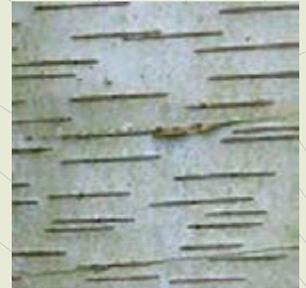


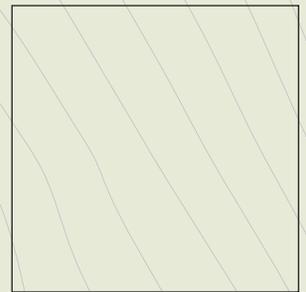


Lake Sammamish State Park

Wetland, Stream and Lakeshore Restoration Plan



Prepared for
Washington State Parks & Recreation Commission



The Watershed Company

DRAFT

**Lake Sammamish State Park
Wetland, Stream and Lakeshore Restoration Plan
King County and City of Issaquah, Washington**

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1 June 2005

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Lake Sammamish State Park Wetland, Stream and Lakeshore Restoration Plan

1. INTRODUCTION

The Watershed Company was retained by the Washington State Parks and Recreation Commission (State Parks) to prepare a *Wetland, Stream, and Lakeshore Restoration Plan* for Lake Sammamish State Park (Park) in Issaquah, Washington. A seven-member Restoration Planning Team guided The Watershed Company in anticipation of overall Park improvement and redevelopment. This group included representatives from State Parks, City of Issaquah Parks and Recreation, City of Issaquah Public Works, Issaquah Rivers and Streams Board, and the Mountains to Sound Greenway Trust.

Lake Sammamish State Park encompasses approximately 512 acres at the south end of Lake Sammamish. The Park is within the Interstate 90/Mountains to Sound Greenway corridor and provides important recreational, open space, and wildlife habitat areas. The Park is primarily developed as a day-use facility including swimming beaches, boat launch, picnic shelters, trails, soccer and baseball fields, and the Hans Jensen Youth Group Camp. Much of the Park is undeveloped and includes meadows, vast wetlands, lakeshore areas, and Issaquah, Tibbetts, and Laughing Jacobs Creeks.

Human activity and development have affected and altered the natural resources in the Park and watershed. Early settlers cleared and farmed the area, draining wetlands and channelizing creeks. Coal mining, forestry, lowering of the winter and flood-event lake level due to Sammamish River dredging and lake outlet reconfiguration by the U.S. Army Corps of Engineers, the construction of Interstate 90, and on-going urbanization have had significant impacts on the natural systems and overall character of the Park.

Lake Sammamish State Park has been identified by both government agencies and non-profit organizations as a high priority area for restoration work within the Issaquah Creek Basin and Lake Sammamish Watershed. This study identifies, evaluates, and ranks specific prospective project areas within the Park for restoration of natural lands including wetlands, streams, shorelines, floodplain areas, and associated buffers. This plan is to be used in conjunction with other planning efforts underway for Lake Sammamish State Park, including the *Facilities Development Plan (FDP)*, *Master Development Plan (MDP)*, and *Classification and Management Planning Project (CAMP)*.

2. METHODS

This *Wetland, Stream, and Lakeshore Restoration Plan* was initiated with a review of existing information provided by State Parks, including maps, aerial photos, resource inventories of wetlands, soils, flooding, and other natural processes, as well as goals and management issues identified through other planning efforts. The review was followed up with a comprehensive and systematic on-site evaluation of the Park, which resulted in a preliminary list of restoration project ideas. After input and initial review from the Restoration Planning Team, additional field work was conducted to complete the evaluation of the Park and to further define projects, both Park-wide and site-specific.

The entire length of Issaquah Creek within the Park was inventoried, photographed, and evaluated for development of restoration plans. Tibbetts Creek, Laughing Jacobs Creek, and lakeshore areas were similarly evaluated. Earlier in the year, The Coot Company, wetland scientists, identified and delineated wetlands mainly within the developed areas of the Park (January 2005). This report was reviewed and used as a guide with aerial photos for on-site evaluation of wetlands. Other recent wetland studies have been done by Washington State Department of Transportation (April and December 2003), primarily in the Tibbetts Creek area of the Park. Wetlands in the Park associated with prospective projects were also evaluated using the *Wetland and Buffer Functions Semi-Quantitative Assessment Methodology* (Cooke Scientific Services 2002). This information is summarized in specific project descriptions and the detailed worksheets are included in Appendix B. Proposed projects were defined as Wetland (W), Stream (S), Lakeshore (L), Upland (U), and/or Recreation (R) projects, with most being a combination of several types.

After identifying and describing projects throughout the Park, the site-specific items were ranked using evaluation criteria developed and compiled on a questionnaire form. Evaluation criteria included issues such as site accessibility, potential for fish and wildlife habitat improvement, water quality, hydraulic impacts, ease and cost of construction, suitability for educational purposes and community involvement, expected life of project, regulatory requirements, aesthetics, public access, and recreational opportunities. Provision for a weighting factor was included in the event that it was appropriate to give certain criteria more or less emphasis than others; however, the weighting factor was not used and each of the criteria were ultimately given equal weight. There is also a provision for any overriding, compelling reasons to either do or not do a particular project.

Projects were separated into three "Implementation Groups" based on their anticipated level of required permitting:

- A. Limited permitting. This designation is used for projects which primarily involve removal of invasive vegetation and replanting with native species. Proposed site preparation and planting plans will need to be reviewed by local regulatory agencies (City of Issaquah or King County) to assure that plans have been prepared by a qualified biologist, but are not expected to require state or federal permits. Most of these projects could be implemented by supervised volunteer groups.
- B. Moderate permitting. This group of projects will require some additional permits and regulatory review, such as Washington Department of Fish and Wildlife Hydraulic Project Approval for installation of log structures. Some of these projects may also require grading permits from King County or City of Issaquah for creation of small depressions or widening of the floodplain along Issaquah or Tibbetts Creeks.
- C. Extensive permitting. These projects will require more complicated permitting on the local, state, and federal levels. They are multi-faceted projects which may be suited for implementation as mitigation projects, and possibly as mitigation banks. Also see Section 3, Regulatory Considerations.

Final rankings for project priorities are within each of these groups. Overall rankings are summarized in Table 1, Section 6 of this report. The ranking forms with tallied scores for each project are included in Appendix A of this report.

Example cost estimates were prepared for six projects, three from Implementation Group A and three from Implementation Group B, as requested by the Restoration Planning Team. These six projects are among the top-ranked projects in each of these two groups, and were chosen to be representative of a wide range of project types including stream, wetland, and lakeshore elements. The estimated costs are included on the applicable project pages and cost worksheets are included in Appendix C.

Each proposed project is also identified with GIS coordinates, its project type designation(s) (Wetland, Stream, Lakeshore, Upland, Recreation), and Implementation Group (A - Limited permitting, B - Moderate permitting, C - Extensive permitting). This information is included on the site-specific project pages and in Appendix E.

3. REGULATORY CONSIDERATIONS

Restoration projects within the Park will fall under the jurisdiction of several different local, state, and federal agencies. Most of the Park is within unincorporated King County, with the exception of the far west extension along the mouth of Tibbetts Creek, which is in the City of Issaquah.

Applicable City of Issaquah regulations include the Critical Areas Ordinance. Wetlands and streams are each classified according to three-tiered rating systems with required buffer widths ranging from 25 feet to 100 feet. Shoreline permits and grading permits may also be required, depending on the elements of the proposed project.

King County recently adopted a new Critical Areas Ordinance in November 2004. These regulations include a new system for categorizing wetlands and streams and assigning their buffers. There are four wetland categories with buffer widths ranging from 50 to 275 feet. Streams are grouped with lakes and ponds and called "aquatic areas." There are four categories with buffer widths ranging from 25 to 165 feet. King County shoreline permits and grading permits will also be required where applicable.

Washington Department of Fish and Wildlife Hydraulic Project Approval (HPA) would be required for any in-stream work such as installation of habitat log structures or grading to create additional floodplain area. Washington Department of Ecology oversees shoreline permit decisions made at the local level and administers the 401 Water Quality Certification in support of the Corps 404 program (see below).

Federal permitting through the U.S. Army Corps of Engineers is necessary for the discharge of dredged or fill materials into waters of the United States under Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act may also be triggered if any work is conducted in or over Lake Sammamish, a navigable water. Under the federal Endangered Species Act, projects requiring a federal permit or receiving federal funds will also be reviewed by the National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (USFWS) if the proposed project may have an effect on listed fish or wildlife. A Biological Evaluation

will need to be prepared to support the federal authorizing or funding agency's consultation with NOAA Fisheries and USFWS.

4. NATURAL RESOURCE PROCESSES

The morphology of the Lake Sammamish area was formed by continental glaciers that, at their maximum extent, likely covered the Issaquah area with over 3,000 feet of ice. As the glaciers retreated, a much larger Lake Sammamish emerged, initially discharging *southwards* through the present day Issaquah Creek and Tibbetts Creek corridors. The retreating edge of the glacier formed an ice dam preventing flow from exiting to the north, as it does now. Over time, as the ice continued to retreat, the discharge location of the lake shifted temporarily to the northwest to the Eastgate Channel, which is the present-day location of Interstate 90. Large deltas began to form at Issaquah Creek, Tibbetts Creek, and other drainages on the east side of the lake. Eventually, the glaciers receded sufficiently such that that meltwater stopped entering the basin, lower elevation discharge pathways to the north along the Sammamish River alignment opened up, and the lake reduced in size to near its present configuration (Booth 1990).

The Park is located on a large delta deposit which had likely been built primarily by Issaquah Creek, but also with contributions from both Tibbetts and Laughing Jacobs Creeks. Typical of delta deposits, the land slopes very gently towards the lake, and the soils are primarily fine-grained sands and silts. There is also a smaller area of the Park northeast of the delta on moderately sloped ground east of East Lake Sammamish Parkway. Soils were identified in the King County Soil Survey and presented in the wetland inventory done by The Coot Company (2005). This information is included in Appendix D of this report. Eleven different soil types are identified within the Park, four of which are considered hydric soil types.

During historic times, the U.S. Army Corps of Engineers altered the outlet of Lake Sammamish. The Corps dredged the channel of the Sammamish River and installed a weir at the outlet of the lake. The result of this activity was a significant reduction in the peak winter water levels of the lake, though non-flood lake levels were largely unaltered.

Issaquah Creek, and to a lesser extent Tibbetts Creek, appear to have downcut significantly in recent years, which has led to over-steepened and less stable banks. Downcutting is a typical response of a stream in an urbanized basin, however in this case downcutting may have been exacerbated by the alteration of the lake's water level regime.

When a stream meets a body of water, it loses energy and can no longer erode its bed or banks. Instead, a stream deposits the material it has been carrying, forming a delta. The elevation of the receiving water is called the base level of the stream. A stream erodes its bed until it forms a stable gradient to match the base level, and the stream cannot erode below that base level.

Streams do most of their erosion and deposition during flood events. Historically, most floods would likely have corresponded with peak lake levels, which alter the base level that the stream can erode to. Therefore the stream would have formed its gradient to the higher lake level that existed prior to the Corps manipulation. When the Corps altered the peak lake level

by several feet, the bed of the stream may have begun eroding to compensate for the difference.

A map depicting the general location of the floodway and floodplain areas within the Park is also included in Appendix D of this report.

5. FISH & WILDLIFE CONSIDERATIONS

A data search of the Washington Department of Fish and Wildlife Natural Heritage System and Priority Habitats and Species database was performed as part of the wetland inventory done by The Coot Company (2005). Four items were identified, as follows.

- All of the Lake Sammamish State Park lands within King County jurisdiction are listed as Urban Natural Open Space (UNOS).
- The active great blue heron rookery is identified along the north lakeshore of the Park.
- The database shows a bald eagle polygon across the northern portion of the Park that is apparently associated with a nest site near the lake.
- Priority anadromous fish are listed for both Tibbetts and Issaquah Creeks.

The Washington Department of Fish and Wildlife's Issaquah Salmon Hatchery lies along Issaquah Creek at River Mile 3.1, a relatively short distance upstream of Lake Sammamish State Park. The hatchery produces primarily coho and chinook salmon. Given the hatchery's situation along the creek relative to the Park, thousands of adult salmon pass through the Park in the process of homing to the hatchery each year and correspondingly larger numbers of juveniles, at least an order of magnitude larger, pass downstream in the process of migrating to sea. As such, Issaquah Creek habitat within the Park is used by and is important to huge numbers of salmon. Adult upstream migrants need places to rest and hide from predators, as do juveniles. Some adult fish inevitably stop short of reaching the hatchery to spawn, so suitable spawning habitat below the hatchery, including sections within the Park, are in high demand. Downstream juvenile migrants as well as some juveniles who rear for longer periods within the Park need functional rearing habitat. Proposed habitat improvement projects within the Park address these needs by providing bank stabilization to reduce turbidity and fine sedimentation of spawning gravels and by the placement of large woody objects in and along the creek to scour and maintain rearing and resting pools and to provide cover from predation within those pools.

The *Lake Sammamish State Park Area Management Plan* (2003) includes policies regarding protection of natural plant and animal communities such as the great blue heron rookery, and for control of nuisance wildlife such as Canada geese. These policies stipulate coordination with other natural resource agencies in terms of restoration planning, protection strategies, and interpretive opportunities.

Project A8 of this study addresses restoration of the field south of the great blue heron rookery. It is recommended that upland forest and shrub patches be installed in this area to

increase habitat diversity while still maintaining the views of the rookery. Interpretive signage along the trail is also recommended to enhance awareness of this special feature and explain the need for protection.

An action plan for control of Canada geese has been prepared by Park staff in coordination with other natural resource agencies. This plan includes a variety of management prescriptions. Many of the project recommendations presented here are consistent with these goals, in that increased native plant communities and habitat diversity will discourage use by geese, since they tend to congregate on expanses of lawns and open areas.

6. PARK-WIDE RECOMMENDATIONS

Invasive Plant Management

Many areas of the Park have become dominated by non-native, invasive vegetation. In the past, much of the Park property was used for agriculture, involving primarily hayfields and pasturelands. Native woody vegetation was cleared, and extensive ditching was done to manage water levels. These now-abandoned fields have become dominated by invasive species, particularly reed canarygrass and blackberries (both Himalayan and evergreen). These species are common in other areas of the Park as well, including stream banks, riparian areas, wetlands, and some lakeshore sections. There are also some fairly extensive stands of Japanese knotweed along the upper reaches of Issaquah Creek.

The *Lake Sammamish Classification and Management Planning Project* (CAMP) classified the Park as a combination of Natural, Resource Recreation, and Recreation Areas. The *Lake Sammamish State Park Land Classification and Long-Term Boundary Map* from this project is included here as Figure 1. The areas shown in blue are the former agricultural fields and emergent wetlands that are classified as Resource Recreation Areas. It is these areas that are most in need of invasive plant control. Specific descriptions of existing conditions and proposed actions for these areas are included in the site-specific project recommendations in Section 6.

The CAMP map also shows that in general, streams, riparian areas, and undeveloped shorelines are classified as Natural Areas (red). Existing high-intensity Park developments are classified as Recreation Areas (purple). Specific recommendations for vegetation management in these areas are included in the site-specific recommendations.

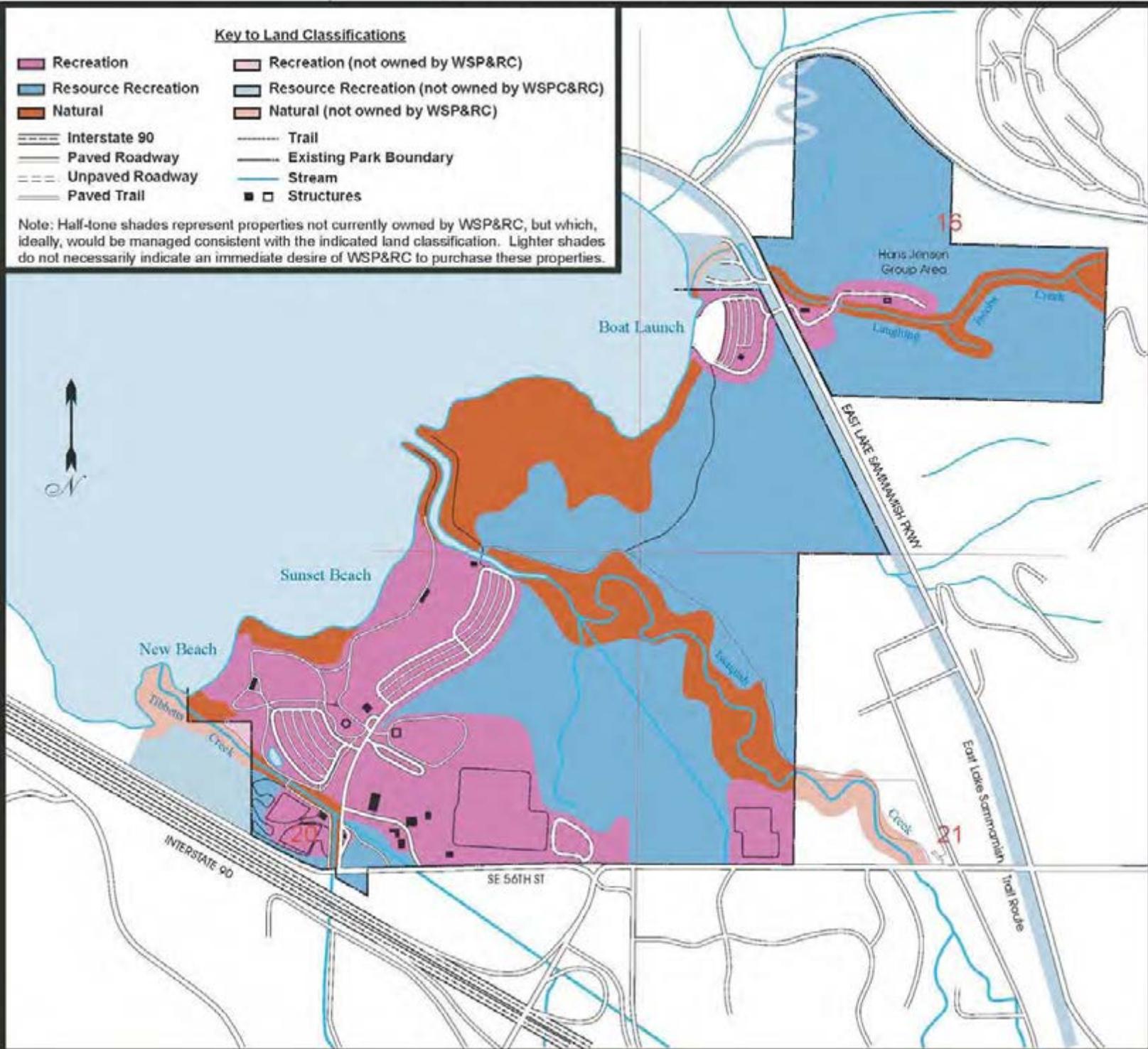
In general, non-native invasive plant species should be removed initially and primarily through mechanical (as opposed to chemical) means. This could include removal with mowing or excavating machinery where feasible and/or through hand-pulling and grubbing where the use of such equipment is not feasible or as a supplement to machine work. The goal is to remove the rootstocks to the greatest extent possible. For blackberries, this involves digging out roots and old canes repeatedly, over several growing seasons, with follow-up plantings to shade and out-compete new shoots. When choosing the size of project to tackle, it is best to choose a smaller area that can be maintained as opposed to choosing a bigger one that will be reclaimed by the blackberries.

Lake Sammamish State Park Land Classification and Long-Term Boundary Approved December 13, 2001

Key to Land Classifications

- | | |
|---|---|
|  Recreation |  Recreation (not owned by WSP&RC) |
|  Resource Recreation |  Resource Recreation (not owned by WSP&RC) |
|  Natural |  Natural (not owned by WSP&RC) |
|  Interstate 90 |  Trail |
|  Paved Roadway |  Existing Park Boundary |
|  Unpaved Roadway |  Stream |
|  Paved Trail |  Structures |

Note: Half-tone shades represent properties not currently owned by WSP&RC, but which, ideally, would be managed consistent with the indicated land classification. Lighter shades do not necessarily indicate an immediate desire of WSP&RC to purchase these properties.



Reed canarygrass can also be weakened over time to some extent with shading and competition. Mowing is also effective in holding back reed canarygrass, as is evident in existing mowed sections of the Park. Large-scale reed canarygrass removal is usually more successful with grading and removal of roots and sod. Creation of more varied topography and dense plantings of aggressive and fast-growing native plants help to combat re-establishment.

With Japanese knotweed, it is particularly important to try and remove all rootstocks as they readily re-sprout. However, since even tiny pieces of rhizomes (roots) can re-sprout and grow, it is especially important to avoid inadvertently facilitating the spread of this plant through improper transport and disposal of excavated root materials. Another method that has been used with some success is injecting individual stalks with herbicides. Further recommendations for control of these and other species may be obtained from the King County Noxious Weed Control Program.

Long-term monitoring and maintenance is required to keep invasives in check as native plantings become established. Most projects will require five or more years of performance monitoring with specific targeted standards of success, such as plant survival and areal coverage.

Trail System

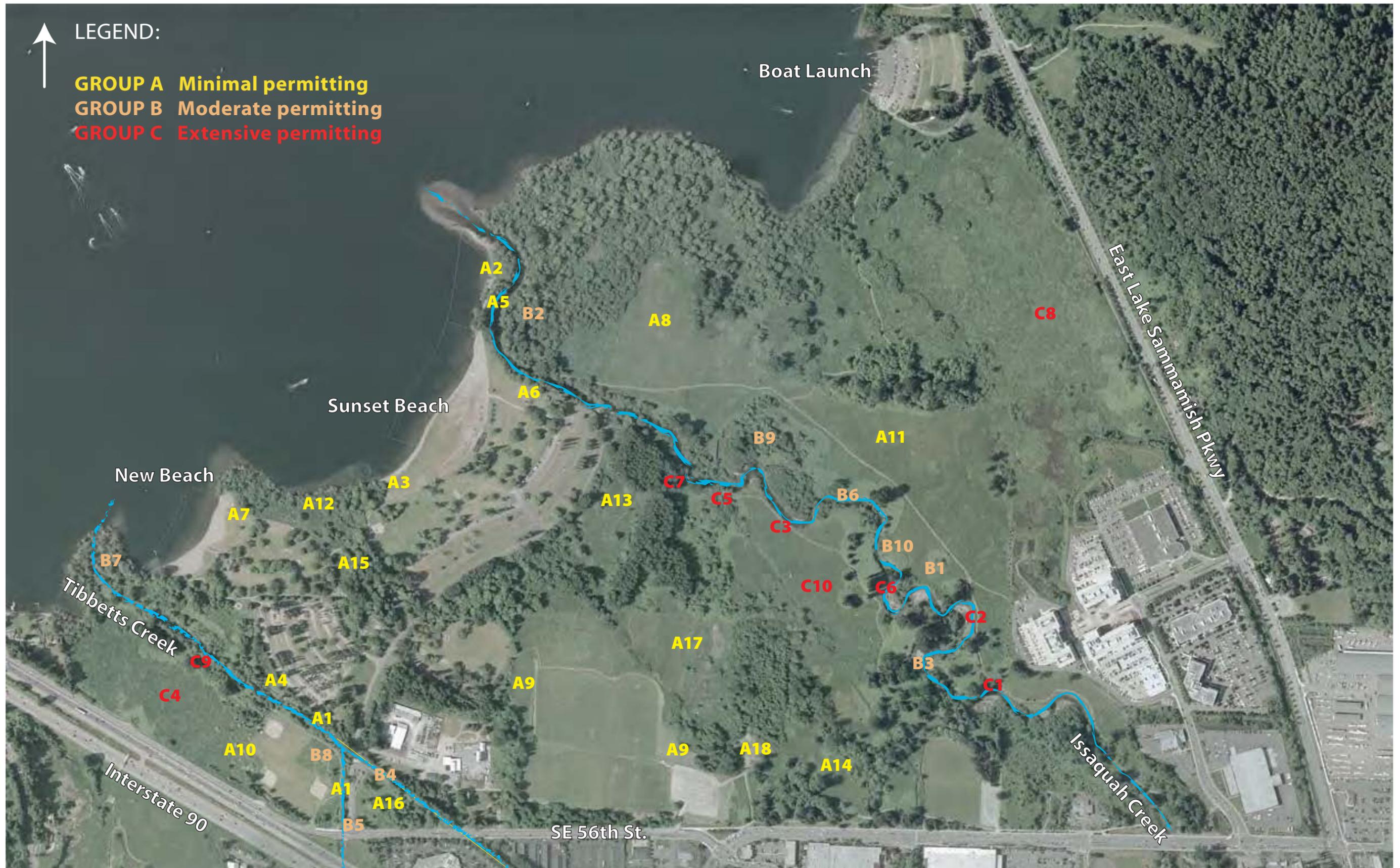
Some specific changes in the existing trail system are detailed in the site-specific project descriptions. However, there is a general need to better define trails and connections throughout the Park. Maps for trail users would be helpful and could be tied to existing and future interpretive information. Overall maps with "You Are Here" locators would be very helpful in orienting visitors to this very large Park.

The CAMP map (see Figure 1) shows the land classifications of Natural, Resource Recreation, and Recreation Areas, as defined in the *Lake Sammamish State Park Area Management Plan* (August 2003). The majority of undeveloped lands are classified as Resource Recreation and Natural Areas. Recreational use and development in the Natural Areas are limited to low-intensity, such as bank fishing, pedestrian trails, and interpretive displays. The Resource Recreation Areas are for recreational use and development is limited to low and medium-intensity levels, such as primitive sanitary facilities and shared use trails. The Natural and Resource Recreation classifications provide high and moderate degrees of protection, respectively, for native plant and animal communities.

7. SITE-SPECIFIC RECOMMENDATIONS

Thirty-eight specific restoration projects have been identified through this study. These are shown on the Overview map (Figure 2) and are detailed in the following project pages.

As explained in Section 2 of this report, these site-specific projects were ranked within each of three Implementation Groups. The projects are presented within these groups and in order from highest to lowest priorities. Table 1 summarizes this information.



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