11. Appendix A: Assumptions for Forest Management

Resource Management

- The City will continue to support the vision of Pioneer Park as a sustainable native forest.
- The funding of maintenance in the park will not change substantially from 2001-2002 levels. Existing maintenance resources have occasionally been devoted to managing vegetation, but only in conjunction with trail maintenance or boundary issues.
- In addition, City Council will likely continue to allocate $50,000 annually for forest management for Pioneer Park through 2008. City Council approves Capital Improvement Project funding with each biennial budget.
- The Park Arborist will be responsible for implementation of this plan.
- The plan that results from this process will provide sufficient direction and detail so that the Park Arborist can implement projects without further planning with the Open Space Conservancy Trust or the general public. The OSCT will receive a quarterly report on proposed and accomplished projects and will give feedback to the Park Arborist at that time. Adjacent residents that are affected by specific projects will be contacted about Parks and Recreation activities in advance.
- The Parks and Recreation Department will be the lead agency for implementation of this plan and will be responsible for contacting other agencies with jurisdictions that overlap in the park.
- From preliminary conversations with Mercer Island Fire Department staff, fire risk is a consideration in Pioneer Park. Parks and Recreation will consult with Fire staff and Washington State Dept. of Natural Resources to assess fire risk and develop fire management protocols in the event of a fire.
- Parks maintenance staff will be involved in the implementation of this plan, but their existing maintenance responsibilities prevent them from being extensively involved on an ongoing basis without additional resources. Plan implementation will be accomplished by contractors or seasonal labor.
- Maintenance of plantings is essential for successful forest management. This means that approximately 50% of the cost of restoration planting projects will be spent in the preparation and installation phase, and 50% will be spent in the maintenance phase (over several years) to insure plant establishment and control of competition.
- Baseline data will be collected as part of the planning process to provide long-term monitoring capabilities. This data will be stored in a geographic information system where this is feasible.
- Arboricultural industry standards, such as ANSI A300, ANSI Z133 and ISA Pruning Guidelines will be followed where applicable.
- Tree hazards will be managed through periodic inspections by trained staff to detect defects that might cause structural failure. Inspections will follow industry-accepted protocols. Areas with higher risk potential will be inspected more frequently.
Community Framework

- The community will continue to support the vision of Pioneer Park as a healthy, sustainable native forest.
- The Open Space Conservancy Trust will continue to advocate for the best possible management of the park and educate the greater community about the value of the park.
- Volunteer and service learning activities will contribute to stewardship of the park at roughly double historical levels (historically there has been one volunteer project and one service learning project (i.e. school group) in the park each year).
- Parks and Recreation staff will seek cooperation of residents along the park boundary to help us manage the edges of the park adjacent to their property according to the plan.

Vegetation Resource

- The existing forest in Pioneer Park is the result of historical events of both human and non-human origin.
- The forest condition within each quadrant varies from place to place, but these variations can be typified by observable criteria, namely the composition, age and condition of the tree canopy. Groups of trees of similar composition, size and condition (stands) will be the primary unit of analysis for this study.
- Management of the forest should achieve a distribution of tree ages within a tree stand whereby enough younger trees are available to replace older trees that are lost through natural attrition or planned thinning.
- Management of the forest should retain the multi-layered canopy structure typical of a coastal Pacific Northwest forest. This includes ground layer, understory and overstory vegetation.
- Managing diversity is an important part of forest management. Too much or too little diversity impacts habitat, aesthetics, pest control, and management efficacy. Activities that increase diversity should not introduce excessive randomness to the forest composition.
- The forest canopy bordering the stream and wetlands directly provides the vegetative matter that is the base of the aquatic food chain. The streamside canopy also shades the watercourse and thus prevents increases in water temperature. High water temperatures (with less dissolved oxygen) tend to increase the metabolic rate of cold-water organisms causing increased stress.
- Additions of large, woody debris maintain the complex structure in the streams and wetlands. As streamside trees die they often fall into or adjacent to the channel creating complex stream and riparian pool habitats.
- Excess fine sediment in the stream channel can impact salmonids through degradation of spawning gravel and reduction of aquatic food production. Maintaining vegetation
cover on the slopes next to the stream corridor is essential to prevent siltation of the stream channel.

- Most of the park is considered “edge” forest. This refers to the microclimatic difference between the conditions found at the edge of a forest and those found in the interior. Edges of forests have higher light levels, lower humidity, higher wind speeds, greater temperature fluctuations, and greater movement of wildlife. Edges are inherently less stable, more dynamic parts of the forest. This, combined with the surrounding urban environment, has made this forest susceptible to loss of “interior” forest conditions, the kind of conditions that we see in forested wilderness areas. Management activities can only partially mitigate “edge effects”. Therefore a goal to develop “old-growth” forest character is probably not realistic.
- Park users enjoy the experience of being in a mature native forest reminiscent of “old-growth” forests they may have experienced elsewhere. Edge effects have to be controlled or mitigated to maintain this type of forest character.
- All alternatives for this park include control of invasive exotic plants (e.g. blackberry, holly, laurel, ivy). Some restriction of these plants must be achieved to sustain the forested condition of this park.
- Invasive exotic plants cannot be eradicated, only controlled to target levels. Control of invasive exotic plants will employ either ground layer disturbance or the targeted use of herbicides, or both. Either technique is best employed as part of an integrated strategy for successfully controlling the target plant with the least amount of external consequences. For example, a strategy for controlling blackberry might consist of digging out roots initially, with subsequent control accomplished by sponge application of Roundup® herbicide. This would avoid repeated digging and confines chemical use to resprouting shoots.
- Strategies requiring heavy equipment, such as logging, will not be used to manage the forest.
- Wildlife habitat will be managed to promote species diversity and to ensure that populations of indigenous species are maintained. This can be best achieved through the maintenance and enhancement of habitat values. Habitat values that lead to species diversity include the following elements: breeding, foraging, watering, rearing, hiding and thermal cover.
- Wildlife management within Pioneer Park is focused primarily on the protection and enhancement of key habitat and structural components that are utilized by a diversity of species. Snags and down logs will be maintained through the retention and recruitment of snags over time. Snags are used to some degree by all major groups of wildlife species found in Pioneer Park. Their primary value is as a nesting and roosting site, or foraging for insects. Species excavate their own cavity, utilize previously excavated cavities or utilize natural cavities and crevices. Other species use the tops of larger snags as nest and roost sites. Species in Pioneer Park that use cavities in snags include hairy woodpecker, chestnut backed chickadee, red-breasted nuthatch, screech owl, violet-green swallow, brown creeper, Douglas squirrel and two bat species. Species that nest or roost at the top of snags include red-tailed hawk, raven, and osprey. Retention of dead and down materials are particularly critical in riparian areas.
• Woody debris and snags will be left in the park as much as possible, except where they present a hazard, or are located in landscaped edges where their habitat value is diminished and aesthetic quality is also a consideration.
• All wildlife management will be conducted under the jurisdiction of the Washington Department of Fish and Wildlife. Nuisance wildlife species will not be managed by changing or reducing habitat in the park unless management activities target only the nuisance species.
• Clearance for power lines must be maintained by Puget Sound Energy according to state law. There is some cooperative basis for managing trees around power lines, but this will not remedy the fundamental incompatibility of mature native trees near power lines. A combination of inspection and new horticultural strategies may provide a more stable landscape in the power line clearance zone.
• Utility boxes in the right-of-way require gravel pads and access. Vegetation can mitigate their visual impacts to a limited degree. Such mitigation will be developed where it is missing or inadequate.
• At intersections and curves in the road, there are sight distances that must be maintained for traffic safety. Vegetation may be pruned or removed to maintain this sight clearance.
• Turf edges to the park will be maintained along the west sides of the southeast and northeast quadrants and along the east and south sides of the northwest quadrant.
12. Appendix B: Alternative Forest Management Scenarios

The following descriptions illustrate general long-term results that could be expected from distinct goals for managing the forest vegetation. All typologies tend towards a more conifer-dominated forest, which is the natural direction of forest succession in this region. Please keep in mind:

- These typologies could be applied to the entire park or to only a portion of the park.
- Strategies within each typology are not necessarily exclusive to that typology.
- There are gradients of choice in between these alternatives. Distinctions between typologies have been created for the purposes of discussion.
- The final “vision” for Pioneer Park’s forest may contain an intermediate typology or one that is not described here.

Deep Forest

Goal: The overriding goal of this alternative is to create interior forest habitat in Pioneer Park to promote the survival of trillium, sword fern and other native understory species. This goal recognizes the historical existence of a lower-growing understory that was found in the park when it was purchased by the City in the 1960’s.

Strategy: The primary strategy for this alternative would be the establishment of dense conifer overstory and dense evergreen edge plantings. Additional strategies include control of invasive exotic plants, planting of some semi and non-native tree species that would improve the canopy integrity, and selective thinning of deciduous trees once conifers are established. Some tall overstory (e.g. elderberry, hazel, Indian plum) would be trimmed back to favor salal, sword fern, Oregon grape, etc.

Invasive Control: Blackberry would be the highest priority for control, since this indicates high light levels. These areas would be densely replanted with trees. Ivy and other invasives would be controlled secondarily to limit the spread of such plants until less favorable forest conditions are created, or to protect new tree plantings.

Character: The character of this forest type in thirty years would be a noticeably denser forest of adolescent conifer trees mixed in with existing mature trees. Light levels in the forest would be lower. Views into the park would be restricted by dense vegetation along the edges.

Costs: Short term cost is expected to be highest because of the extensive planting and invasive control. However, long-term cost of this alternative is expected to be lowest of all the alternatives because the dense overstory provides the most effective control of invasive exotic plants.
Limitations: One limitation of this alternative is that it is most effective if applied to an entire quadrant. More limited applications will reduce the effective interior area. Application to less than half a quadrant would probably be ineffective. Another limitation of this alternative is its initial expense.

Purely Native

Goal: This alternative would utilize only the native plant species currently found in the park. Genetic conservation of plant populations in the park could also be a secondary goal.

Strategy: Management activities would consist of aggressive control of invasive exotic plant species and dispersed planting of evergreen and deciduous overstory species. Native regeneration of overstory and understory would be utilized as much as possible. Canopy gaps would be managed or created for forest regeneration. Since root rot is a significant management issue, choices of overstory trees would be limited in affected areas and tend to favor red cedar and deciduous species which are resistant.

Invasive Control: Invasive control is the cornerstone of this strategy. As much as possible, existing native vegetation would be “liberated” from invasive exotic species. Natural regeneration of understory would be preferred over replanting where practical, even if this results in less diversity.

Character: The character of this forest in thirty years would be a mixed forest of predominantly mature deciduous trees with adolescent conifer trees dispersed throughout. Cedar would predominate as regeneration, with hemlock represented to a lesser degree, alder and bigleaf maple in remnant canopy gaps and Douglas fir in edges along the south and west quadrant boundaries. Understory vegetation would consist primarily of taller “brushy” species, including elderberry, Indian plum, and hazel. Trillium, salal, Oregon grape and sword fern would be expected to become less prevalent. Edges of the park would be moderately permeable.

Costs: Short term costs are expected to be somewhat lower than for the Deep Forest alternative, since it places less emphasis on planting. Because this alternative does not effectively reduce light levels in the park, long term control of invasive exotic plants will keep long-term costs higher than for the Deep Forest alternative.

Limitations: One limitation of this alternative is the long-term expense of continually controlling invasive plants. These costs should become less with adequate initial efforts, but routine control efforts will be necessary at substantial levels to achieve goals. Another limitation is the loss of understory species that are both environmentally and aesthetically desirable.
Basic Canopy

**Goal:** This alternative would be the most flexible about the content of the forest, instead focusing on retaining an attractive forest character for park users and existing wildlife. The primary goal would be on maintaining a continuous tree canopy.

**Strategy:** Tree selection would be primarily native, but selected semi and non-native species would be used as in the Deep Forest option to improve canopy integrity. Understory content would be less important than maintaining a balance of vistas and enclosures along trails and in the periphery of the park. Woody debris would be managed more actively to move down logs outside of trail corridors.

**Invasive Control:** Invasive exotic plants would be controlled, but more selectively than in the Deep Forest and Native Only options. Emphasis would be on low visual impact strategies and maintaining planted trees.

**Character:** The character of this forest in thirty years would be a mixture of evergreen and deciduous canopy, intermediate in conifer character between the Deep Forest and Natives Only alternatives. However, the understory would be more diverse than either of the above scenarios because tall “brushy” species would be controlled in areas to provide visual landscape diversity.

**Costs:** The short term cost should be lowest of the three alternatives, but long-term costs are expected to be greater.

**Limitations:** One limitation of this alternative is the continuing costs for invasive control, which is expected to remain fairly constant for the long-term. Another limitation is the loss of native plant populations as the park is managed for structure, rather than for species content.
Deep Forest | Purely Native | Basic Canopy
--- | --- | ---
**TREES: What trees are planted/fostered? How are they located? How are existing trees handled?**
Mostly conifer species, including some non-native species are planted or selected from on-site regeneration. The trees are planted densely to get new canopy going quickly. Existing deciduous trees are pruned or “snagged” to favor conifer species. | Any native trees are considered acceptable. They are selected from existing regeneration that occurs from invasive weed control and understory management. | Trees are only planted in canopy gaps. Any native trees are considered acceptable. Conifers are preferentially planted in gaps where root rot is not prevalent. |
**Density of tree regeneration**
High – with subsequent thinning | High with subsequent thinning | Low – only in gaps |
**INVASIVES: How much are invasives controlled? How are they controlled?**
Invasive plants are controlled aggressively everywhere. Ivy is weeded out of native groundcovers. | Invasive plants are controlled aggressively everywhere. Ivy is weeded out of native groundcovers. | Invasive plants are controlled where they inhibit canopy growth (ivy on trees, blackberry patches) or threaten to significantly encroach on the forest (seed-producing holly). Ivy on the ground is allowed to remain. |
**SHRUBS: What understory plants are encouraged?**
Native evergreen groundcover (sword fern, salal, Oregon grape) are fostered where they exist, and are replanted where they are absent. Tall native shrubs are cut back where needed to allow this. | All native understory plants are considered acceptable, except where they compete with canopy regeneration. Invasives are aggressively weeded out. | Understory is only manipulated along trails, selectively encouraging evergreen groundcovers to provide more openness for park users. Otherwise, understory is only controlled around planted trees. |
### 13. Appendix C: Criteria for a Sustainable Urban Forest in Pioneer Park

(Revised after Clark, et. al. *Model of Urban Forest Sustainability* 1997)

#### 13.1. Vegetation Resource

<table>
<thead>
<tr>
<th>Goal</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Conservation</td>
<td>Protect the park’s soils to insure biological function, nutrient cycling and soil building processes. Forest soils are living systems that build soil and provide the rooting environment for all vegetation in the park. Compaction, disturbance, changes in drainage and other human influences damage the health of the soil ecosystem. Protection and periodic additions of organic matter preserve the soil ecosystem.</td>
</tr>
<tr>
<td>Canopy Structure</td>
<td>Achieve appropriate canopy cover and layering. Canopy should be mostly continuous over the site. Multiple layers of understory are desirable for habitat and canopy integrity. Gaps should be created or replanted to manage for structural diversity.</td>
</tr>
<tr>
<td>Age Distribution</td>
<td>Provide for uneven age distribution. A mix of young and mature trees is essential if canopy cover is to remain relatively constant over time. Planting or recruitment of native regeneration will increase age diversity.</td>
</tr>
<tr>
<td>Species Mix</td>
<td>Provide for a diversity of primarily native species. Species diversity is important for the long-term health of the forest. Dry soil conditions and the persistence of laminated root rot makes species selection very site-specific.</td>
</tr>
<tr>
<td>Invasive, Non-native Species</td>
<td>Control the extent of blackberry, ivy, holly, laurel and other species identified as such. The introduction of invasive, non-native species has changed the ecology of the forest. Native plants, including trees, will be displaced unless the invasive plants are controlled. Eradication is not a goal of this plan, however.</td>
</tr>
</tbody>
</table>
### Habitat

| Preserve and enhance habitat features to maintain native wildlife populations | The park contains wildlife that depend on particular forest features, such as tree canopy, gaps, nesting cavities, perched wetlands, etc. Identify native wildlife species and their habitat needs to inform management objectives. |

### Edges

| Manage park edges to maintain forest integrity and character | Edges must contain dense vegetation to protect the forest interior from wind and sun. Edges along public right-of-way should also allow some views into the forest. |

### 13.2. Community Framework

| OSCT Leadership | OSCT board members create initiatives to carry out plan goals | The OSCT board members communicate the long-term direction for the park. They develop connections with constituents, educate the public and recruit resources on behalf of the park. |
| Neighborhood involvement | Neighbors of the park and nearby residents take active role in park projects and park monitoring | Local residents assist the City by monitoring the park and reporting problems to City staff. Residents work with City staff to implement restoration projects according to plan. City staff develop technical competence in “core” volunteers. |
| Education | Materials and planned activities help the greater community become aware of Pioneer Park and learn the value of its ecosystem | Island residents benefit from Pioneer Park, but their understanding of the park depends on different strategies for outreach that are tailored to the various levels of awareness among island residents. |
| Volunteerism | Volunteers provide a significant amount of the labor for restoration projects | People come to volunteer at the park for scheduled project events. Volunteers are both individuals from the community and members of service groups. City staff and core volunteers provide training and leadership. |
Local Businesses | Local businesses promote involvement in the park and support projects with cash and in-kind donations | The South Mercer shopping center and food service businesses are current places for partnerships. Business connections should be expanded island-wide.

Green Industry Capability | Landscape and tree care firms that work in the park meet plan goals | The restoration work proposed for the park is not traditional work for the Green Industry. New work skills and methods are needed to accomplish plan goals.

Public Agency Cooperation | County and State agencies provide technical assistance and regional perspectives | Issues facing Pioneer Park are common for all urban forests in the Pacific Northwest. Projects such as regional ecosystem analysis can help educate the greater public about the benefits of urban forest canopy.

13.3. Resource Management

| Management Plan | Develop a forest management plan with input from stakeholders | A management plan should represent a consensus of the community about the future of the forest. The plan guides the resource managers in their operations and projects. It also provides a way for citizens and private groups to participate as partners in forest management activities.

| Funding | Develop and maintain adequate funding to implement this management plan | Public and private funding for Pioneer Park depends on recognition of the park as a resource for the greater community. Mercer Island City Council currently funds all forest management in the park.

| Staffing | Employ and train adequate staff to maintain and manage the park | Mercer Island Parks and Recreation is responsible for maintenance and management of the park. Staff have various levels of involvement with the park according to their areas of responsibility. Currently, staff do not perform all work associated with forest management in the park. |
### Planning and Assessment tools

Develop methods for documenting site conditions, operations and projects. Evaluate activities and improve future projects with resulting input.

The City maintains a GIS database that serves as a top level planning tool for forest management. Additional planning and assessment tools such as protocols and forms must be developed. This information is useful when it is stored systematically so it is accessible to future managers.

### Citizen safety

Maximize public safety with respect to trees

Managing hazard trees requires inspection protocols and schedules, plus ability remedy hazards a timely manner. Fire safety depends on prevention and response capabilities.

### Vegetation protection

Trees and shrubs are protected from damage by park users, management activities and neighbors

Protection of vegetation in native forest settings focuses on preventing compaction and disturbance to the soil around trees and shrubs. Theft or vandalism of vegetation is also an issue.

### Species selection

Species are selected to fit the particular growing conditions where they are located

To preserve the plant communities in the park, native species are strongly preferred for planting wherever possible. Certain coastal northwest species may be used where locally native species cannot perform as needed for plan objectives.

### Standards for tree removal

Trees are removed to achieve management goals

Clear policy concerning tree removals is needed avoid arbitrary and ad hoc decision-making by managers.