Physical features, particularly nature, play an important role in creating vital neighborhood spaces (Sullivan et al. 2004). Urban greenspaces and parks provide a gathering place for people of different backgrounds to connect with each other. Strong community relationships are built from exchanging information and working together to achieve common goals (e.g., open-space improvements). Residents who are more attached to their community have higher levels of social cohesion and social control, less fear of crime, and display more signs of physical revitalization of the neighborhood (Brown et al. 2003).</p>
	<p>Make Communities More Attractive</p>	<p>Vegetation provides visual relief from the built environment. Trees and stretches of parkland can soften the angular edges of buildings, while the natural tones of bark and foliage are easy on the eyes. Trees are known to be 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 2001), graffiti, vandalism, and littering (Brunson 1999).</p>
	<p>Physical Wellness and Fitness</p>	<p>Physical exercise and activity has been shown to reduce the risk of hypertension, coronary heart disease, stroke, diabetes, and breast and colon cancer (World Health Organization 2010). 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). People in communities with high levels of greenery or greenspace are more likely to be physically active, and less likely to be overweight or obese (Maas et al. 2006 and Ellaway et al. 2005).</p>
	<p>Mental health and Function</p>	<p>Physical activity has also been linked to decreases in symptoms of stress and depression (U.S. Dept. of Health 1999). The opportunities to exercise provided by trails through forested parks and natural areas is therefore relevant to the treatment of these mental health ailments. Even basic mental function is improved, as the experience of nature helps restore the mind after the mental fatigue of work or studies, improving productivity and creativity (Kaplan 1995 and Hartig et al. 1991).</p>
	<p>Child Development</p>	<p>Experience with nature helps children to develop cognitively, emotionally, and behaviorally by connecting them to environments that encourage imagination, cognitive and intellectual development, and social relationships (Isenberg and Quisenberry 2002 and Heerwagen and Orians 2002). Green settings and green play areas also decrease the severity of attention deficit in children (Taylor et al. 2001).</p>
	<p>Health Benefits of Stewardship Activities</p>	<p>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-lb person can burn 340 calories from digging, gardening, and mulching; 306 calories from planting trees; and 292 calories from raking leaves (www.calorie-count.com).</p>

Appendix B: Maps of Tree-age Categories per Natural Open Space – Overview and Individual Natural Open Space Maps



Overview of Individual Site Maps: HMU Tree-iage Maps



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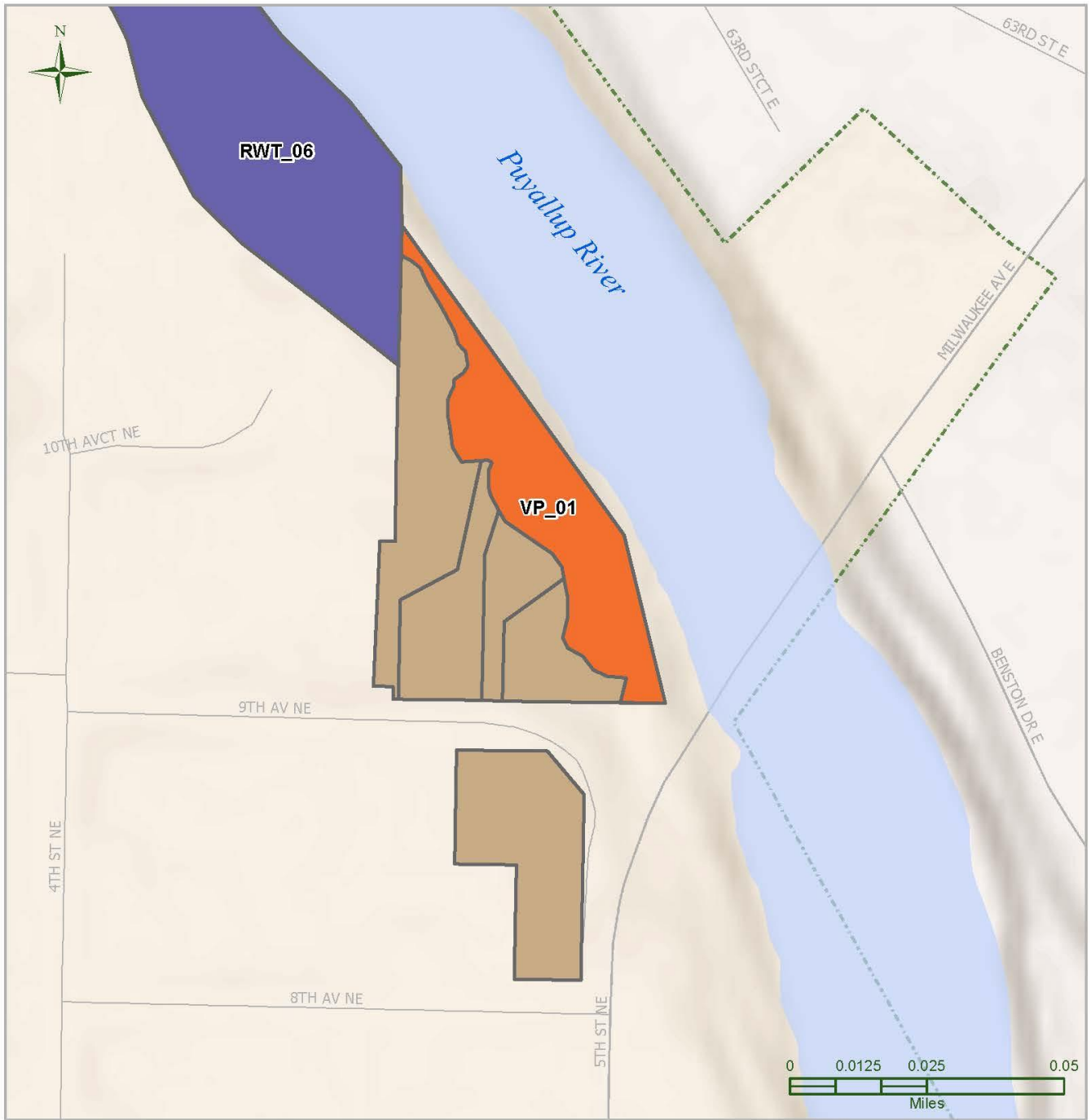
Key to Individual Tree-iage Maps

Map Number	Park Name	Map Number	Park Name
1	Veteran's Park	8a	Clarks Creek Watershed
2a	Pioneer Place	8b	Dead Man's Pond
2b	Decoursey Park	9	Wildwood Park
3a	Clarks Creek North	10a	Cherokee Open Space
3b	Clarks Creek South	10b	Rainier Woods Park
4a	Meeker Creek Open Space	11	Puyallup Downs Wetland
4b	Meeker Creek	12	Bradley Lake Park
5a	Silver Creek Wetland	13	Manorwood Park
5b	Silver Creek Lower	14	Foothills Open Space
5c	Silver Creek Upper	15	Black Swamp Wetland
6	Brown Community Gardens	16a	Riverwalk Trail - West
7	SR512 Open Space	16b	Riverwalk Trail - East
		17	Deer Creek Open Space



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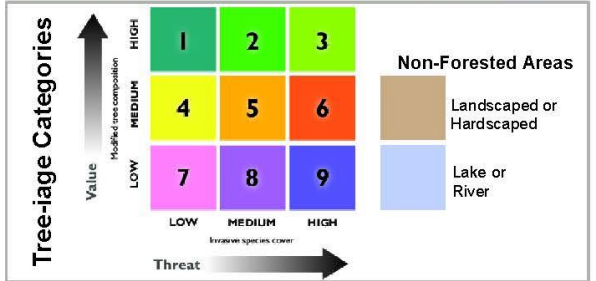
Tree-iage Categories per Park: Map 1 Veteran's Park and Riverwalk Trailhead



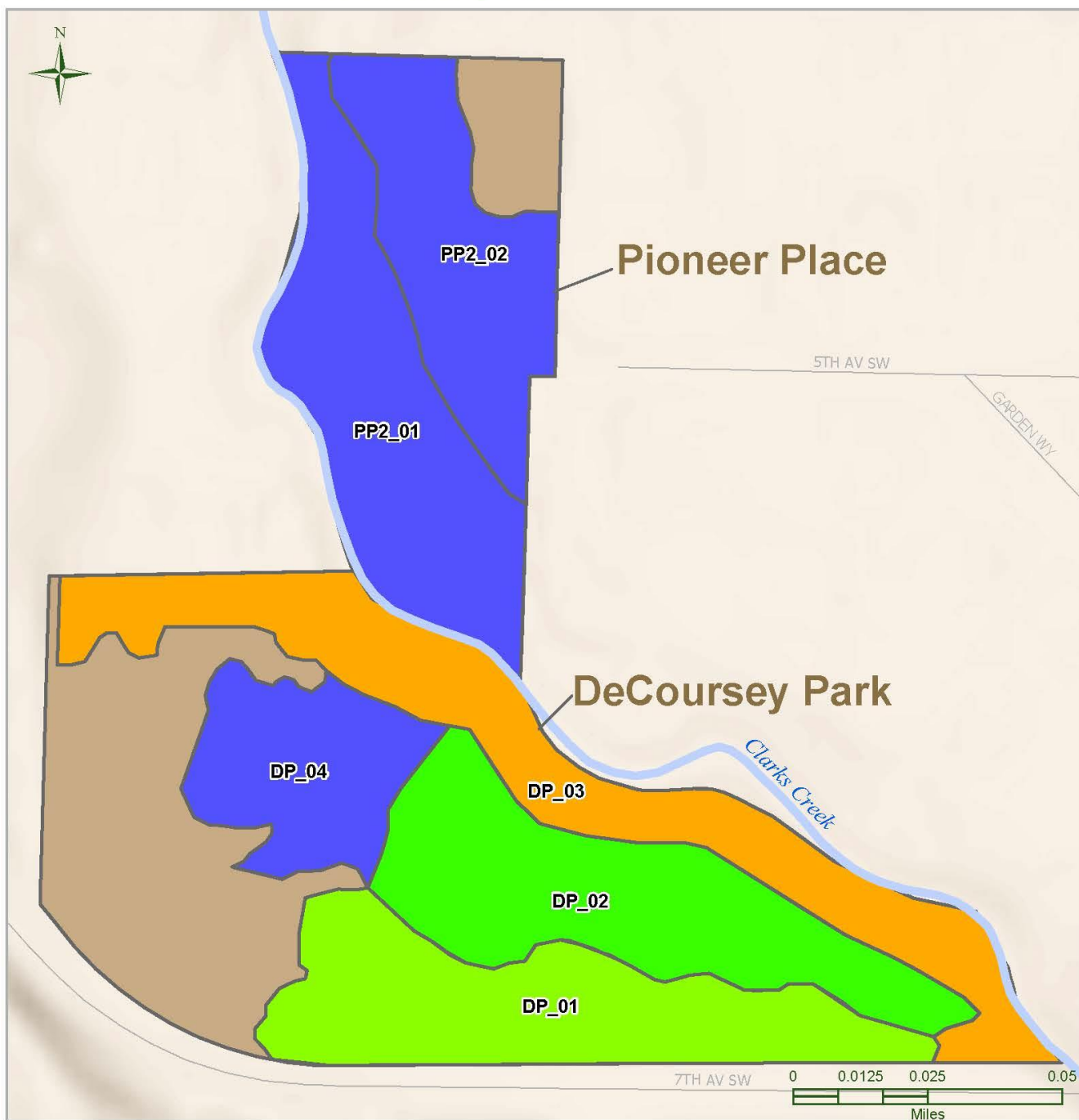
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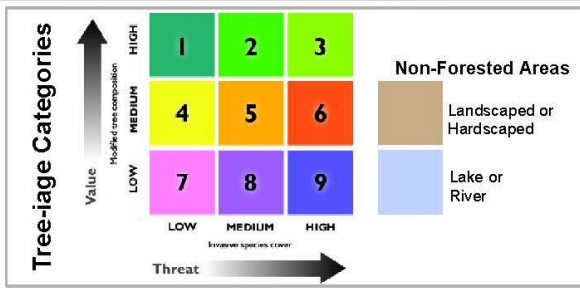
Tree-age Categories per Park: Map 2 Pioneer Place and DeCoursey Park



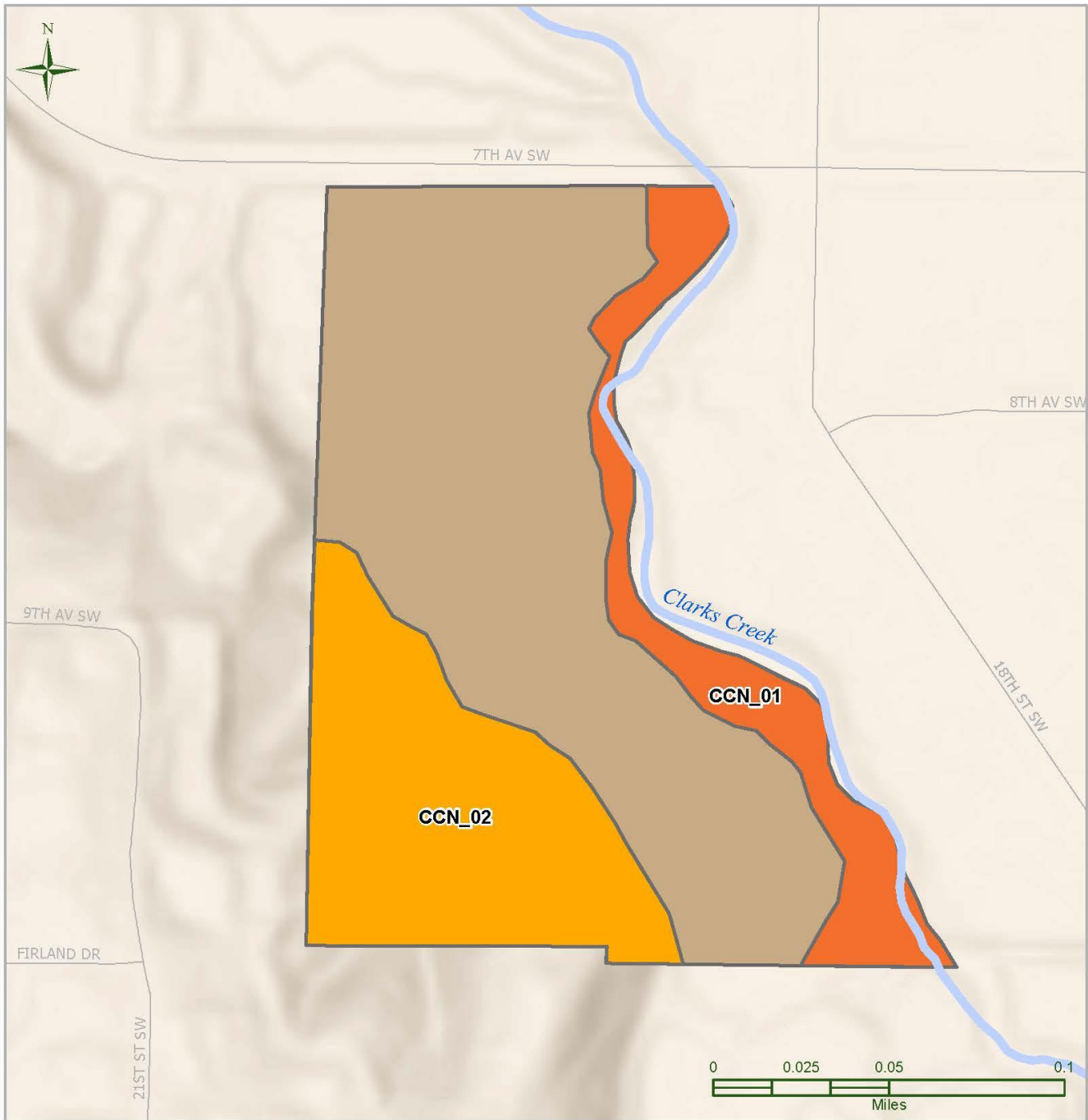
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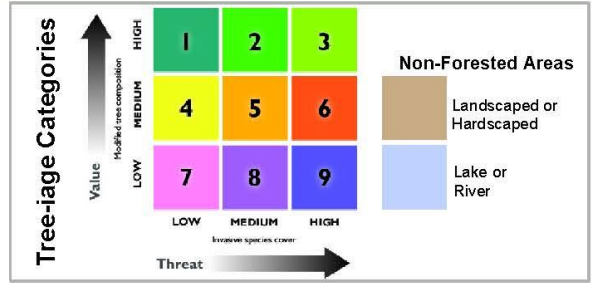
Tree-age Categories per Park: Map 3a Clark's Creek North



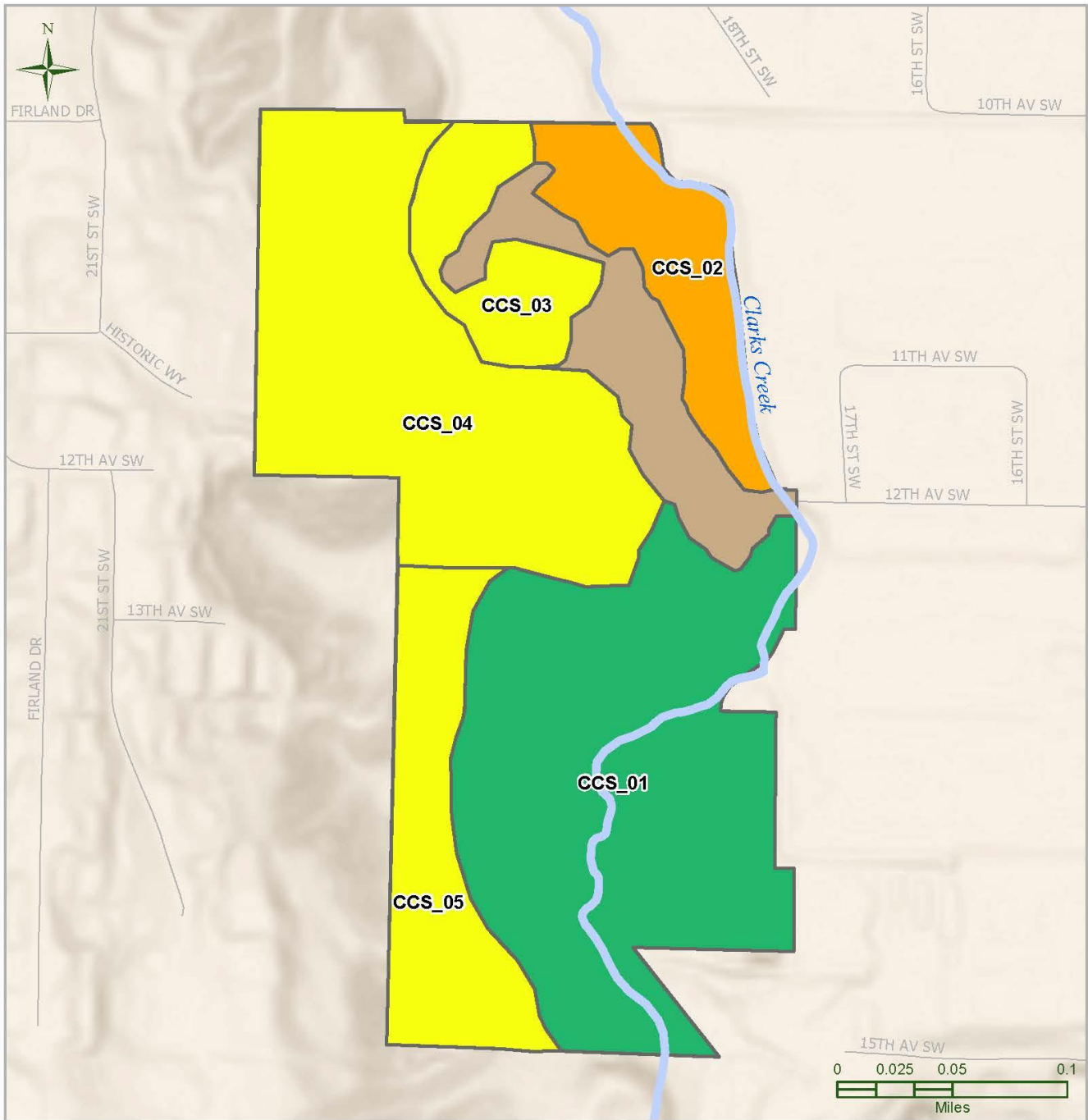
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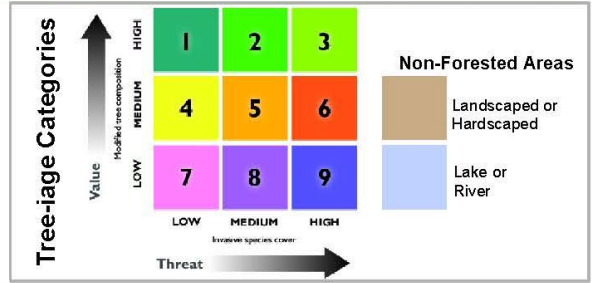
Tree-age Categories per Park: Map 3b Clarks Creek South



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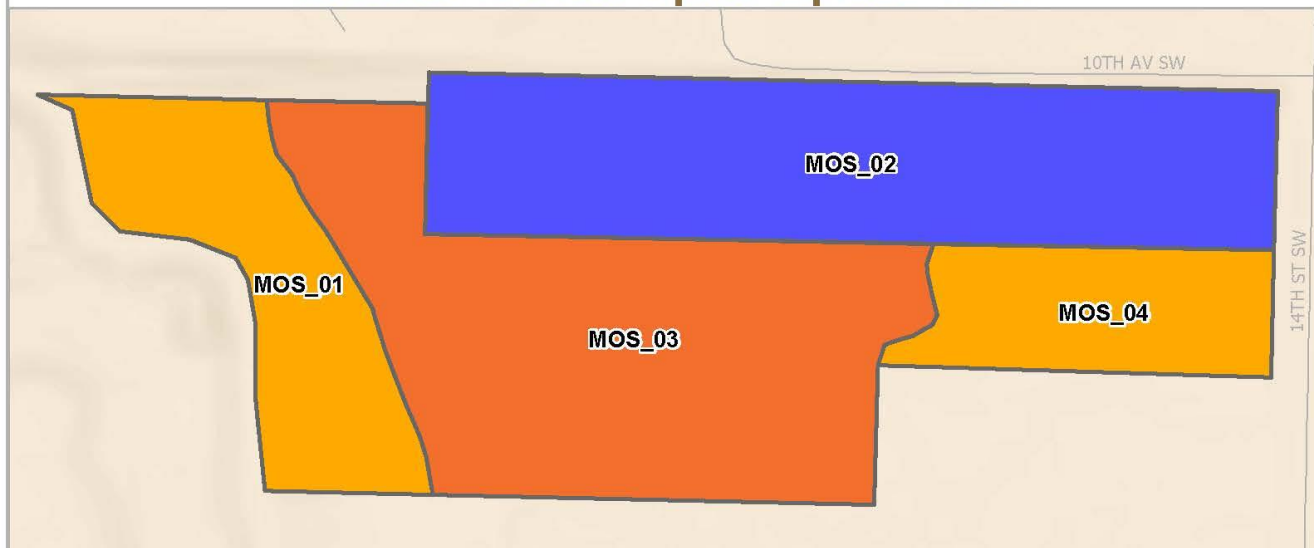
Tree-iage Categories per Park: Map 4 Meeker Creek and Open Space Site



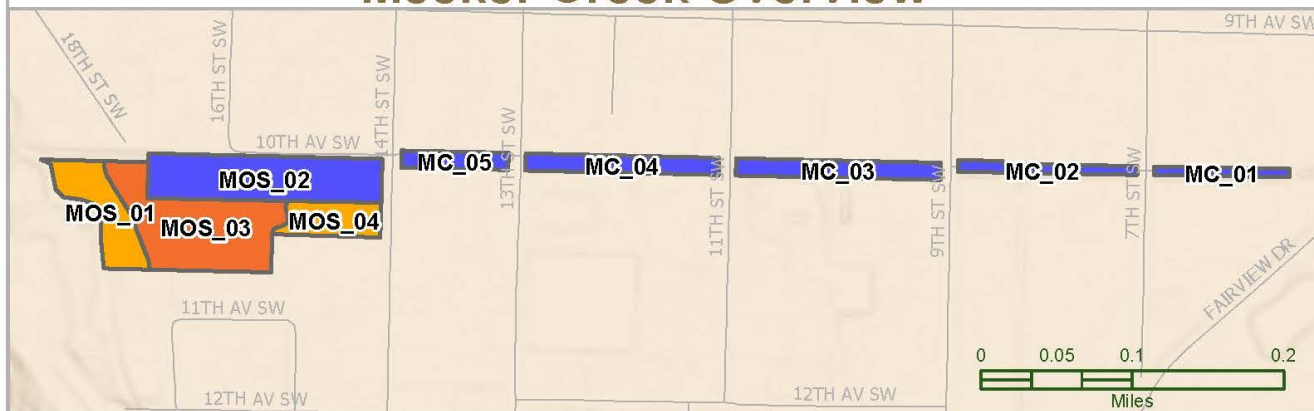
Meeker Creek



Meeker Creek Open Space Site



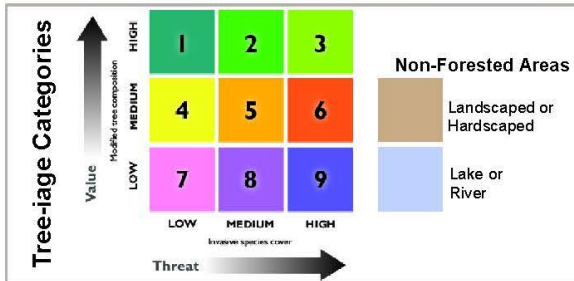
Meeker Creek Overview



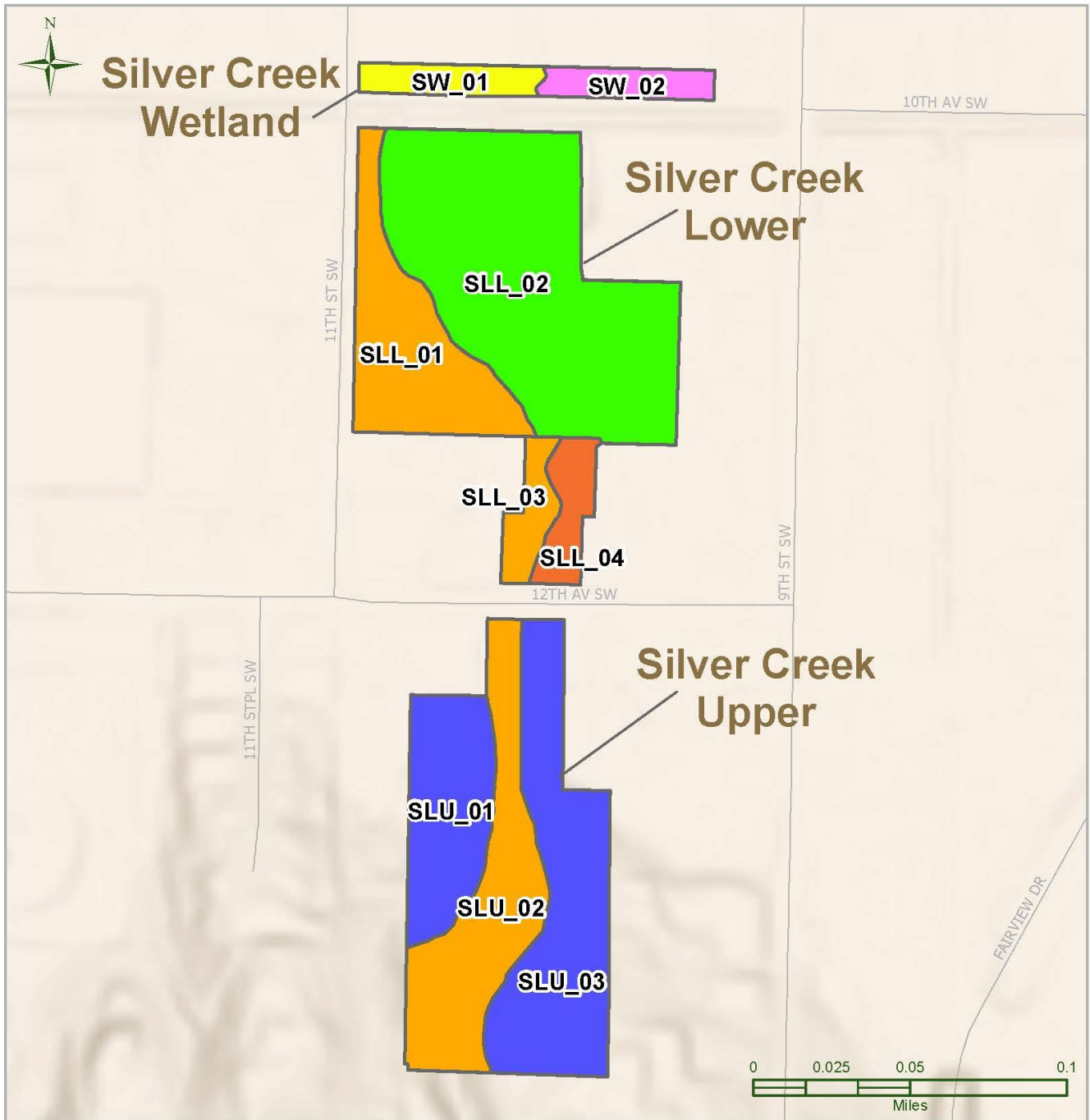
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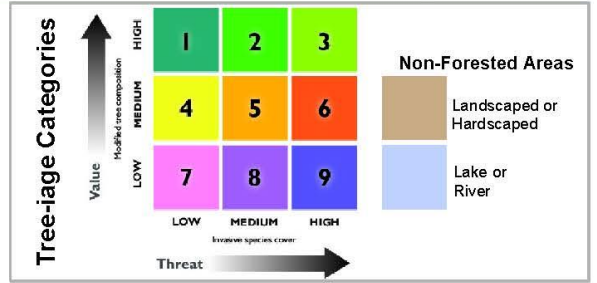
Tree-age Categories per Park: Map 5 Silver Creek



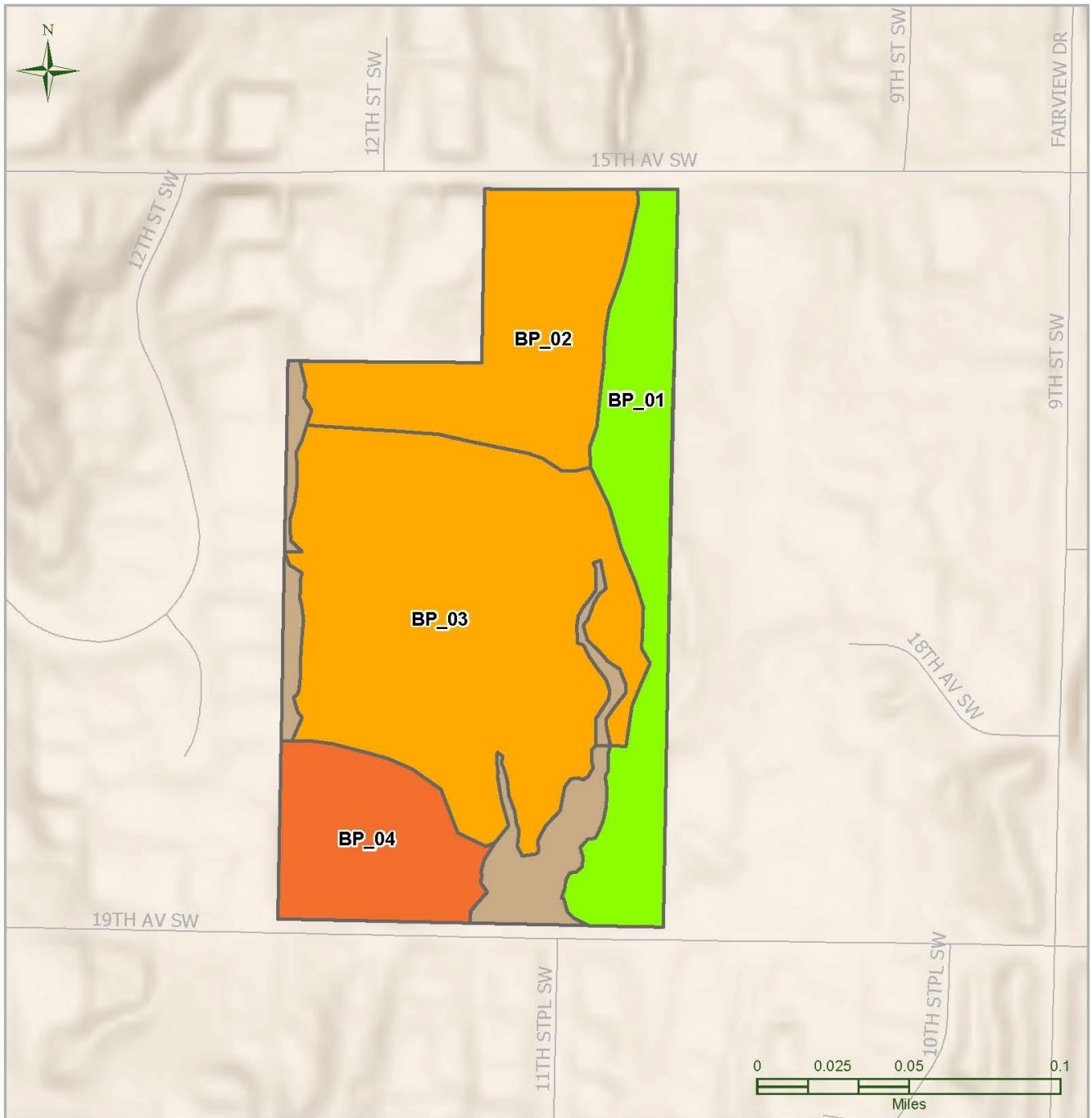
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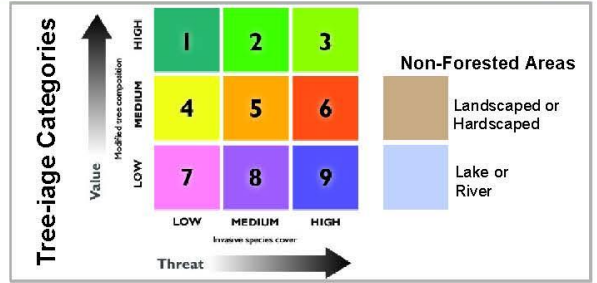
Tree-age Categories per Park: Map 6 Brown Community Gardens



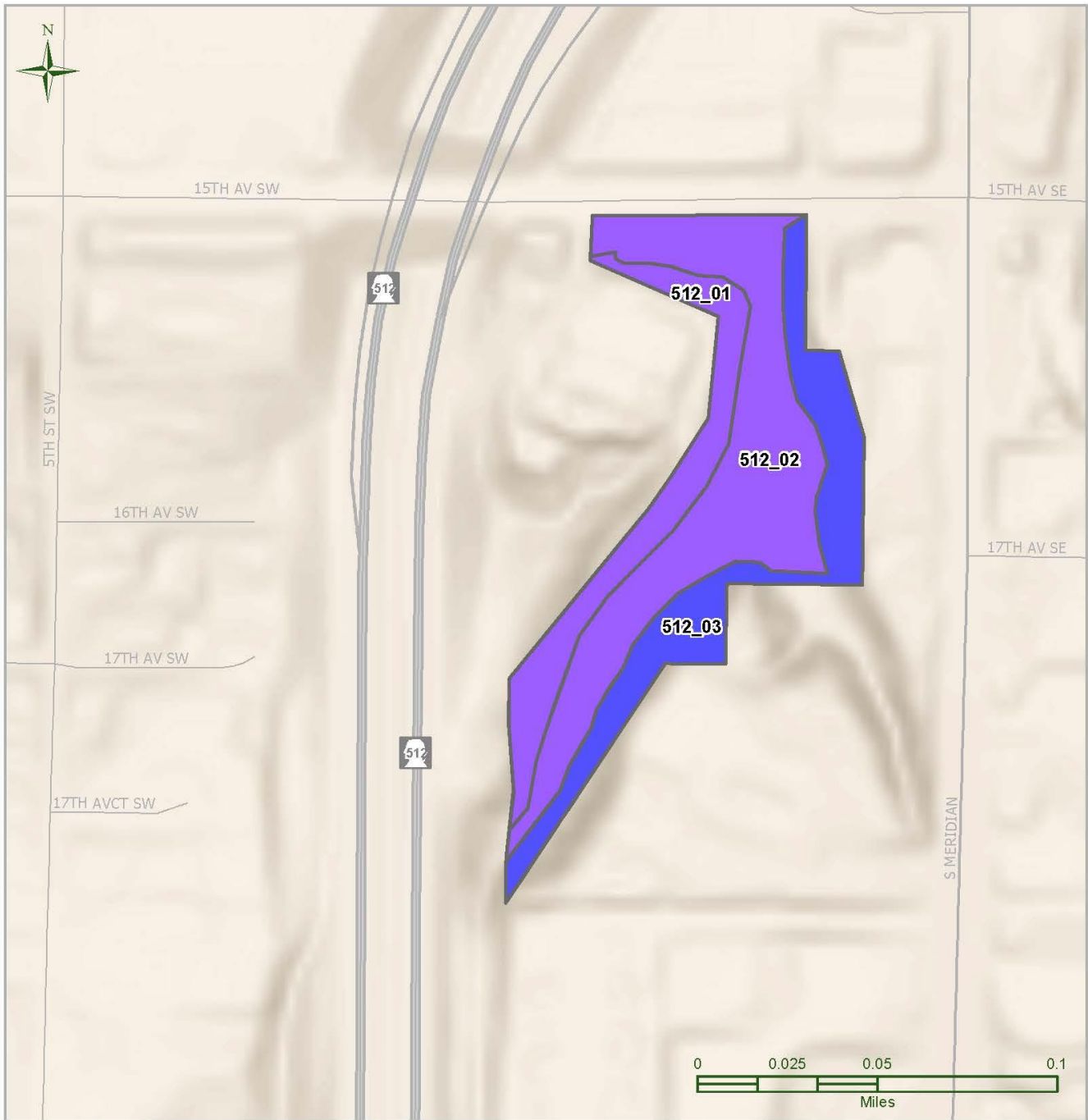
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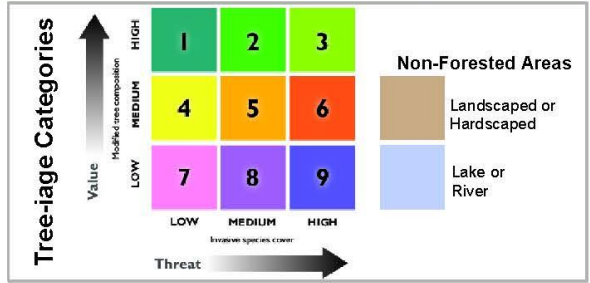
Tree-iage Categories per Park: Map 7 SR 512 Open Space



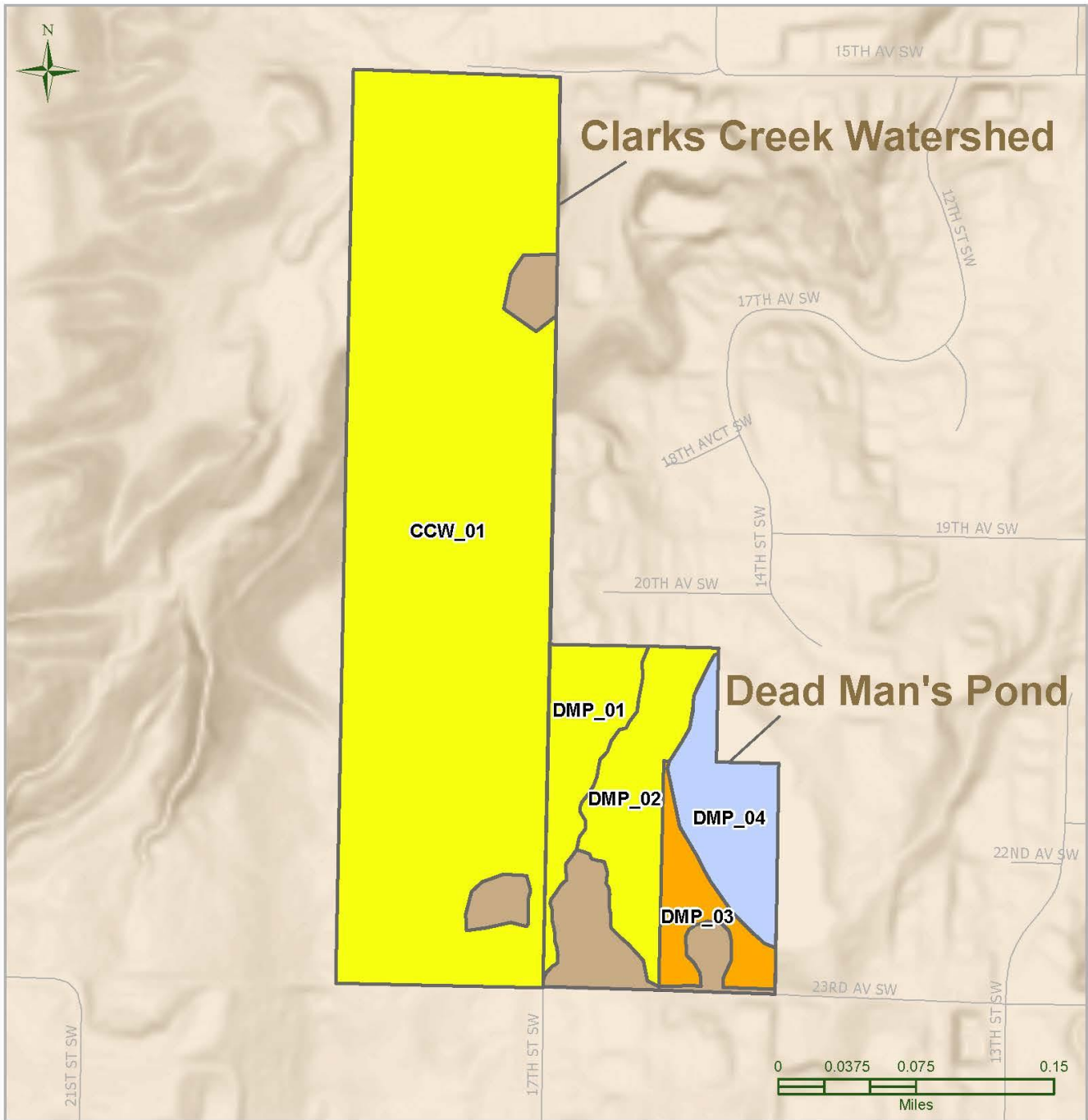
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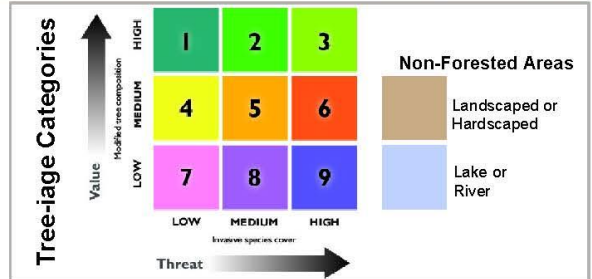
Tree-age Categories per Park: Map 8 Clarks Creek Watershed and Dead Man's Pond



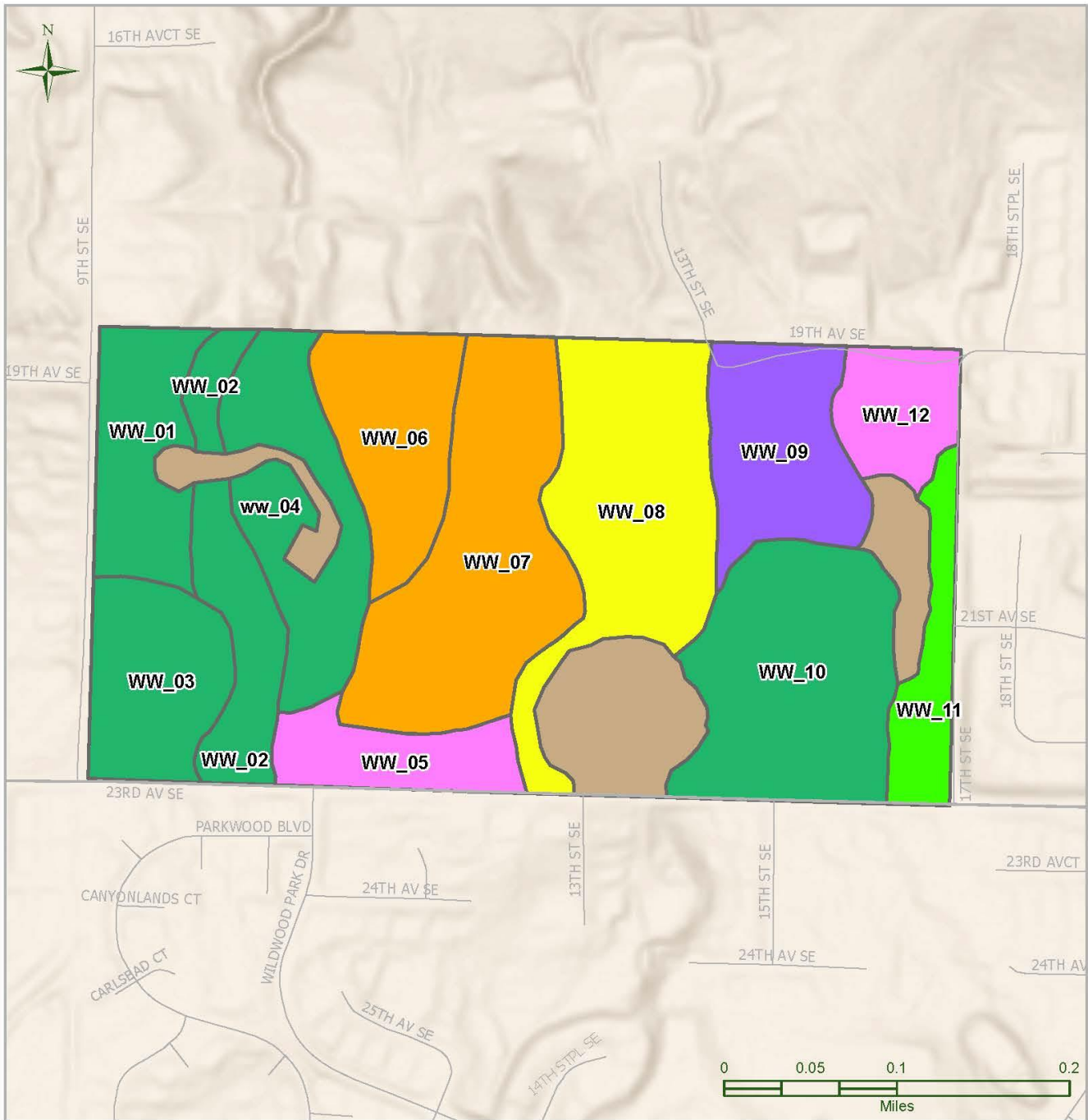
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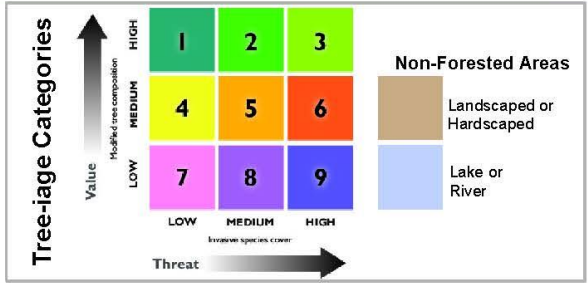
Tree-age Categories per Park: Map 9 Wildwood Park



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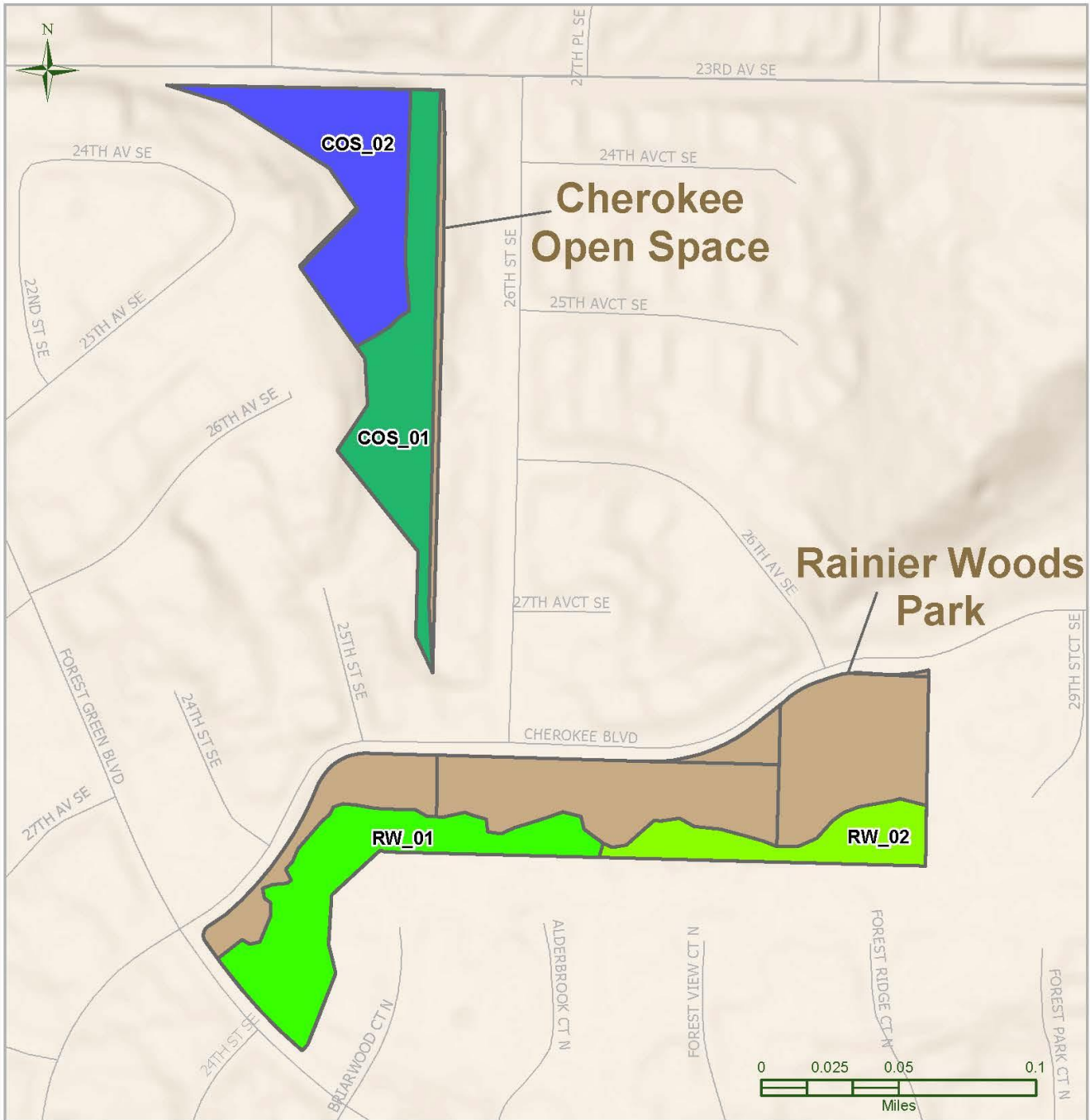


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Tree-iage Categories per Park: Map 10

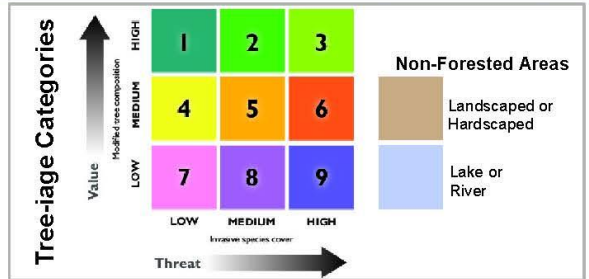
Cherokee Open Space and Rainier Woods Park



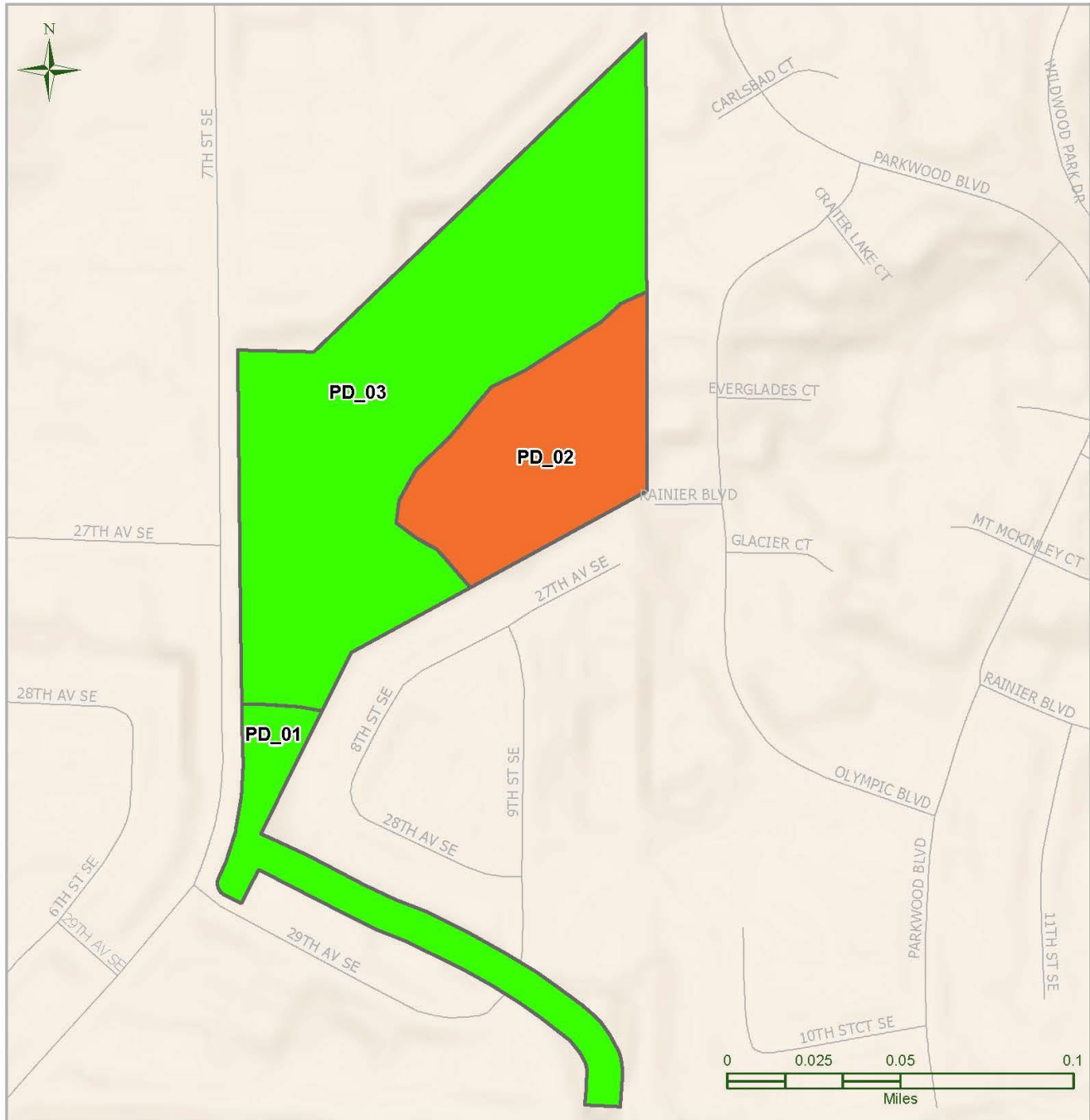
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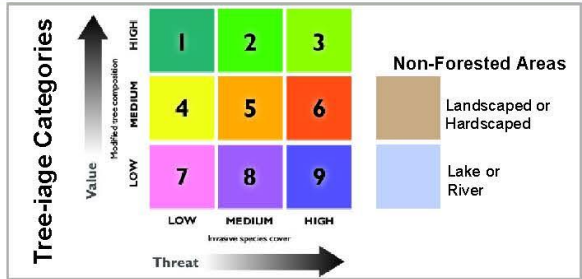
Tree-iage Categories per Park: Map 11 Puyallup Downs Wetland



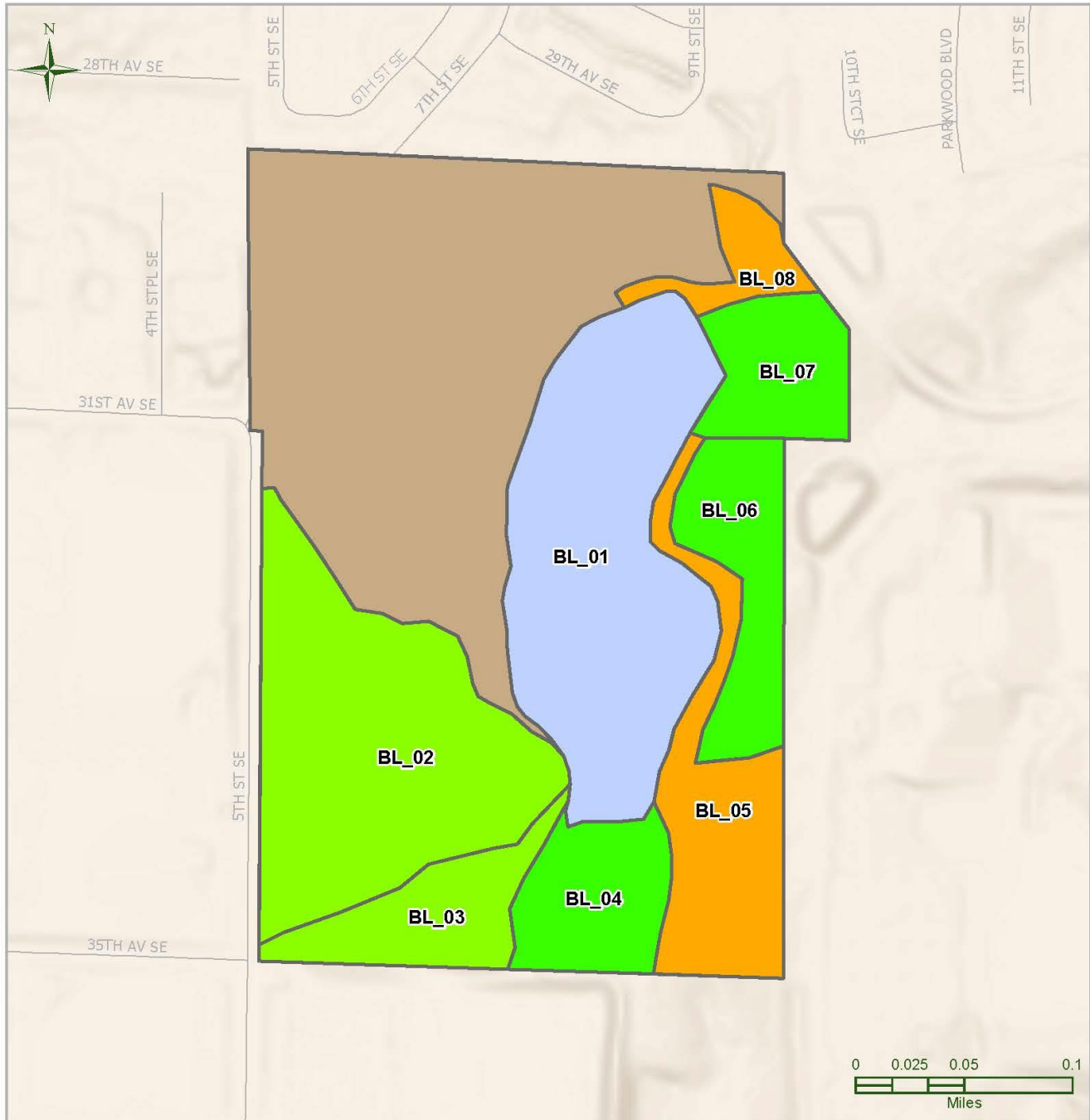
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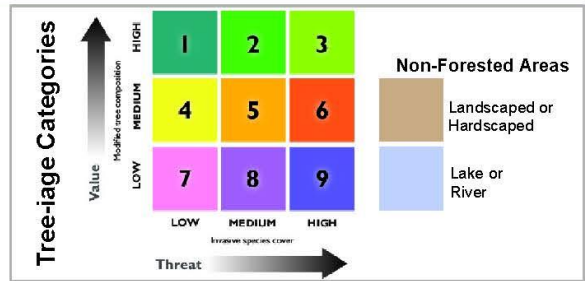
Tree-age Categories per Park: Map 12 Bradley Lake Park



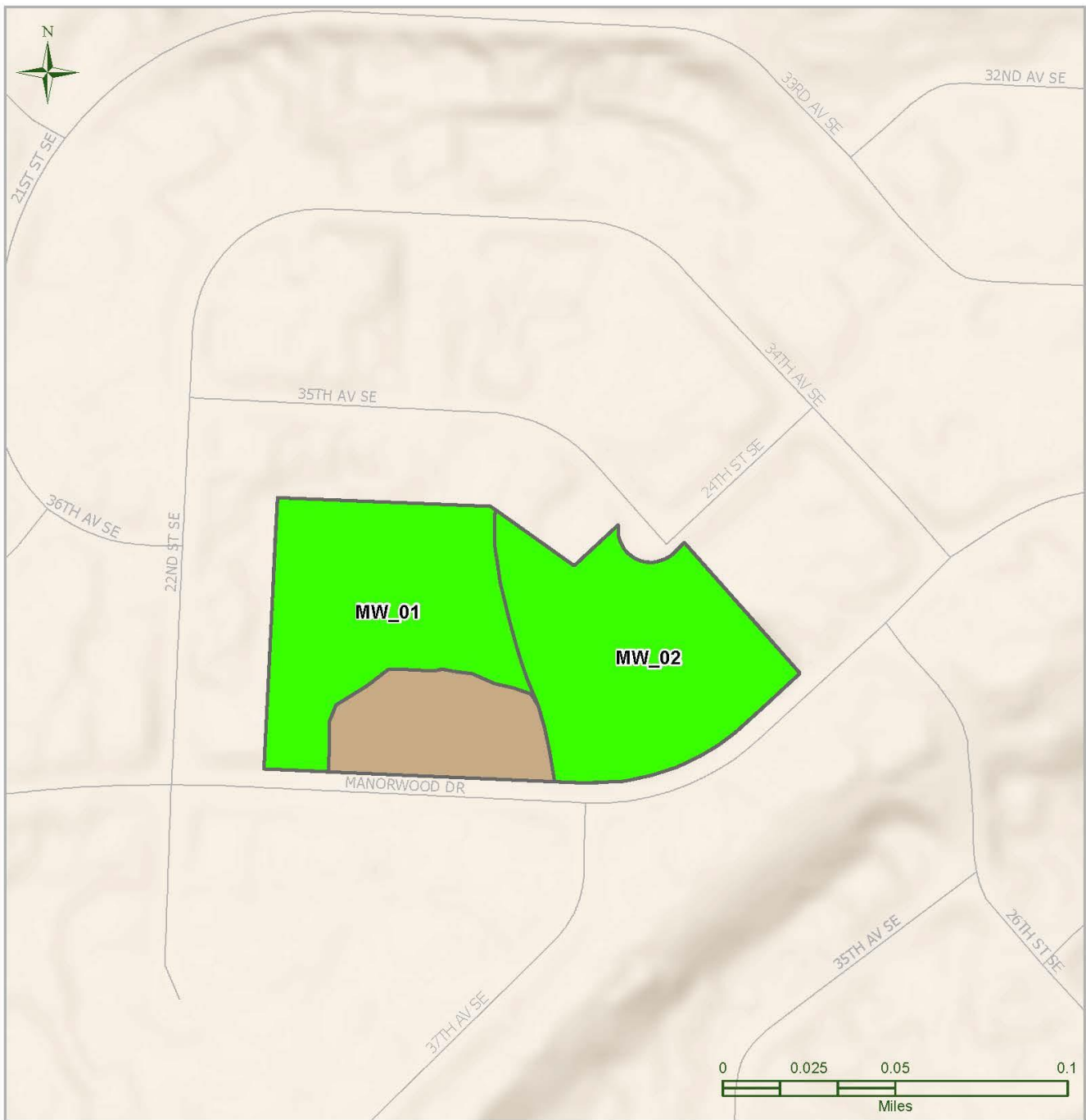
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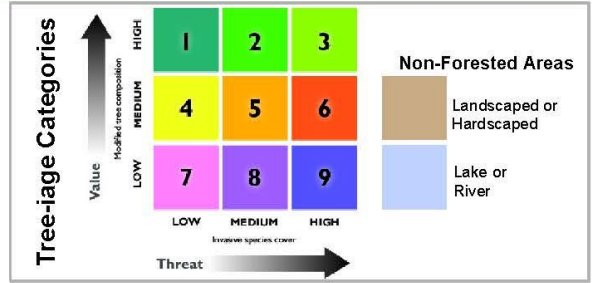
Tree-age Categories per Park: Map 13 Manorwood Park



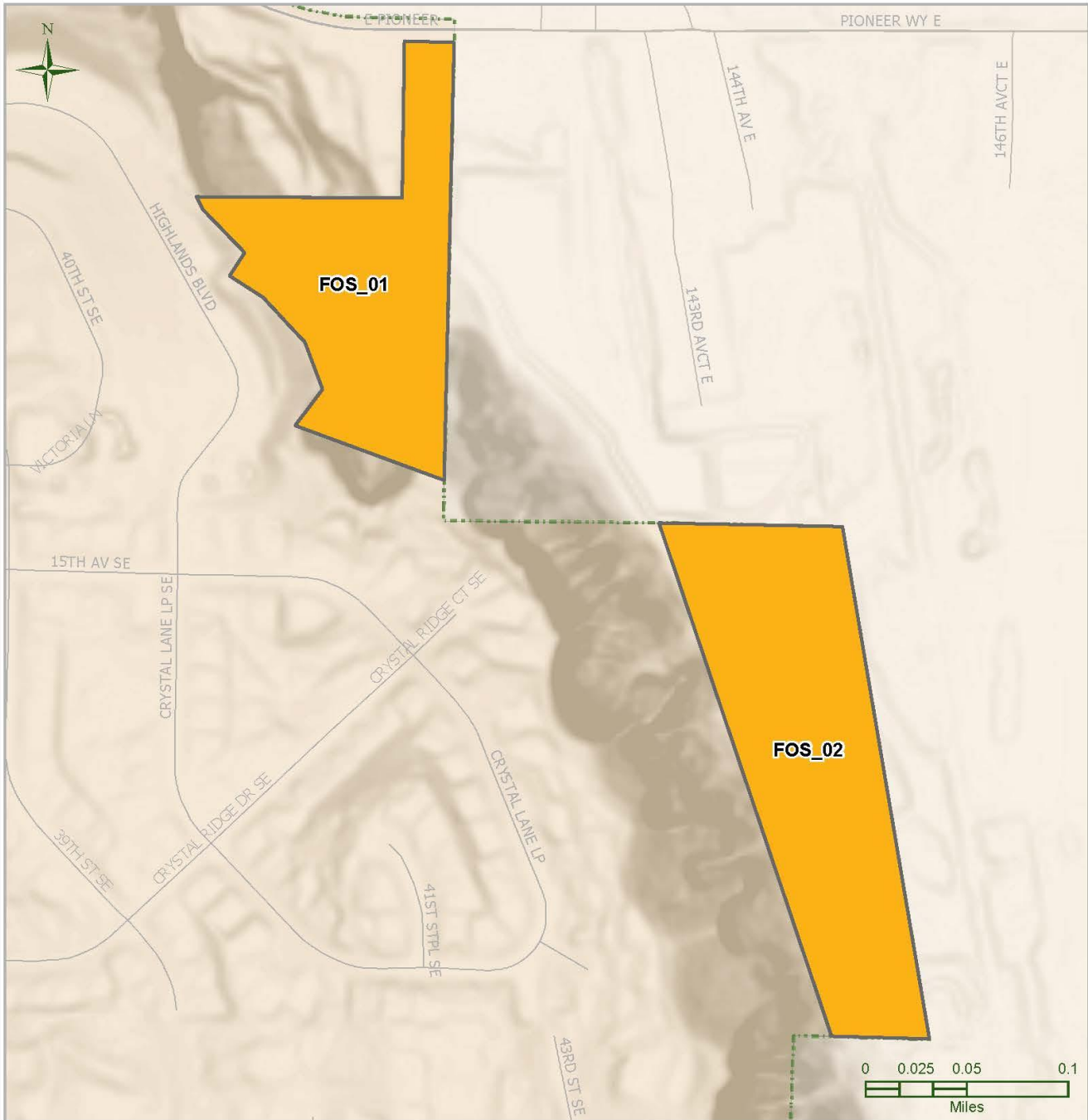
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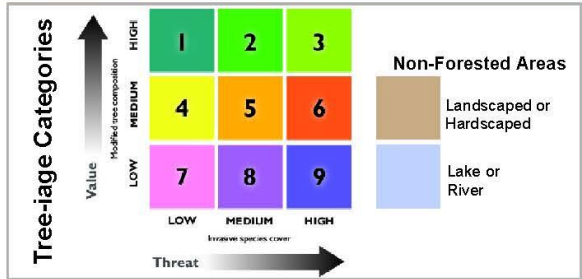
Tree-iage Categories per Park: Map 14 Foothills Open Space



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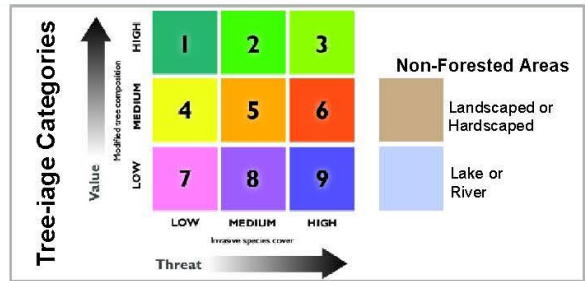
Tree-age Categories per Park: Map 15 Black Swamp Wetland



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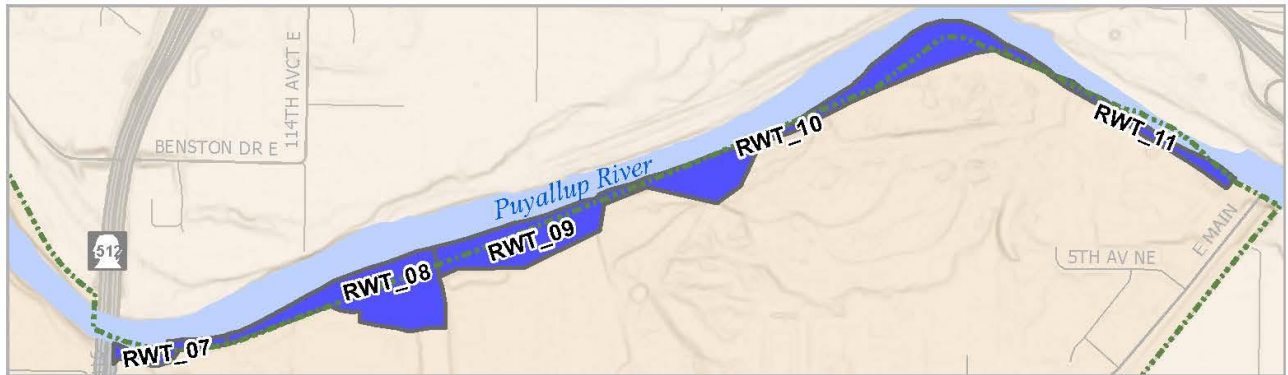
Tree-age Categories per Park: Map 16 Riverwalk Trail



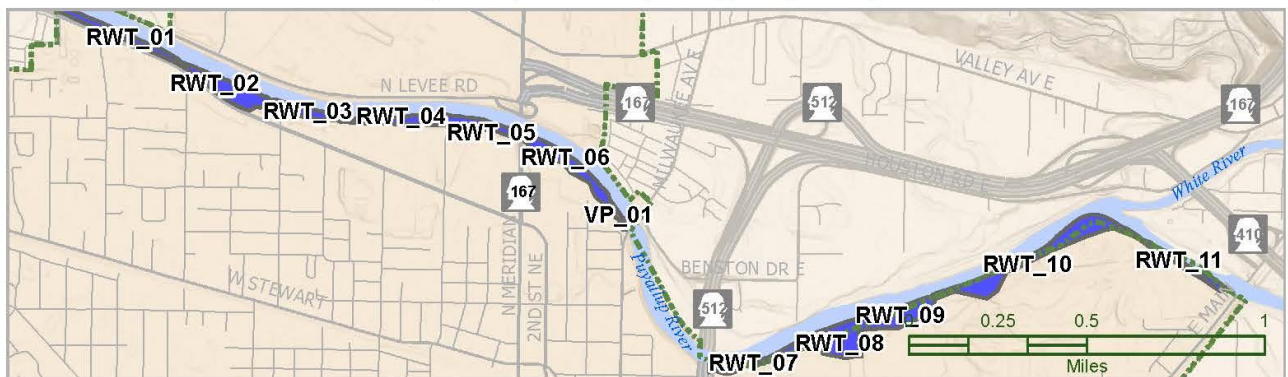
Riverwalk Trail - West



Riverwalk Trail - East



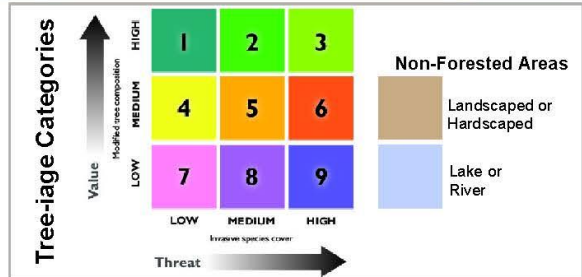
Riverwalk Trail Overview



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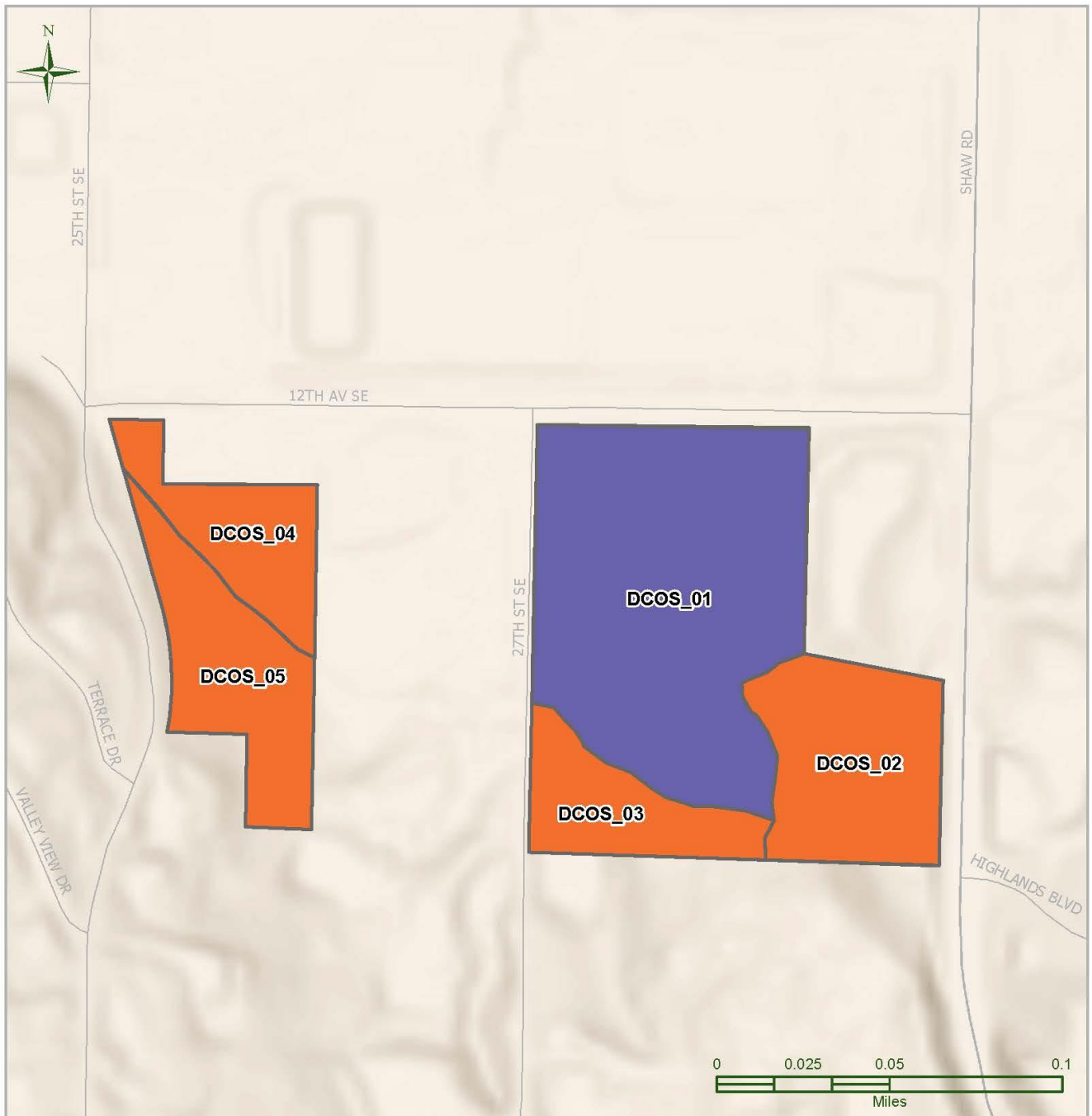


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Tree-age Categories per Park: Map 17

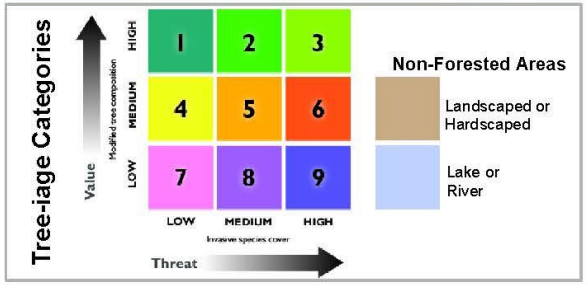
Deer Creek Open Space



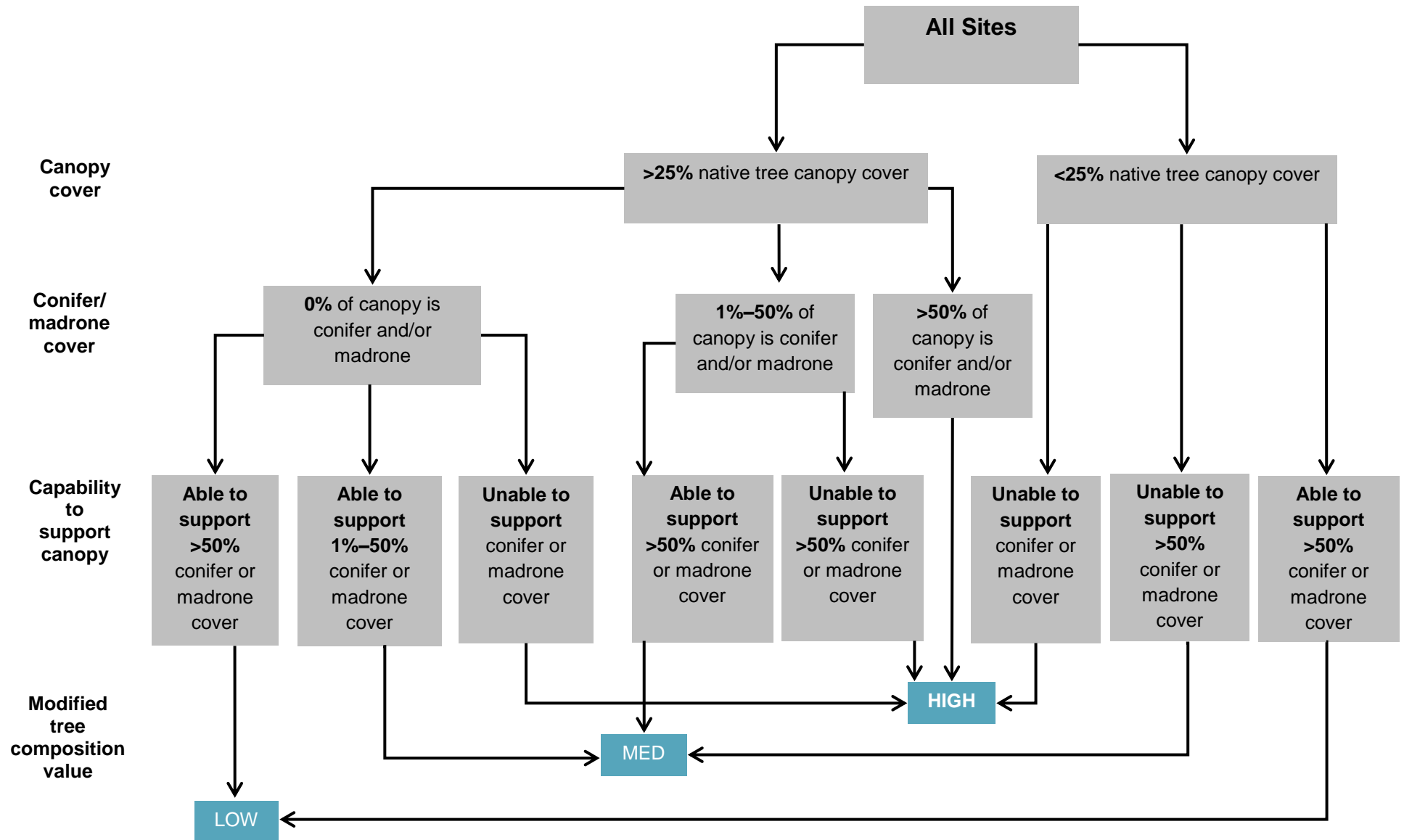
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Appendix C: Forest Landscape Assessment Tool (FLAT) Flow Chart for Habitat Composition



Appendix D: Distribution of Tree-iage Categories by HMU Acre per Natural Open Space

PARK NAME	TREE-IAGE CATEGORY (HMU ACRES)										Total Acres
	0*	1	2	3	4	5	6	7	8	9	
Black Swamp Wetland			0.83								0.83
Bradley Lake Park	11.06		8.87	13.29		5.91					39.13
Brown Community Gardens				2.95		10.98	2.14				16.07
Cherokee Open Space		1.94								2.07	4.01
Clarks Creek North						4.59	2.32				6.91
Clarks Creek South		16.53			21.47	4.15					42.15
Clarks Creek Watershed					34.75						34.75
Dead Man's Pond	3.13				6.54	1.88					11.55
DeCoursey Park	1.54			1.47		1.71				0.81	5.53
Deer Creek Open Space							5.51			1.90	7.41
Foothills Open Space						19.36					19.36
Manorwood Park			5.28								5.28
Meeker Creek										3.21	3.21
Meeker Creek Open Space						2.27	3.18			2.88	8.33
Pioneer Place Wetland										2.72	2.72
Puyallup Downs Wetland			7.51				2.19				9.70
Rainier Woods Park			2.09	0.98							3.07
Riverwalk Trail										56.44	56.44
Silver Creek Lower			3.99			1.84	0.39				6.22
Silver Creek Upper						1.73				3.33	5.06
Silver Creek Wetland					0.36			0.33			0.69
SR-512 Open Space									3.44	1.37	4.81
Veterans Park							0.64				0.64
Wildwood Park		32.44	3.04		10.76	17.44		6.70	6.10		76.48
<i>Total acreage mapped, including open water</i>	<i>15.73</i>	<i>50.91</i>	<i>31.61</i>	<i>18.69</i>	<i>73.88</i>	<i>71.86</i>	<i>16.37</i>	<i>7.03</i>	<i>9.54</i>	<i>74.73</i>	<i>370.35</i>
<i>Total tree-iage acres in project area</i>											354

* "0" represents open water that was mapped for the FLAT analysis but not given a tree-iage category. Total Project Area = GIS Acres Mapped - Open-Water Acres

HMUs summarized by habitat type and total project area summed to 354.62 acres. Due to rounding conventions used throughout the assessment process, the Green Puyallup Partnership will use 354 acres as the total project area.

Appendix E. Site-Specific Information and Generalized Management Recommendations

The following overview is a summary of the ecological conditions documented during the rapid assessment process. This data was used to categorize habitat management units (HMUs) into tree-age categories. Acres listed refer to total HMU acres and not total acres of the park or natural open space (does not include landscaped/hardscaped acres). Green Puyallup Partnership staff and Habitat Stewards will develop more-detailed site-level stewardship plans to further assess planting conditions and outline management recommendations as the 20-year plan is implemented.

VETERANS PARK (VP) – MAP 1

- Located in the northeast quadrant of the city, at the northwest corner of 9th Ave. NE and 5th St. NE (site address: 429 9th Ave. NE)
- 0.64 total acres
- Contains one HMU and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: Veterans Park is located along the banks of the Puyallup River; the park's one HMU is the riparian vegetation zone along the river. Like all stretches of the river within city limits, a number of invasive plants heavily impact this HMU, including Japanese knotweed, English ivy, Himalayan blackberry, and reed canary grass.

PIONEER PLACE (PP2) – MAP 2

- This open-space site is located north of DeCoursey Park, along the banks of Clarks Creek, and accessed off 5th Ave. SW
- 2.72 total acres
- Contains two HMUs and one stormwater pond management unit

GENERALIZED SITE ASSESSMENT: The Pioneer Place wetland — that received its name from the abutting residential subdivision to the north — is a highly degraded, reed-canary-grass dominated, riverine wetland, located along the banks of Clarks Creek. The site was planted heavily in the fall of 2014 with shrubs, live stakes, and large (e.g., 5 gallon+) conifer stock. The site plays an important role in restoring forested wetlands to the Clarks Creek riparian area.

DECOURSEY PARK (DP) – MAP 2

- Located north of Clarks Creek Park North, accessed off 7th Ave. SW
- 5.53 total acres
- Contains four HMUs — one of which is 90% open water,— and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: DeCoursey Park's primary feature is a 1.5-acre man-made pond, fed by a diversion of water from Clarks Creek, which defines the east border of the park; a loop trail circles the pond. A small riparian border buffers some parts of the trail from the pond. Duck feeding is a major influence on the water quality and condition of the park HMUs. Domesticated duck fecal waste, promoted by human feeding, is polluting the pond and Clarks Creek. Some restoration work has occurred in recent years, including work with the Friends of DeCoursey Park. The work includes buffer plantings and soft-shore armoring near the pond and Clarks Creek.

CLARK'S CREEK NORTH (CCN) – MAP 3a

- Accessed off 7th Ave. SW (across the street from DeCoursey Park)
- 6.91 total acres
- Contains two HMUs and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: Clarks Creek Park North is just downstream of Clarks Creek South and just upstream of DeCoursey Park along Clarks Creek, which borders the park's easternmost area. The majority of Clarks North is a developed park with open lawn areas, tennis courts baseball/softball field, active play equipment and parking areas. Two distinct Habitat Management Units are within the park area – one along the buffer area to the creek and the other an upland slope on the far southwest side of the park. The creek buffer HMU has been the subject of re-configuration (a trail was relocated further away from the creek) and replanted with native trees and shrubs – on-going improvements to this area will occur over time to shade the creek. The upland buffer is composed largely of aging big-leaf maple and native understory shrubs, such as sword ferns and osoberry.

CLARKS CREEK SOUTH (CCS) – MAP 3b

- Located at the end of 12th Ave. SW, west of 17th St. SW
- 42.15 total acres
- Contains five HMUs and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: Clarks Creek Park South contains the headwaters to Clarks Creek, including areas of the creek known to contain in-water spawning habitat for Endangered Species Act-listed salmon species. The site contains large riparian buffer zones, wetlands, floodplains, tributary streams, and steep slopes. It is composed largely of overmature bigleaf maple, black cottonwood, and red alder; very few evergreen trees are present throughout much of the park, with only a few examples of mature western redcedar and a handful of Douglas-fir. The site was likely logged in the city's early settler days and never replanted with conifers, leading to the rise and current dominance of short-lived deciduous tree species (e.g., bigleaf maple, red alder, etc.). Overall, however, the park's understory is generally free of invasive species. Only approximately 10%–15% of the park area contains invasive species, with

small pockets of reed canary grass and English ivy present. Abundant understory species include salmonberry, sword fern, Indian plum, and thimbleberry.

MEEKER CREEK OPEN-SPACE SITE (MOS) – MAP 4

- Located just east of Clarks Creek Park South, across Clarks Creek to the east and bordering Meeker Creek to the north (site address: 1002 14th St. SW)
- 8.33 total acres
- Contains four HMUs

GENERALIZED SITE ASSESSMENT: This entire site is set to receive a major transformation in 2015: Meeker Creek will be taken out of its channelized configuration along the site's north side and remeandered through the property. Some vegetation will be displaced due to this restoration project. The site currently harbors some restoration plantings from 10 years earlier. It has various types of management units, which will mostly become riparian areas abutting the creek once it's reconfigured.

MEEKER CREEK STREAM CHANNEL CORRIDOR (MC) – MAP 4

- Located within the 10th Ave. SW right-of-way, stretching from Fairview Drive to where it intersects with the Meeker Creek open-space site
- 3.21 total acres
- Contains five HMUs

GENERALIZED SITE ASSESSMENT: The entire stretch of Meeker Creek in this area is located in a channelized ditch, located entirely within city right-of-way. Some areas of the channel have paved or gravel roadways immediately abutting the top of the ditch bank. Until 2006, Meeker Creek was known as Meeker Ditch and was not classified as a regulated, protected stream body; the entire Meeker Creek channel was a reed-canary-grass-dominated waterway with no native plant cover. After the creek was classified as a type II stream body, work was begun to plant its banks and lower the water temperature to support salmon usage. Most of the planting work has occurred in HMUs 4 and 5.

SILVER CREEK WETLAND (SW) – MAP 5

- Located along the 10th Ave. SW right-of-way, due north of the Meeker Creek channel abutting 11th St. SW
- 0.69 acre
- Contains two HMUs

GENERALIZED SITE ASSESSMENT: The Silver Creek wetland site is a small, depressional, streamside wetland area abutting the Meeker Creek channel corridor. The site is under active restoration and contains mostly fast-growing cottonwood and alders.

SILVER CREEK – LOWER (SLL) – MAP 5

- Meeker Creek defines the north portion of the site, with 11th St. SW along its western edge and 12th Ave. SW as its southern border
- 6.22 total acres
- Contains four HMUs

GENERALIZED SITE ASSESSMENT: The lower Silver Creek site is part of the collection of parcels that were part of the Silver Creek realignment nearly 10 years ago. This site received the greatest amount of transformation, with Silver Creek taken out of a ditched, roadside alignment and meandered through the property in an engineered stream channel. The lower site is also used by salmon that swim upstream from Puyallup River/Clarks Creek/Meeker Creek to spawn.

SILVER CREEK – UPPER (SLU) – MAP 5

- The upper Silver Creek site is directly south of the lower site, separated by 12th Ave. SW
- 5.06 total acres
- Contains three HMUs

GENERALIZED SITE ASSESSMENT: The upper Silver Creek site is directly south of the lower restoration site and contains portions of the channel which were daylighted around the same time the lower portion was rechannelized. The stream channel bisects the site into two portions (east, west), both with distinctive features, including riparian habitats, wetlands, and dry uplands.

BROWN COMMUNITY GARDENS (BP) – MAP 6

- Located at the intersection of 19th Ave. SW and 11th St. SW
- 16.07 total acres
- Contains four HMUs and one landscaped/hardscaped unit

GENERALIZED SITE ASSESSMENT: The Brown Property contains the city's community garden site, located along the southern end of the park. The remaining portions of the site contain wooded trails and a segment of Silver Creek. The park overstory is a mixture of evergreen conifer and deciduous trees. Invasive cover in the park ranges from heavy to moderate, with Himalayan blackberry the dominant invasive species.

SR-512 OPEN-SPACE SITE – MAP 7

- Located along 15th Ave. SW, bordering SR-512 to the west
- 4.81 total acres
- Contains three HMUs

GENERALIZED SITE ASSESSMENT: The SR-512 open-space site contains the upper reaches of Meeker Creek; after leaving this site, Meeker Creek is culverted for a substantial length as it flows under the Washington State Fair Grounds. The site is

characterized by a central stream channel (Meeker Creek), which carves a deep ravine into the topography of the property. Substantial steeply sloped areas border the property to the east and west. The site contains what are likely riverine wetland areas, as well as drier sloped areas with plant species characteristic of drier sites. The site contains substantial invasive plant species, including reed canary grass, English ivy, and Himalayan blackberry.

DEAD MAN'S POND (DMP) – MAP 8

- Located along the north side of 23rd Ave. SW at the intersection of 23rd and 17th St. SW
- 11.55 total acres
- Contains four HMUs and one landscaped/hardscaped management unit; one HMU is open water

GENERALIZED SITE ASSESSMENT: The Dead Man's pond sites are split apart into three (3) separate tax parcels; the City of Puyallup owns two parcels totaling 8.66 acres (mostly upland property on the west side of the pond) and Forterra NW owns 5 acres (the majority of which is open-water pond). The upland portions of the site are relatively free of invasives, other than some ivy and blackberry in heavily disturbed areas near the two homes still on the parcels. The forested area is composed mostly of aging bigleaf maple, cottonwood, and alder, with some western redcedar and a few specimen hemlocks. The understory is dominated by sword fern, salmonberry, and Indian plum.

CLARKS CREEK WATERSHED PROPERTY (CCW) – MAP 8

- Located immediately west of the Dead Man's Pond properties
- 34.75 total acres
- The site is currently categorized into one large HMU* with two municipal water tanks on the property (nonhabitat units)

**The site's size, lack of accessibility, and areas of steep topography lead to a sample plot FLAT analysis of the property as opposed to dividing the property into smaller HMUs and assessing all areas of the property.*

GENERALIZED SITE ASSESSMENT: The Clarks Creek watershed property abuts the Dead Man's Pond properties along its southeastern border, Clarks Creek South along its northern border, and Washington Department of Fish and Wildlife (WDFW) watershed properties to the immediate east. The WDFW properties were not included in the Green Puyallup Partnership's FLAT analysis. The property is similar in overstory/understory makeup to the HMUs in Clarks Creek parks. The overstory is dominated by bigleaf maple and regenerating western redcedar. The property contains upland, steep slopes and buffers the upper reaches of Clark Creek (which are contained on WDFW properties to the west).

WILDWOOD PARK (WW) – MAP 9

- Located along the north side of 23rd Ave. SE, between 9th St. SE and 17th St. SE.
- 76.48 total acres
- Contains 12 HMUs and three landscaped/hardscaped management units

GENERALIZED SITE ASSESSMENT: Centrally located Wildwood Park is the largest in the city's system and is classified as a community park (serving the community as a whole). The park is truly a gem in terms of natural resources, containing some of the only HMUs in the city dominated by western redcedar, although much of the park overstory is dominated by aging bigleaf maple. The park contains a number of small streams, including Wildwood Creek; includes some wetland systems are contiguous with these stream bodies. The park contains undulating topography, with some pockets of steep slope. The understory is generally dominated by sword fern, Indian plum, and salmonberry, with substantial pockets of vine maple as well.

CHEROKEE OPEN-SPACE SITE (COS) – MAP 10

- Located at the intersection of 23rd Ave. SE and 26th St. SE
- 4.01 total acres
- Contains two HMUs

GENERALIZED SITE ASSESSMENT: The Cherokee open-space site is an oddly shaped parcel sandwiched between single-family developments on its south, east, and west sides. Access to the site is very difficult due to heavy blackberry growth and steep drop-off topography along the north side. A small, unnamed stream runs through the center of the site, flowing due north. The site clearly contains two different habitat units, with vegetation more typical of wet streamside areas (e.g., cottonwood/alder) in the northern part and drier conditions in the southern parts (dominated by Douglas-fir and vine maple).

RAINIER WOODS PARK (RW) – MAP 10

- Located along the south side of Cherokee Blvd. at the intersection with 26th Ave. SE
- 3.07 total acres
- Contains two HMUs and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: Rainier Woods contains less than half of its area in forested open-space condition; the site does, however, contain an overstory dominated by Douglas-fir with heavy western redcedar regeneration observed. The site contains the only madrone trees found in the city's parks and open-space system and also contains heavy areas of salal, which is not found in many HMUs citywide. The topography of the site is flat, with no wetlands, streams, or steep slope present. Heavy areas of Himalayan blackberry are found in the understory of the site.

PUYALLUP DOWNS WETLAND (PD) – MAP 11

- Located just north of the intersection of 7th St. SE and 29th Ave. SE
- 9.70 total acres
- Contains three HMUs

GENERALIZED SITE ASSESSMENT: The Puyallup Downs wetland site contains a large wetland and portions of Wildwood Creek as it flows north toward Wildwood Park from Bradley Lake. A stream corridor is sandwiched along the south side of the site between homes in an established subdivision. The on-site wetland has large areas of open-water habitat, and the upland areas surrounding it are dominated by wet plant species, such as Pacific/Sitka willow and black cottonwood. Some Douglas-fir is also present in upland areas of the site, indicating pockets of drier soil conditions.

BRADLEY LAKE PARK (BL) – MAP 12

- Located along the east side of 7th St. SE, just south of the Puyallup Downs wetland site
- 39.13 total acres
- Contains eight HMUs and one landscaped/hardscaped management unit; one HUM is open water

GENERALIZED SITE ASSESSMENT: Bradley Lake Park is one of three community parks in the city's park system and one of the most popular park facilities. The lake itself is a central feature of the park, and a well-used trail system circles the pond. The HMUs are varied: those near the southwestern portion of the site are drier and dominated by Douglas-fir, oceanspray, sword fern, etc., while areas in the south-southeastern portion of the site are much wetter, with *Salix*, black cottonwood, and red alder dominant. Pockets of wetlands are also present in the northeastern portion of the site. Areas of moderate-to-heavy blackberry and Scotch broom are present across HMUs.

MANORWOOD PARK (MW) – MAP 13

- Located in the southeast quadrant of the city on the north side of Manorwood Drive near 22nd St. SE
- 5.28 total acres
- Contains two HMUs and one landscaped/hardscaped management unit

GENERALIZED SITE ASSESSMENT: Manorwood Park is a small community park in a residential neighborhood that shares its name. The park is dominated by Douglas-fir overstory. The topography is relatively flat and dry; no streams or wetland are observed or known here. The understory contains salal, sword fern, oceanspray, and Indian plum, with Himalayan blackberry and English ivy also present.

FOOTHILLS OPEN-SPACE SITES (FOS) – MAP 14

- The Foothills Open-Space Site is on the extreme east side of the site, just off East Pioneer and the Foothills Trail
- 19.36 total acres
- Contains two HMUs*

**The site's size, lack of accessibility and areas of steep topography lead to a sample plot FLAT analysis of the property as opposed to dividing the property into smaller HMUs and assessing all areas of the property.*

GENERALIZED SITE ASSESSMENT: The Foothills sites border the city limit on the far east side of the city. The site is split into two separate parcels. Steep topography and a lack of accessible walking paths/trails throughout the sites make them some of the most remote properties in the city's open-space inventory. Due to the topography and accessibility issues, only a small sample plot of vegetation was taken on the southernmost parcel. Red alder, black cottonwood, and some western redcedar dominate the overstory canopy.

BLACK SWAMP WETLAND (BS) – MAP 15

- Located on the south side of 39th Ave. SW, near 5th St. SW
- 0.83 acre
- Contains one HMU

GENERALIZED SITE ASSESSMENT: The Black Swamp wetland was originally acquired by the city when it constructed roadway improvements to 39th Ave. SW; it is a mitigation site for that capital project. Emergent deciduous species such as black cottonwood and *Salix* heavily dominate the site, with some red-osier dogwood in the understory. The site also contains a small depressional wetland.

RIVERWALK TRAIL (RWT) – MAP 16

- The Riverwalk Trail spans the city from east to west, following the south bank of the Puyallup River.
- Collectively, the Riverwalk Trail and abutting habitat areas compose 56.44 acres.
- Contains 11 HMUs

GENERALIZED SITE ASSESSMENT: The south bank of the Puyallup River was assessed during FLAT given by the current Friends of the Riverwalk group, which is seen as a potential steward of the HMUs alongside the locally important, multiuse trail. The area that the trail and HMUs are on is owned mostly by Pierce County surface water management and contains a levee and revetment system for flood-control purposes. The HMUs along the Puyallup River — a waterbody of statewide significance under the Shoreline Management Act — are some of the poorest-quality HMUs in the city. There are no conifers growing in these areas. The overstory is dominated by black cottonwood and red alder throughout, with very little native understory present.

Himalayan blackberry, Japanese knotweed, morning glory, English ivy, reed canary grass, and Scotch broom can be found in moderate-to-heavy densities throughout.

DEER CREEK OPEN-SPACE SITES (DCOS) – MAP 17

- Located along the south side of 12th Ave. SE between Shaw Road and 25th St. SE
- 7.41 total acres
- Contains five HMUs

GENERALIZED SITE ASSESSMENT: Deer Creek runs through the middle of these sites and is important due to its use by salmon species that enter the creek from the Puyallup River. The site is heavily degraded and contains very low-quality depressional wetlands and patches of overhead vegetation, mostly black cottonwood and alder. Some restoration work occurred on the far western parcels about 10 years ago — much of that planting was not maintained and did not survive, although commemorative signage is still present on-site marking the planting event. Most of the sites are dominated by reed canary grass, with large patches of Japanese knotweed present near Shaw Road.

Appendix F: Native and Invasive Plant Species per HMU Acre

Table 1a. Overstory species

Scientific Name	Common Name	Primary	Secondary
<i>Acer macrophyllum</i>	bigleaf maple	113.31	62.97
<i>Alnus rubra</i>	red alder	74.41	79.85
<i>Picea sitchensis</i>	Sitka spruce	5.82	2.88
<i>Pinus contorta</i>	shore pine	0	0.93
<i>Populus balsamifera</i>	black cottonwood	74.97	50.57
<i>Populus tremuloides</i>	trembling aspen	2.88	0.93
<i>Prunus emarginata</i>	cherry species	0	7.68
<i>Pseudotsuga menziesii</i>	Douglas-fir	59.58	4.22
<i>Quercus garryana</i>	Garry oak	2.13	0
<i>Salix</i> species	willow species	5.90	11.46
<i>Thuja plicata</i>	western redcedar	6.83	112.46
<i>Tsuga heterophylla</i>	western hemlock	0	10.46

Table 2a. Overstory regeneration species

Scientific Name	Common Name	Primary	Secondary
<i>Acer macrophyllum</i>	bigleaf maple	135.18	62.97
<i>Alnus rubra</i>	red alder	45.16	70.56
<i>Populus balsamifera</i>	black cottonwood	50.44	23.16
<i>Populus tremuloides</i>	trembling aspen	2.88	0
<i>Pseudotsuga menziesii</i>	Douglas-fir	19.28	4.48
<i>Salix</i> species	willow species	0	2.35
<i>Thuja plicata</i>	western redcedar	55.01	54.11
<i>Tsuga heterophylla</i>	western hemlock	0	3.04

Appendix F continued: Native and Invasive Plant Species per HMU Acre

Table 3a. Native understory shrubs, herbs, and graminoid species

Scientific Name	Common Name	Primary	Secondary
<i>Acer circinatum</i>	vine maple	0	16.90
<i>Cornus sericea</i>	red-osier dogwood	14.33	6.67
<i>Corylus cornuta</i>	beaked hazelnut	2.74	31.06
<i>Gaultheria shallon</i>	salal	4.63	0
<i>Holodiscus discolor</i>	oceanspray	2.74	15.64
<i>Lonicera involucrata</i>	twinberry	0.33	0.83
<i>Mahonia nervosa</i>	dull Oregon grape	0	10.46
<i>Oemleria cerasiformis</i>	Indian plum	40.51	59.36
<i>Physocarpus capitatus</i>	Pacific ninebark	2.13	3.99
<i>Polystichum munitum</i>	sword fern	91.78	49.61
<i>Pteridium aquilinum</i>	bracken	8.36	0
<i>Rhododendron macrophyllum</i>	Pacific rhododendron	1.71	0
<i>Ribes sanguineum</i>	red-flowering currant	0	2.13
<i>Rosa gymnocarpa</i>	baldhip rose	0	0.93
<i>Rubus parviflorus</i>	thimbleberry	0	16.86
<i>Rubus spectabilis</i>	salmonberry	60.23	54.87
<i>Sambucus racemosa</i>	red elderberry	2.88	11.02
<i>Scirpus acutus</i>	hardstem bulrush	3.99	0.36
<i>Spiraea douglasii</i>	hardhack	1.47	0
<i>Symphoricarpos albus</i>	snowberry	64.05	12.95

Appendix F continued: Native and Invasive Plant Species per HMU Acre

Table 4a. Invasive species

Scientific Name	Common Name	HMU acres
<i>Calystegia arvensis</i>	morning glory/field bindweed	21.56
<i>Cytisus scoparius</i>	Scotch broom	59.99
<i>Galium aparine</i> *	cleavers	2.13
<i>Hedera helix</i>	English ivy	129.76
<i>Ilex aquifolium</i> **	English holly	86.07
<i>Phalaris arundinacea</i>	reed canary grass	118.7
<i>Polygonum cuspidatum</i>	Japanese knotweed	34.17
<i>Prunus laurocerasus</i> **	English laurel	36.12
<i>Rubus armeniacus</i>	Himalayan blackberry	210.39
<i>Rubus laciniatus</i>	evergreen blackberry	37.26
<i>Solanum dulcamara</i>	European bittersweet	0.39

**G. aparine* is native to the PNW, but weedy on acres where present.

** Invasive tree species

Appendix G: Proposed Rate of Restoration and Volunteer Goals from 2015 to 2024

Year	New Acres in Restoration and Maintenance	Cumulative Acres in Restoration and Maintenance	Estimate of Total Volunteers	Estimate of Total Volunteer Hours
2015	5	5	600	1,800
2016	5	10	800	2,400
2017	5	15	900	2,700
2018	7	22	1,200	3,600
2019	9	31	1,500	4,500
2020	11	42	1,900	5,700
2021	13	55	2,300	6,900
2022	15	70	2,700	8,100
2023	15	85	2,900	8,700
2024	15	100	2,950	8,850

GREEN PUYALLUP PARTNERSHIP

