Camp Long Park
Vegetation Management Plan

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"There is no quiet place in the white man's cities. No place to listen to the leaves of spring or the rustle of insect wings. But perhaps because I am a savage and do not understand – the clatter only seems to insult the ears. And what is there to life if a man cannot hear the lovely cry of the whippoorwill or the arguments of the frogs around a pond at night?"

-Attributed to Chief Seattle, 1855

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1. Introduction

1.1 Purpose and Need for a Vegetation Management Plan

This Vegetation Management Plan has been written to serve as a guide in the adaptive management and enhancement of Camp Long Park (Camp Long). The primary purpose of this vegetation management plan is to inform and direct the actions of organizations and individuals that have assumed the great responsibility of maintaining the unique character of this park. Organizations such as Friends of Camp Long, Seattle Department of Parks and Recreation (DPR), and non-profit environmental enhancement organizations will be the primary users of this document. Through ongoing public education at Camp Long it is hoped that some of the information in this vegetation management plan will also empower community residents and facilitate the expansion of a pro parks constituency.

The large number of people who use Camp Long each year has provided a unique educational opportunity within the Seattle Park System. That same large number of users has taken a significant toll on the resident vegetation of Camp Long. Areas of the park have become bare due to trampling and soil compaction. Several species of invasive weeds have been introduced and are beginning to seriously threaten the native vegetation of Camp Long. The lack of a comprehensive and accepted vegetation management plan has led to insufficient focus, lack of cooperation and wasted or underutilized resources.

Despite these impediments, Camp Long continues to provide visitors with a unique and predominately native forest experience. This native vegetation also provides significant habitat for many species of native fauna that are uncommon throughout the urban parks and green spaces of Seattle. In addition, this fifty-five acre park provides a significant buffer to ground water runoff entering the West Seattle Golf Course and Longfellow Creek.

Since Camp Long was conceived in 1937, it has served the dual purpose of refreshing and educating residents of Seattle. Camp Long provides urban residents with a native forest experience, without having to travel far from home. Environmental education programs at Camp Long have reached many Seattle children, teenagers and adults. The value of Camp Long to urban residents cannot be easily computed or over stated. Directing limited resources towards a comprehensive and attainable vegetation management plan will insure the ability of Camp Long to continue to refresh and educate urban residents about our wonderful Puget Sound flora and fauna. This vegetation management plan attempts to balance realistic limitations with the highest aspirations for improving Camp Long. Concerned DPR staff, private organizations and individuals ultimately will determine how this “Jewel of the Emerald City” matures into the twenty-first century.

1.2 Goals of the Camp Long Vegetation Management Plan

Every goal of this vegetation management plan and its implementation should be directed to sustaining the original purpose for which Camp Long was created. Since the creation of Camp Long, however, many things have changed. Advances in natural resource management techniques and alteration of the surrounding environment necessitate general vegetation management goals. These goals are the most general desirable outcomes of vegetation management at Camp Long.

1. To maintain and enhance the native character of Camp Long Park.
    - Develop strategies for the removal and control of invasive plant species and replacement with appropriate native plants.
    - Promote natural multiple cohort forest succession that would occur if Camp Long were not an isolated forest remnant.
    - Increase native plant species diversity and distribution throughout Camp Long.

2. To enhance soil and water quality.
    - Increase the use of coarse woody mulches in high use areas.
    - Plant native vegetation buffers around the pond area.
    - Change management regime on select grassland areas to mowing every other year.
    - Reduce of eliminate the use of fertilizer and herbicides on new meadow areas.

3. To integrate the historic vision of Camp Long with sustainable long-term management.
    - Enhance the Northwest native character of Camp Long, by managing for long term sustainability.
    - Increase wildlife appropriate habitat and breeding sites.
    - Broaden community involvement opportunities in Camp Long vegetation management.

4. To integrate vegetation management activities with ongoing environmental education programs.
    - Provide opportunities to integrate outdoor education with volunteering for local school and other organizations.
    - Increase educational signage at park kiosks and near ongoing restoration areas.
    - Direct and enhance Friends of Camp Long.
    - Use programs at Camp Long to educate local residents about the influences that land management practices have on the Longfellow Creek watershed.

1.3 Organization and Intended Use of Plan

This vegetation management plan is intended to elucidate goals, priorities, and best management practices for Camp Long. It is not intended to address specific site planning and project implementation. One document can not address the multitude of different sites at Camp Long in detail. There may be more than one way to attain the same goals for a site and this may require additional surveying and research. Actual implementation of specific projects may require consultation with DPR staff, knowledgeable volunteers or paid consultants.

This plan begins with three introductory sections. The purpose of these sections is to familiarize the reader with purpose of this plan, to provide a historic overview of Camp Long and to describe the current state of Camp Long vegetation in detail. The three following sections address different components of changing vegetation management at Camp Long:

Section 4 – Vegetation Management at Camp Long Park
Section 5 – Wildlife
Section 6 – Public Education and Outreach

These sections include current (2000-2001) natural resource descriptions and specific management recommendations. Management recommendations are prioritized based on ecosystem value, educational value, and expressed public concerns. Appendices at the end provide detailed information on specific topics that may be of interest to the reader. Topics include control methods for invasive plants, plant lists for Camp Long, wildlife food plant lists as well as data concerning existing park vegetation.

1.4 General Description of the Park Setting

Camp Long Park is a 55-acre site of primarily native vegetation in various seral stages. There are 2 covered picnic areas and 10 cabins that are available for group and individual rentals. The primary entrance to the park is located at the corner or 35th Ave. Southwest and Southwest Dawson Street. Camp Long Park lies immediately southwest of the West Seattle Golf Course. It is bounded on the south by houses and undeveloped green spaces. To the northwest is a highly maintained grassy strip. The southwest side of Camp Long is bordered by houses, many of which are inundated with invasive plant species.

A large main lodge is located at the Dawson Street entrance to the park. There is a parking lot located around the main lodge area. A mixture of native and non-native ornamental plants occupies the area immediately surrounding the main lodge. Further to the east is a mowed grass basin known as the “parade ground”. Most of the cabins are located in the primarily deciduous and sparse conifer wooded areas around this parade ground. Recreational trails run through large sections of Camp Long. There is also a


Figure 1-1
SEATTLE PARKS AND RECREATION
Camp Long
Legend
Trail
Park Boundary
35th Av SW
N
1:4200
100 0 100 Feet

large climbing rock designed to imitate conditions that a climber might encounter while glacier climbing, located at the head of the "wooded loop" trail.

On the north end of the parade ground is a small pond, which is connected to a creek that flows to the northeast. The areas surrounding the pond and creek are small fringing wetlands. Just to the east and north of the parade ground, the ground slopes downward to the Park boundary. Slope vegetation consists of primarily deciduous forest. Some scattered pockets of conifers are present on these slopes. The understory vegetation is a mixture of native and invasive species.

Mixtures of red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum)* dominate the overstory in most forested areas of Camp Long. Large populations of horsechestnut (*Aesculus hippocastanum*), a non-native and invasive tree species, also inhabit these forested areas. Small pockets of Pacific madrone (*Arbutus menziesii*) exist around cabins and at forest edges. Western red cedar (*Thuja plicata*), western dogwood (*Cornus nuttallii*), and willow (*Salix sp.*) trees also occur sporadically throughout forested areas. To the southeast of the parade ground non-native poplar tree species (*Poplus sp.*) dominate the overstory and are spreading by lateral root sprouting.

The understory of the forested areas is occupied by a variety of native, invasive and non-native plant species. Some common native plants are sword ferns (*Polysticum munitum*), hazelnuts (*Corylus cornuta*), and nettle (*Urtica dioica*). Some common invasive plants are English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*) and English holly (*Ilex aquifolium*).

Invasive plant species may also be facilitating the invasion of non-native animal species in a process called mutualism. An example of such a mutualistic relationship is the eastern gray squirrel (*Sciurus carolinensis*), which feeds on and disseminates horeschestnut seeds. Other invasive plants can provide habitat for non-native animal species. For example, the black rat (*Rattus norvegicus*) can nest in English ivy patches.

In a recent survey 46 native plant species and 39 invasive plant species were found to be present at Camp Long. In general most of the native plant species are shade tolerant and most of the invasive plant species prefer open, disturbed areas. A small number of shade tolerant invasive species, however, cover substantial portions of the forested areas at Camp Long.

2. Historic Overview of Camp Long

"One day he (Archie Phelps) called, and in his gentle way commanded me to inspect this seventy-acre portion of the general golf course tract for the purpose of considering its possibilities as a camp site for kids. We scrambled and climbed all over this place through a jungle of brush, briars, and trees. It seemed to me to have possibilities." - William G. Long, 11/8/41

"The streets and alleys of a city are not healthful or wholesome places for kids to play. The polluted air of cities is not healthful or wholesome air for kids to breathe. The adventure found by kids in streets and alleys is destructive of character itself. If we are to give them strength in body, mind and soul, we must lead them from the dirt, congestion and complexities of the city to the hills from which cometh our help." –William G. Long, 11/8/41

2.1 History of Camp Long Park

In 1935 due in large part to the lobbying of H.W. Blackstock, founder of a lumber company and Parks Board member, work was approved to develop a municipal golf course in West Seattle. This work was to be co-sponsored by the City of Seattle and the federal Works Progress Administration (WPA). The WPA supplied a labor match to City of Seattle money. Re-grading was done over the entire site except for Longfellow creek and Camp Long creek. The golf course was opened for play in May of 1940.

As work on the golf course progressed, a member of the Parks Board named Archie Phelps proposed including a sport stadium and camping area. In 1936 the Parks Board approved changing the name of the park to "West Seattle Golf Course and Recreation Area".

In 1937 Archie Phelps telephoned a respected colleague and friend, Superior Court Judge William G. Long, who worked in the Juvenile and Divorce Courts. "He said 'Bill, there is a 65 acre corner of the golf course tract that they are not going to use for golf. They've started to cut down the trees and plant it to flowers and grass. I have stopped them because I think it would make a wonderful campsite for the Boy Scouts of West Seattle. I wish you would come over and take a look at it and see what you think about it.'" The pair cruised the tract of primarily "...brush, nettles, briars, and fallen trees." **(2).** The area now called the parade ground was a "swampy bog" at that time **(1).** Even though the current conditions of the park were less than optimal, the pair agreed that the park had great possibilities as a campsite "...not merely for the Scouts of West Seattle, but for the kids of the entire city."**(2).**

A committee of seventeen people representing various youth groups was formed and began planning the camp, and calling on the services of Clark Sherman who had previously designed a wilderness camp. Sherman was also a recognized expert in camping and mountaineering. Clark Sherman, who died in 1955, designed the climbing rock at Camp Long to imitate the conditions that a climber might face when climbing a real glacier.

Since Camp Long was conceived during the depression years, funding was difficult to secure. With the application of "persuading, maneuvering, finagling, scrounging, snaffling, and even a little benevolent larceny..."**(2)**, and man power supplied by WPA, the park plan became a reality.

Initially there was some debate about how the park should be used by citizens. The decision was made by Sherman, acting as Park director that the park should be used solely for the purposes of camping and climbing, under "the guidance and direction of responsible adult leadership."**(3).** The park and the great climbing rock were designed to emulate the natural beauty of Mt. Rainier, with an unobstructed view of the great mountain from the top of the rock. The cabins built at Camp Long were named in honor of Washington State peaks: Rainier, Constitution, Pilchuck, Pinnacle, Constance, Olympus, Glacier, St. Helens, Baker and Adams.

Camp Long Park without doubt was designed so that urban "Children who cannot afford the cost of going to the mountains will get at least a taste of outdoor life." In 1940 the Parks Board officially adopted the name Camp William G. Long. The Park was dedicated on November 8, 1941 "...to youth: for camp and climbing skills and education by supervised groups only."**(2).**

Since the dedication in 1941, Camp Long has served Seattle residents as a site for recreation and education. Cabins at Camp Long are frequently rented by individuals and groups wishing to have a campsite experience without leaving the city. In addition the multitude of environmental education and outreach programs offered at Camp Long have reached thousands of children and adults in Seattle and surrounding areas.

2.2 Integration of Plan with Historic Elements

There are at two major factors, which were not anticipated when the original plans for Camp Long were made.

- **The presence of aggressive, invasive plants in all areas immediately surrounding Camp Long Park could not have been anticipated.**
- **The vast increase in the number of human visitors to Camp Long Park each year was also not anticipated.**

Diverse invasive plant populations surround Camp Long on the different boarders. The West Seattle Golf Course is lined with a row of greater that 50 mature European Horsechestnut trees (*Aesculus hippocastanum*) to the north and east of Camp Long. A green belt to the southeast is predominately populated with Himalayan blackberry (*Rubus*

discolor), with other scattered invasive plants intermixed. Private residences to the south and west harbor large populations or English ivy (*Hedera helix*), English laurel (*Prunus laurocerasus*), English holly (*Ilex aquifolium*), Poplar species (*Poplus spp.*), with other scattered invasive plants intermixed. In essence Camp Long is an island of native vegetation surrounded, on all sides, by invasive and non-native plant species. Use of a park by large numbers of people deteriorates soil quality through soil compaction. Human use also disrupts wildlife and may inhibit their ability to carry out normal functions such as feeding and reproduction. Consequently the health of plant and animal species are being negatively impacted.

Clearly Camp Long was intended to be a naturalistic park to be used by children of the City of Seattle to have an experience of Northwest nature. The founders intended that camping and climbing skills could be learned at Camp Long, under the supervision of qualified adults. It was presumed that outdoor education in an environment that emulated the forested mountains of Washington State would provide a healthy recreational alternative for residents of the City of Seattle.

Managing vegetation in order to achieve sustainable native character is expressly in keeping with the original intent of Camp Long as a place where "...children will receive their first glimpse of the glory of simple outdoor living."**(3)** Promoting sustainable plant and animal biodiversity is also supported by the original intent of Camp Long as an educational resource for urban residents. "Here they (children) will receive the basic training that will prepare them for fuller enjoyment of God's outdoor wonderland."**(3)** Enhancing the aquatic resources to emulate the natural state of ponds and streams is also inherent in the management of a park that is inspired by Northwest wilderness.

With proper management, the presence of invasive plant species in Camp Long can be reduced or eliminated. In order to sustain the exclusion of invasive plant species from Camp Long it will be necessary to work with the surrounding neighbors through community out reach and education. Surrounding residents may not understand that invasive plants can spread from their yard into Camp Long. Eliminating invasive plant food sources for non-native animals will reduce the appeal of Camp Long to non-native animal species. These non-native animals might otherwise compete with or entirely displace native animal species. Sensible management to direct the movement of park visitors and reduce soil compaction in high use areas can significantly reduce the deleterious effect of visitors on soil quality, plant and animal communities. The fact that Camp Long has so many educational programs in place makes these goals all the more achievable. By working to educate neighbors and park visitors it should be possible to simultaneously improve the physical integrity of Camp Long while broadening local community support and involvement with the sustainability of Camp Long as it was originally envisaged.

(1) *The terms swamp and bog are technically contradictory. A bog is a wetland with no ground water input and subsequently low nutrient status. Bogs are dominated by sphagnum moss and few other plants. Swamps are wetland, which are higher in nutrients and dominated by woody vegetation. Due to the location of the parade ground it was most likely a swamp and not a bog.*

(2) *William G. Long. From Judge's notebook, September 7, 1957.*
(3) *William G. Long. Remarks at Dedication of Youth Camp, November 8, 1941.*

3. Vegetation of Camp Long

3.1 Forest Succession in the Puget Trough

Succession is defined as the directional and continuous pattern of colonization and extinction of an area by plant species populations (Begon, et.al. 1996). Succession begins after an environmental disturbance. For a plant species to colonize and inhabit an area three criteria must be met. Plant propagules must be capable of reaching the area. A physical environment that the plant is capable of surviving must also be present. Finally, predators, competitors and parasites must not preclude the presence of a particular plant species.

The process of succession occurs as a result of changing environmental conditions. There are no sharp boundaries between the different stages that lead to forest succession. We can refer conceptually to different stages of the process as seral stages. Various plant species have evolved over vast eons of time to be specifically adapted to particular physical environments and the seral stages that produce those environments. Individual plant species are replaced by other species by either exhausting necessary resources or changing the physical environment to make it more favorable to superior competitors.

Major disturbances, which completely destroy plant communities, result in same aged or single cohort tree communities, in the Puget trough. This level of disturbance is naturally uncommon and only occurs as a result of catastrophic fire or forest clear cutting. A more natural form of forest succession that occurs in the Puget trough results from chronologically staggered gaps opening in forest canopy as a result of tree failure. This regionally typical pattern results in multiple cohort forest communities (Bradley 1995).

Camp Long Park lies within a large and distinct geographic area known as the Puget trough or basin. The Puget trough is bordered by the Olympic Mountains to the west, the Cascade Range to the east, Canada to the north and the Coast Range to the south. Most of the elevations are below 500 feet above sea level. Ice ages, volcanoes, earthquakes and glaciers have shaped this land over millions of years (Kruckeberg 1998). The most recent glacier in the Puget Sound was called the Fraser Glaciation that occurred over 20,000 years ago, scouring all major vegetation from this region. It also left river valleys and rock/soil deposits that forever changed the character of the Puget trough. This major disturbance reset the biological clock in the Puget trough.

After the glaciers succeeded the process of primary succession began. Primary succession is the process by which the first “pioneer” plant species begin to inhabit an area. These plants must be halophytes and often have other special adaptations such as the ability to withstand drought or fix nitrogen from the air. In the process of completing their lifecycle, these plants improve the environment for other plants by adding nutrients and organic matter to soils and providing shade. This change in the physical environment allows new mesophytic herbs and shrubs to begin colonization of the site. While these plants may not thrive in extremely sunny sites they still may have special adaptations to

poor soils. These early successional plants will even eventually shade out the early halophytes and replace them as the dominant species. Shade intolerant trees will also begin to grow in such a site by growing taller than the surrounding vegetation. As these trees grow taller they further increase the amount of shade in the site. Eventually shade tolerant late successional trees will shade and thereby out compete most of these early pioneer trees. The dense shade beneath these trees will only permit the sustained growth of shade tolerant shrubs and herbs. This stage is referred to as the climax stage of succession in the Puget trough.

More specifically, Camp Long would be classified as being in the lowlands of the *Tsuga heterophylla* Zone (Franklin & Dyrness 1988). Wet mild winters and relatively dry summers typify this Zone. Typical early successional plants in this Zone would be red alder (*Alnus rubra*), vine maple (*Acer circinatum*), and sword fern (*Polysticum munitum*). These plants might be expected to co-exist with populations of Douglas fir (*Pseudotsuga menziesii*). The climax trees of this zone, in a lower coastal region would be expected to be shade tolerant conifers such as western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*). One would also expect to see populations of grand fir (*Abies grandis*), bigleaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*) interspersed through out (Franklin & Dyrness 1988). As forest succession proceeds the changing nature of the vegetation also begins to support differing animal and microbial communities that rely on the vegetation for food and shelter. Over time succession increasingly favors shade tolerant shrubs and herbs within forested areas.

Stream banks and wetlands would be expected to harbor other plants that are adapted to their unique microclimates. There is some debate about the existence of native prairies within the Puget trough. The best evidence indicated that native peoples maintained prairies with regular burning of the fields. Without this burning it is likely that the typical pattern of forest succession in the Puget trough would occur.

It is crucial to remember three points when considering forest succession at Camp Long. The first point is that ecosystem change is happening all the time and is inevitable. Even if the current state of Camp Long vegetation was ideal, it is unrealistic to expect it to stay that way indefinitely. The second major point to consider it that Camp Long is a remnant forest fragment. Due to this isolation, the natural process of succession that typically would occur in the *Tsuga heterophylla* zone will not occur, due to a lack of plant seed and propagule sources in the surrounding environment. The final factor to consider it the time scale at which forest succession operates. It may take over 100 years for a forest to regain a late seral stage character (Bradley 1995). Other authors conclude that late seral stage plants such as *Tsuga heterophylla* will not even be present in significant numbers for 50-100 years, under natural conditions and that climax forests only occur when a site has remain undisturbed for 400-600 years (Franklin and Dyrness 1988).

3.2 Vegetation Plot Inventory Methods

A survey of Camp Long vegetation was conducted during the winter of 2000 – 2001. In total 28, 1/10 acre circular plots were selected to represent the variety of habitat types

present at Camp Long. The location of the survey plots can be seen in **Figure 3-1**. An example of the field survey sheets used can be seen in **Table 3-1**.

All tree species were recorded for each plot as well as their physical structure. This structure coding was done such that 1 = >1-4" DBH, 2 = 5-8" DBH, 3 = 9-20" DBH, 4 = 21-31" DBH, 5 = > 32" DBH, and 6 = "Multi-storied canopy". All visible shrub, herb and fern species were also recorded for each plot. The percentage of a plot that was covered by a given plant species was also recorded (% Cover). The percent canopy cover was approximated for each plot. An approximation of the seral stage of each plot was also recorded. Seral stages were coded such that 1 = old growth (approximately $\geq$ 180 years old), 2 = late mature (approximately 120-180 years old), 3 = mid-mature (approximately 60-120 years old), 4 = early mature (approximately 30-60 years old), 5 = sapling-small tree (>1" to 5" DBH), and 6 = shrub pioneer less than 10% canopy closure of trees. The soil type was recorded for each plot. This was recorded as the sized particle or material, which dominated a given soil. Soils that were dominated by clay were recorded as "clay"; those dominated by sand were recorded as "sand", etc. The percent slope and the aspect were recorded for each plot. In addition the number of pieces of downed woody debris, and snags were also recorded.

On the basis of dominant vegetation, Camp Long has been divided into 18 distinct vegetation zones. The dominant vegetation in each zone, percent invasive plant cover and percent canopy cover can be seen in **Table 3-2**.

**Diameter at breast height (DBH) is the diameter of a tree trunk, taken 4.5 feet from the base of the tree.*

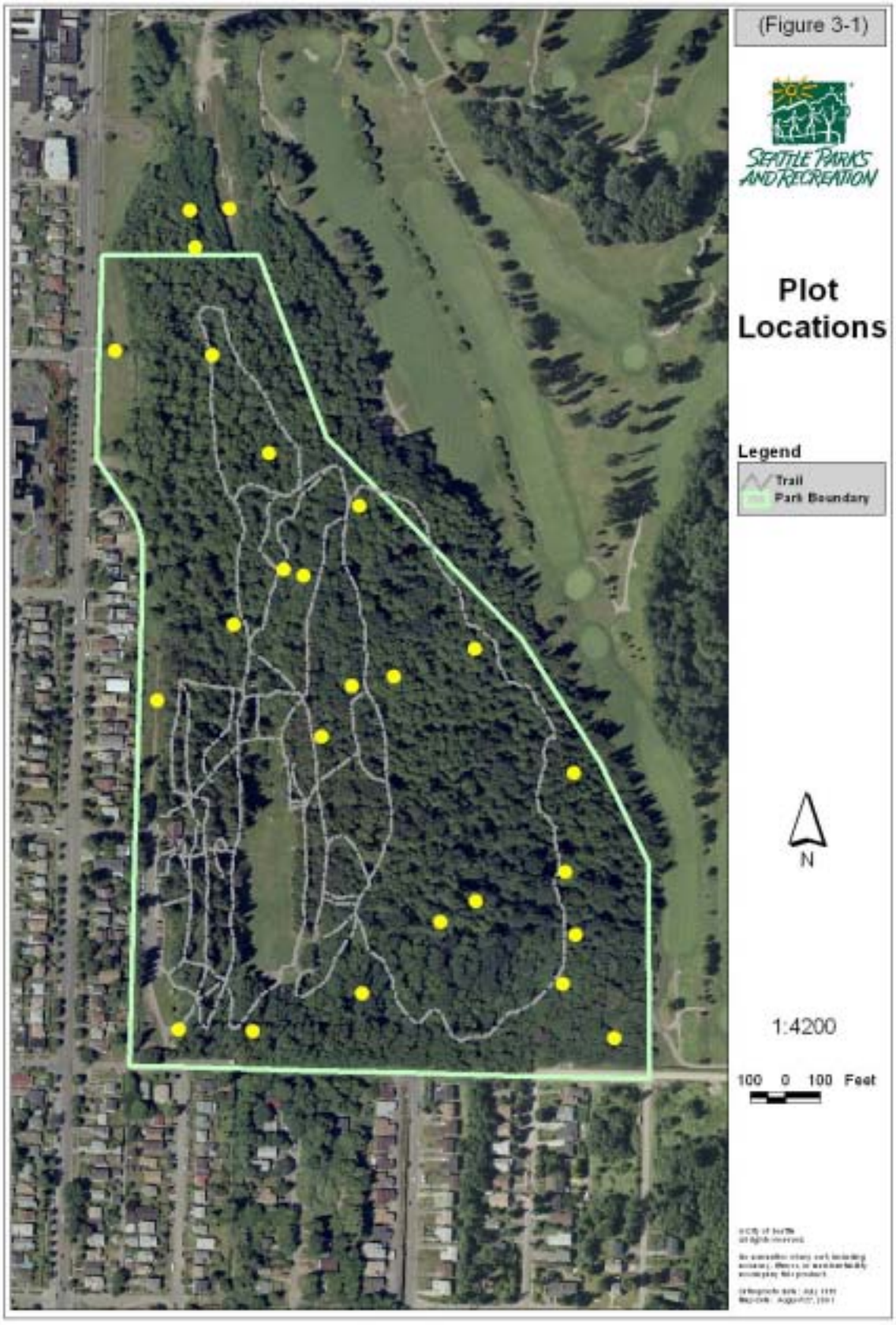
(Figure 3-1)
SEATTLE PARKS AND RECREATION
Plot Locations
Legend
Trail
Park Boundary
N
1:4200
100 0 100 Feet

Table 3-1. Vegetation Plot Data Sheet used for 2000-2001 Survey

Park	Plot	Name/Date	Plot Location			
Camp Long						

Water			Canopy Closure				
			0-40% 40-60% 60-80% >80%				
Soils			**Aspect**				
Sand/Clay/Duff/Gravel/Eroded			N S E W				
Slope		**Seral Stage**		**#DWD**	**#Snags**		
0-15% 15-40% >40%							
Special feature							
Gully, slide, Mt. Beaver presence, stream, wetland, seep, trail							

Comments/Recommendations

Species	Tree	Crown	Estimated Age	% Cover	%Cover	Health	Native	Regeneration
Code	Structure	Class	(years)	1/4 plot	Total plot	Good	Non-Native	Planted

Table 3-2. Dominant Plant Species Distribution for Vegetation Zones

Zone	Tree 1	Plant 1	%	Plant 2	%	Plant 3	%	% Invasive
1	Hawthorn	GRASS	>95	N/S	N/S	N/S	N/S	<1
2	Red alder	Blackberry	49	Ivy	21	Sword fern	8	81
3	N/A	Scotch broom	15	Blackberry	44	Horsetail	12	72
4	Red cedar	Sword fern	52	Salmonberry	18	Hazelnut	11	9
5	Big-leaf maple	Douglas fir	54	Trailing blackberry	5	Nettle	4	22
6	Red alder	Trailing blackberry	21	Red elderberry	19	Ivy	3	17
7	Douglas fir	Salal	14	Hazelnut	10	Trailing blackberry	8	19
8	Ironwood	GRASS	>75	Hardhack	2	Snowberry	2	<1
9	N/A	GRASS	100	N/S	N/S	N/S	N/S	N/S
10	Big-leaf maple	Sword fern	28	Ivy	11	Blackberry	9	28
11	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
12	Red alder	Sword fern	32	Fringecup	21	Hazelnut	20	2
14	Red alder	Nagoonberry	31	Nettle	19	Sword fern	16	32
14	Red alder	Blackberry	60	Salal	39	Hazelnut	24	61
15	Red cedar	Low Oregon grape	56	Hazelnut	11	Salal	9	7
16	Big-leaf maple	Nettle	45	Hazelnut	21	Sword fern	20	1
17	Scouler's willow	Red-twig dogwood	23	Ivy	11	Sword fern	9	44
18	Poplar	Hazelnut	17	Nagoonberry	10	Holly	11	54

**Plants are listed in order of their prevalence in a given zone. Only the three most prevalent plants and the most prevalent tree species are listed. The column labeled "% Invasive" refers to the total amount of the ground covered by invasive shrubs and herbs. Sparsely vegetated zones were not covered in the 2000-2001 survey. If this was the case it is indicated by "N/S" for not surveyed. These "N/S" areas were ground surveyed to arrive at management recommendations, but no vegetation plots were located in these zones due to ongoing landscape maintenance.*

3.3 Map Creation Methods

Camp Long is a mixture of native, invasive and non-native plants of varied age classes. To illustrate broad trends in the vegetation patterns at Camp Long, several maps have been created using ArcView GIS software. Statistics used to generate these maps can be found in **Appendix - 4**.

Invasive plant species were found in 100% of the plots sampled at Camp Long during the 2000-2001 survey. On average 33% of the vegetated ground at Camp Long was found to be covered by invasive understory plant species. An invasive tree species, the horsechestnut tree (*Aesculus hippocastanum*) represented 9.9% of the total trees found in sample plots. This inundation with invasive plant species persists despite the ongoing efforts to reduce or eradicate them by naturalists and volunteer groups.

Several invasive plant species have encroached upon large areas of Camp Long and threaten to dominate most vegetation zones. The most serious invader at Camp Long is the horsechestnut tree (*Aesculus hippocastanum*). Other invasive plants with excessive populations at Camp Long, in order of prevalence, include; English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*) English holly (*Ilex aquifolium*), poplar trees (*Populus sp.*), English laurel (*Prunus laurocerasus*), and Japanese knotweed (*Polygonum cuspidatum*). General information on these invasive plants, along with suggested control methods can be found in **Appendix - 7.**

Figure 3-2 is a map that depicts the invasive/native plant species ratio. This is not a measure of percent cover, but rather of plant species present and their characterization. Plots with a ratio over one have a greater diversity of invasive plant species than native plant species. Plots with a ratio between 0 and 0.19 were classified as very low. Plots with a ratio between 0.2 and 0.39 were classified as low. Plots with a ratio between 0.4 and 0.59 were classified as medium. Plots with a ratio that was greater than 0.6 were classified as high.

Figure 3-3 is a map that depicts the relative invasion by horsechestnut trees in each plot. The horeschestnut tree (*Aesculus hippocastanum*) is an invasive tree that is native to the mountain valleys of Greece-Albania. Significant populations of horsechestnut trees have invaded the native forest areas of Camp Long. Relative invasion was used to estimate the biological significance being exerted by horsechestnut trees in each sample plot. Relative invasion values were computed for each plot by adding up the physical structure ratings of horsechestnut trees in each plot. For example, 5 trees of >1-4" DBH (physical structure code of 1) would have the same value as 1 tree of > 32 DBH (physical structure code of 5). It is important to bear in mind that this figure is only an estimate of the biological significance being exerted by horsechestnut trees in each plot at the time of the survey. Plots with a relative importance value of 0-1.5 were classified as very low. Plots with a relative importance value of 2-3.5 were classified as low. Plots with a relative importance value of 4-6 were classified as medium. Plots with a relative importance value of >6 were classified as high.

Figure 3-4 is a map that depicts the percent invasive plant cover for a given plot. This is a measure of the ground that is covered by one or many invasive plant species. Horsechestnut trees (*Aesculus hippocastanum*) were not included in this measure since they were examined separately. Plots with a percent invasive plant coverage of 1-10% were classified as very low. Plots with a percent invasive plant coverage of 11-20% were classified as low. Plots with a percent invasive plant coverage of 21-80% were classified as medium. Plots with a percent invasive plant coverage of >80% were classified as high.

Figure 3-5 is a map that depicts the native plant species richness for each plot. This is simply a measure of the number of native plant species that are present in each plot. Plots with 2-7 native plant species were classified as very low. Plots with 11-16 native plant species were classified as low. Plots with 16-20 native plant species were classified as medium. Plots with >20 native plant species were classified as high.

Figure 3-2


Seattle Parks and Recreation
Camp Long
VMP
Invasive
/Native
Plant Ratio
Legend
Very Low
Low
Medium
High
Trail
Park Boundary
35th Av SW
N
1:4200
100 0 100 Feet


Figure 3-3
SEATTLE PARKS AND RECREATION
Camp Long
Invasion by Horsechestnut
Legend
Very Low
Low
Medium
High
Trail
Park Boundary
35th Av SW
N
1:4200
100 0 100 Feet


Figure 3-4
SEATTLE PARKS AND RECREATION
Camp Long
Percent Invasive Plant Cover
Legend
0-10%Very Low
11-20%Low
21-80%Medium
>80%High
Trail
Park Boundary
35th Av SW
N
1:4200
100 0 100 Feet

Figure 3-5


SEATTLE PARKS AND RECREATION
Camp Long
Number of Native Plant Species
Legend
0-10 Very Low
11-15 Low
16-20 Medium
>20 High
Trail
Park Boundary
35th Av SW
N
1:4200
100 0 100 Feet

3.4 Vegetation Zone Descriptions

All vegetation zones were delineated based upon the dominant plant communities and physical continuity. Even though vegetation zones may be dominated by different plant communities they often have similar management needs. For example a zone that is dominated by bigleaf maple (*Acer macrophyllum*) and sword fern (*Polystichum munitum*) and a zone that is dominated by red alder (*Alnus rubra*) and red elderberry (*Sambucus racemosa*) may both harbor significant invasive plant populations and be in need of conifer saplings to continue the process of forest succession. **Figure 3-6** shows the different vegetation zones referred to in this section. Map Statistics for individual zones are summarized in **Table 3-3**. **Table 3-4** displays the distribution of common tree species in vegetation zones.

Definitions for seral stage and soil types can be found in section 3.2 "Vegetation Plot Inventory Methods". Section 3.3 "Map Creation Methods" contains the definitions for; invasive/native ratio, relative invasion by horsechestnut, percent invasive plant cover and number of native plant species.

Zone 1 – 35th Street Edge Zone.
Acres: 1.1
Aspect and Soils: Northern exposure with high clay content soils

Zone 1 was not surveyed during the 2000-2001 vegetation survey. This zone is an almost completely open, highly maintained grass lawn area. The north tip of this zone is used for firework viewing on the fourth of July. There is a deep basin contour in the southern portion of this zone. A small patch of trees and shrubs divides the north and south ends of this zone. This small patch is a mixture of primarily invasive plants such as himalayan blackberry (*Rubus discolor*) with some native plants.

This zone has very limited value for wildlife. Human use of this zone is very low with the exception of the northern tip on the fourth of July.

Zone 2 – Sapling Red Alder (*Alnus rubra*) Zone.

Acres: 2.7
Canopy Closure: 60% - 80%
Aspect and Soils: Eastern exposure with high clay content soils.
Average Invasive/Native Ratio: 0.16 – Very low
Average Relative Invasion by Horsechestnut: 1.25 – Very low
Average % Invasive Plant Cover: 81% - High
Number of Native Plant Species: 21 - High

This zone is dominated by a dense deciduous canopy of sapling red alder trees (*Alnus rubra*). Red alder trees (*Alnus rubra*) make up 74% of the trees in this zone. Bigleaf maple trees (*Acer macrophyllum*) make up 13% of the trees in this zone. Western red


Figure 3-6
Camp Long
VMP
Vegetation Zones
35th AV SW
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Legend
Park Boundary
Trail
Zone Boundary
N
1:3,703
200 100 0 200
Feet

Table 3-3. Map Statistics for Vegetation Zones

Zone #	Acres	Invasive/Native ratio	Relative Inv. by AEHI	% Invasive Cover	# Native sp.
1	1.1	N/S	N/S	N/S	N/S
2	2.7	0.16	1.25	81	21
3	0.5	2.99	0.25	72	13
4	2.2	0.19	1	9	23
5	2.4	0.23	3.25	22	25
6	14	0.28	2.4	17	24
7	5	0.37	0	19	15
8	0.7	N/S	N/S	N/S	N/S
9	2.5	N/S	N/S	N/S	N/S
10	6.4	0.27	1.7	28	23
11	0.5	N/S	N/S	N/S	N/S
12	2	0.05	7	32	19
13	1.3	0.39	0	61	23
14	0.9	0.26	0	32	23
15	2.3	0.06	1	7	18
16	1.8	0.25	6	1	19
17	2	0.53	6	44	18
18	2.2	0.69	0.5	76	27

**Zone # refers to the vegetation zone in Figure 3-6. The column labeled "Invasive/Native ratio" is a measure of invasive vs. native plant diversity. Numbers over 1 indicate that there are more invasive than native plants in a plot. The column labeled "Relative Invasion by of AEHI" is a measure of the biological significance being exerted by the Horsechestnut tree (Aesculus hippocastanum) in a particular plot. The column labeled "% Invasive cover" displays the percentage of ground in a particular plot that is covered with invasive plant species. The column labeled "# Native sp." displays the total number of native plant species found in a particular zone. Zones, which did not contain any survey plots during the 2000-2001 vegetation survey, are labeled "N/S".*

Table 3-4. Distribution of Common Tree Species by Vegetation Zone

Zone	ACMA %	AEHI %	ALRU %	POSP %	THPL %	TSHE %	ARME %	PSME %	SASC %
1	0	0	0	0	0	0	0	0	0
2	13%	2%	74%	0	3	0	0	0	0
3	14%	0	31%	0	0	0	0	16%	0
4	27%	18%	0	0	50%	0	0	0	0
5	48%	37%	15%	0	0	0	0	0	0
6	14%	12%	46%	0	6%	2%	0	1%	0
7	0	0	0	0	19%	0	25%	38%	0
8	0	0	0	5%	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	57%	13%	10%	0	0	0	0	2%	0
11	0	0	0	8%	0	0	35%	0	0
12	0%	27%	27%	0	9%	0%	0	0	0%
13	25%	0	0	0	0	0	0	0	0
14	38%	0%	38%	0	0%	0%	0	0	17%
15	0	3%	0	0	80%	3%	6%	0	0
16	43%	43%	14%	0	0	0	0	0	0
17	0	24%	0	0	0	0	0	0	59%
18	3%	3%	3%	30%	15%	6%	0	9%	11%

ACMA = *Acer macrophyllum* (bigleaf maple)
AEHI = *Aesculus hippocastanum* (horsechestnut)
ALRU = *Alnus rubra* (red alder)
POSP = *Populus sp.* (poplar/cottonwood)
THPL = *Thuja plicata* (western red cedar)
TSHE = *Tsuga heterophylla* (western hemlock)
ARME = *Arbutus menziesii* (pacific madrone)
PSME = *Pseudotsuga menziesii* (Douglas fir)
SASC = *Salix scouleriana* (Scouler's willow)

cedar (*Thuja plicata*) make up 3% of the trees in this zone. There has not been significant invasion by horsechestnut trees (*Aesculus hippocastanum*) in this area. This may be due to the high soil clay content and distance from seed sources. Horsechestnut trees (*Aesculus hippocastanum*) make up only 2% of the trees in this zone.

Large populations of Himalayan blackberry (*Rubus discolor*)-49% English ivy (*Hedera helix*)-21% and have extensively invaded most of the understory in this zone. Small populations of singleseed hawthorn (Crataegus monogyna), an invasive tree species introduced from Europe and northern Africa, also inhabit this area. While native species are scarce there are small populations of sword fern (*Polystichum munitum*)-8% and trailing blackberry (*Rubus ursinus*)-7%. It is likely that soils in this area were covered by a landslide at some point in the recent past. This has resulted in the lack of soil horizon development and the early seral stage development. The amount of downed woody debris is variable but usually low. There are few snags that could serve as significant wildlife habitat.

Zone 3 – Old Sand Pit Zone.
Acres: 0.5
Canopy Closure: Less than 40%
Aspect and Soils: Southeastern exposure with high sand content soils.
Average Invasive/Native Ratio: 2.99 – High
Average Relative Invasion by Horsechestnut: 0.25 – Very low
Average % Invasive Plant Cover: 72% - Medium
Number of Native Plant Species: 13 – Low

Only a small portion of this zone actually extends into the recognized boundaries of Camp Long. This area can best be described as an open, pioneer shrub zone. Most of zone 3 lacks any canopy cover at all. Of the few trees that are present, 31% are red alder trees (*Alnus rubra*), 21% are goldenchain trees (*Laburnum anagyroides*) and 16% are Douglas fir trees (*Pseudotsuga menziesii*). Goldenchain trees are nitrogen fixing, invasive trees that are native to central and southern Europe.

This zone has a much larger diversity of invasive plants than native plants. The open areas of this zone are dominated by ruderal, invasive plant species. Some of the invasive species present require high levels of sun exposure and do not pose a significant threat to forest invasion. This includes species such as grass-51% and scotch broom (*Cytisus scoparius*)-15%.

Zone 3 is also a significant seed source for invasive species that are capable of invading forest edges such as himalayan blackberry (*Rubus discolor*)-44% and singleseed hawthorn (*Crataegus monogyna*)-1%. The sandy soils are probably due to the use of this area for storing sand piles, by the West Seattle Golf Course. There are no significant amounts of downed woody debris or snags in this area.

Zone 4 – Early Mature Western Red Cedar/Early Mature Bigleaf maple (*Thuja plicata/Acer macrophyllum*) Zone.
Acres: 2.2
Canopy Closure: 40% - 60%
Aspect and Soils: Northeastern exposure with clay soils covered with forest duff.
Average Invasive/Native Ratio: 0.19 – Very low
Average Relative Invasion by Horsechestnut: 1 – Very low
Average % Invasive Plant Cover: 9% - Very low
Number of Native Plant Species: 23 – High

This zone is dominated by a fairly open mixed canopy of early mature western red cedar trees (*Thuja plicata*) and early mature bigleaf maple trees (*Acer macrophyllum*). Western red cedar trees (*Thuja plicata*) make up 50% of the trees in this zone. Bigleaf maple trees (*Acer macrophyllum*) make up 27% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 18% of the trees in this zone. Zone 4 is similar to zone 15 in that the natural process of forest succession is progressing. This is evidenced by the presence of large numbers of early mature western red cedar trees (*Thuja plicata*).

Only shade tolerant invasive species such as English ivy (*Hedera helix*)-8% and English holly (*Ilex aquifolium*)-1% are surviving in this area. Common native species include sword fern (*Polystichum munitum*)-52%, moss-38%, salmonberry (*Rubus spectabilis*)-18%, hazelnut (*Corylus cornuta*)-11% and trailing blackberry (*Rubus ursinus*)-9%. There are significant amount of downed woody debris, but few snags in this zone.

Zone 5 – Mid-Mature Bigleaf Maple/Early Mature Horsechestnut (*Acer macrophyllum/Aesculus hippocastanum*) Zone.
Acres: 2.4
Canopy Closure: 60% - 80%
Aspect and Soils: Northwestern exposure with highly variable soils (clay, loam, sand, gravel).
Average Invasive/Native Ratio: 0.23 – Low
Average Relative Invasion by Horsechestnut: 3.25 – Low
Average % Invasive Plant Cover: 22% - Medium
Number of Native Plant Species: 25 – High

This zone is dominated by a dense deciduous canopy of mid-mature bigleaf maple (*Acer macrophyllum*) trees. Bigleaf maple trees (*Acer macrophyllum*) make up 48% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 37% of the trees in this zone. Red alder (*Alnus rubra*) make up 15% of the trees in this zone. Immature horsechestnut (*Aesculus hippocastanum*) trees pose a significant threat to the native character of this zone. The largest and probably oldest bigleaf maples in Camp Long can be found here.

The most common ground cover in this association is the sword fern (*Polysticum munitum*), which covers 54% of the ground. Common native plants in this area include moss-15%, trailing blackberry (*Rubus ursinus*)-5%, nettle (*Urtica dioica*)-4% and

hazelnut (*Corylus cornuta*)-3%. This area has significant downed woody debris and some snags.

Zone 6 – Mature Red Alder (*Alnus rubra*) Zone.
Acres: 14
Canopy Closure: 40% - 80%
Aspect and Soils: Northeastern exposure with highly variable soils (duff, sand, clay).
Average Invasive/Native Ratio: 0.28 - Low
Average Relative Invasion by Horsechestnut: 2.4 - Low
Average % Invasive Plant Cover: 17% - Low
Number of Native Plant Species: 24 – High

Zone 6 is the largest vegetation zone at Camp Long comprising a large portion of the eastern, forested slope at Camp Long. A fairly dense deciduous canopy of mature red alder trees (*Alnus rubra*) dominates this area. Red alder trees (*Alnus rubra*) make up 46% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 12% of the trees in this zone. Bigleaf maple trees (*Acer macrophyllum*) make up 10% of the trees in this zone.

The relative invasion by horsechestnut trees (*Aesculus hippocastanum*) is variable. The most serious invasion by horsechestnut trees within the boarders of Camp Long is in the northeast corner of this zone, adjacent to the West Seattle Golf Course. Large populations of horsechestnut trees have also invaded the southern end of this zone.

Large populations of English ivy (*Hedera helix*)-3%, Himalayan blackberry (*Rubus discolor*)-5%, English holly (*Ilex aquifolium*)-1% and English laurel (*Prunus laurocerasus*)-1% have also invaded. Even with the presence of these invasive plants there are still large numbers of native plant species present.

Common native plant species include trailing blackberry (*Rubus ursinus*)-21%, sword fern (*Polystichum munitum*)-19%, red elder berry (*Sambucus racemosa*)-19%, and moss-31%. There are variable amounts of downed woody debris scattered throughout and relatively few snags in this zone.

Zone 7 – Douglas fir/Pacific madrone (*Pseudotsuga menziesii/Arbutus menziesii*) Zone.
Acres: 5
Canopy Closure: Less than 40%
Aspect and Soils: Eastern exposure with highly variable soils (sand, clay, duff, gravel).
Average Invasive/Native Ratio: 0.37 - Low
Average Relative Invasion by Horsechestnut: 0 – Very low
Average % Invasive Plant Cover: 19% - Low
Number of Native Plant Species: 15 - Low

An open canopy of primarily Douglas fir trees (Pseudotsuga menziesii) and pacific madrone trees (Arbutus menziesii) dominate this zone. Douglas fir trees make up 38% of

the trees in this zone. Pacific madrone trees (*Arbutus menziesii*) make up 25% of the trees in this zone. Western red cedar trees make up 19% of the trees in this zone. Significant populations of non-native conifers also exist in this zone.

The very low level of horsechestnut (*Aesculus hippocastanum*) invasion is probably due to the distance from a seed source, and pulling by Camp Long staff. There are significantly large patches of Japanese knotweed (*Polygonum cuspidatum*), a noxious weed, on the north west edge of this area.

Common native species in this area include salal (*Gaultheria shallon*)-14%, hazelnut (*Corylus cornuta*)-10% and trailing blackberry (*Rubus ursinus*)-8%.

Most of the recreational cabins are located in this zone. As a result, soils in this zone are often bare and compacted. This condition can make tree failure in high use areas around cabins a legitimate concern. This zone has a fair amount of downed woody debris and snags, but wildlife use may be limited due to high human presence.

Zone 8 – The Pond Zone.
Acres: 0.7
Canopy Closure: Less than 40%

Zone 8 was not surveyed during the 2000-2001 vegetation survey. This zone includes the pond and the surrounding vegetation. There is a grove of non-native hornbeam trees (*Carpinus sp.*) growing in this area. A highly invasive Lombardy poplar tree (*Populus nigra* 'Italica') towers over this zone. This tree is spreading by root sprouts throughout this zone.

Few small patches of resilient native plant species such as hardhack (*Spiraea douglasii*) and snowberry (*Symphoricarpos albus*) inhabit small areas around the pond. Much of the vegetation in this area has been trampled, leaving large bare spots. Compacted bare ground is undoubtedly due to high use by visitors to Camp Long. The state of this bare, compacted soil may lead to flooding, pond sedimentation and may also threaten the health of the hornbeam (*Carpinus sp.*) grove. In addition this lack of vegetation severely limits the use of the pond by wildlife.

Zone 9 – The Parade Ground Zone.
Acres: 2.5
Canopy Closure: Less than 40%

Zone 9 was not surveyed during the 2000-2001 vegetation survey. This zone transitions from the cabin areas of zone 7 on the western edge to a completely open, highly maintained grass lawn area. Included in this zone is the western slope to the parade ground and the parade ground itself. The soils in this area are compacted, as would be expected in this high use area. The lawn is mowed short on a regular basis and is not serving any significant function for wildlife.

Zone 10 – Early Mature Bigleaf Maple (*Acer macrophyllum*) Zone.
Acres: 6.4
Canopy Closure: 40% - 80%
Aspect and Soils: Varied exposure (E, NE, SE, W) and varied soils (clay, duff, sand).
Average Invasive/Native Ratio: 0.27 - Low
Average Relative Invasion by Horsechestnut: 1.7 – Very low
Average % Invasive Plant Cover: 28% - Medium
Number of Native Plant Species: 23 - High

Zone 10 is the second largest vegetation zone at Camp Long. This zone bridges the forested areas of Camp Long and the highly maintained lawn of the parade ground. Early mature bigleaf maple trees (*Acer macrophyllum*) with a fairly dense deciduous canopy dominate this zone. Bigleaf maple trees (*Acer macrophyllum*) make up 57% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 13% of the trees in this zone. Red alder (*Alnus rubra*) make up 10% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) pose a significant threat to the native character of this zone. Without action the eastern edge of this zone is likely to become dominated by horsechestnut trees, due to the presence significant numbers of immature trees.

The number of invasive plant species is highly variable within this zone, as is the percent of ground coverage by invasive species. Invasive species such as English ivy (*Hedera helix*)-11%, Himalayan blackberry (*Rubus discolor*)-9% and English holly (*Ilex aquifolium*)-3% are common in this zone.

This area has a fairly high number of native plant species distributed throughout. Common native plants in this area include sword fern (*Polysticum munitum*)-28%, salal (*Gaultheria shallon*)-6%, moss-24% and nettle (*Urtica dioica*)-5%. This area has a large amount of downed woody debris, but few snags.

Zone 11 – Forest Edge Zone.
Acres: 0.5
Canopy Closure: Less than 40%
Zone 11 was not surveyed during the 2000-2001 vegetation survey. This zone is a slope covered primarily by an open canopy of non-native conifers and pacific madrone (*Arbutus menziesii*) trees. The southern portion of this zone is covered with highly maintained grass lawn. Three cabins are located in this zone. Soils in this area are compacted, in part due to the high use by park visitors. Soil compaction may threaten the health of trees in the areas around the cabins. This condition may present a hazard to recreational cabins and park users.

Zone 12 – Early Mature Red Alder (*Alnus rubra*) Zone.
Acres: 2
Canopy Closure: 40% - 60%
Aspect and Soils: Eastern exposure and clay soils covered with forest duff.
Average Invasive/Native Ratio: 0.05 – Very low
Average Relative Invasion by Horsechestnut: 7 – Very high

Average % Invasive Plant Cover: 32% - Medium
Number of Native Plant Species: 19 – Medium

This zone is dominated by an open deciduous canopy dominated by early mature red alder (*Alnus rubra*). Red alder (*Alnus rubra*) make up 27% or the trees in this zone. Another native tree species, the Cascara (*Rhamnus purshiana*), makes up 27% of the trees in this zone. Large populations of the invasive horsechestnut (*Aesculus hippocastanum*) are also present making up 27% of the trees in this zone and pose a serious threat to the native plants. Western red cedar (*Thuja plicata*) make up 9% of the trees in this zone.

The only other invasive plant found in this zone was English holly (*Ilex aquifolium*) and it only covered a small portion of the ground - 0.5%. Native plants were found to populate most of the understory in this zone. Common natives include sword fern (*Polystichum munitum*) – 32%, moss – 28%, fringecup (*Tellima grandiflora*) – 22%, oceanspray (*Holodiscus discolor*) – 20% and hazelnut (*Corylus cornuta*) – 19%. This zone has large amounts of downed woody debris, but few snags.

Zone 13 – Salal/Hazelnut (*Gaultheria shallon/Corylus cornuta*) Zone.
Acres: 1.3
Canopy Closure: Less than 40%
Aspect and Soils: Eastern exposure and clay soils covered with forest duff.
Average Invasive/Native Ratio: 0.39 - Low
Average Relative Invasion by Horsechestnut: 0 – Very low
Average % Invasive Plant Cover: 61% - Medium
Number of Native Plant Species: 23 – High

This zone is a very open canopy dominated by salal (*Gaultheria shallon*) and hazelnut (*Corylus cornuta*). Salal (*Gaultheria shallon*) covers 39% of this zone. Hazelnut (*Corylus cornuta*) covers 24% of this zone. A mixture of red alder trees (*Alnus rubra*) and bigleaf maple trees (*Acer macrophyllum*) make up the majority of the few trees inhabiting this zone. The low invasion by horsechestnut (*Aesculus hippocastanum*) may be due to the distance of this zone from seed sources.

The most common invasive species is himalayan blackberry (*Rubus discolor*), which covers 60% of the ground. Common native plant species include sword fern (*Polystichum munitum*)-15% and red elder berry (*Sambucus racemosa*)-8%.
There are significant amounts of downed woody debris and very few snags.

Zone 14– Early Mature Red Alder/ Early Mature Bigleaf Maple (*Alnus rubra/Acer macrophyllum*) Zone.
Acres: 0.9
Canopy Closure: Less than 40%
Aspect and Soils: Northeastern exposure and clay soils covered with duff.
Average Invasive/Native Ratio: 0.26 - Low

Average Relative Invasion by Horsechestnut: 0 – Very low
Average % Invasive Plant Cover: 32% - Medium
Number of Native Plant Species: 23 - High

This zone is dominated by a fairly open deciduous canopy of early mature red alder trees (*Alnus rubra*) and early mature bigleaf maple trees (*Acer macrophullum*). Red alder trees (*Alnus rubra*) make up 38% of the trees in this zone. Bigleaf maple trees (*Acer macrophyllum*) make up 38% of the trees in this zone.

Common native plant species include nettle (*Urtica dioica*)-19%sword fern (*Polystichum munitum*)-16% and hazelnut (*Corylus cornuta*) – 4%. There are large amounts of large woody debris and few snags in this zone.

Zone 15 – Early Mature Western Red Cedar (*Thuja plicata*) Zone.
Acres: 2.3
Canopy Closure: Greater than 80%
Aspect and Soils: Eastern exposure and a mixture of sand and duff soils.
Average Invasive/Native Ratio: 0.06 – Very low
Average Relative Invasion by Horsechestnut: 1 – Very low
Average % Invasive Plant Cover: 7% - Very low
Number of Native Plant Species: 18 - Medium

This zone is dominated by a dense (>80% closure) evergreen canopy of early mature western red cedar trees (*Thuja plicata*). Western red cedar trees (*Thuja plicata*) make up 80% of the trees in this zone. Smaller populations of pacific madrone trees (*Arbutus menziesii*)-6%, western hemlock trees (*Tsuga heterophylla*)-3% and horsechestnut trees (*Aesculus hippocastanum*)-3% also inhabit this zone. This is one of the few areas at Camp Long where forest succession appears to be following a natural pattern. The dense evergreen canopy probably accounts for the low percent cover by invasive species.

Shade tolerant natives such as low Oregon grape (*Berberis nervosa*)-56%, hazelnut (*Corylus cornuta*)-11% and salal (*Gaultheria shallon*)-9% are common in the understory of this zone. There is a large amount of downed woody debris and some snags in this zone. This zone appears capable of providing significant habitat for wildlife at Camp Long.

Zone 16 – Early Mature Bigleaf Maple/Early Mature Horsechestnut (*Acer macrophyllum/Aesculus hippocastanum*) Zone.
Acres: 1.8
Canopy Closure: 40% - 60%
Aspect and Soils: Eastern exposure and a mixture of sand and duff soils.
Average Invasive/Native Ratio: 0.25 - Low
Average Relative Invasion by Horsechestnut: 6 - High
Average % Invasive Plant Cover: 1% - Very Low
Number of Native Plant Species: 19 - Medium

This zone is dominated by a fairly open deciduous canopy of early mature bigleaf maple trees (*Acer macrophyllum*) and immature horsechestnut trees (*Aesculus hippocastanum*). Bigleaf maple trees (*Acer macrophyllum*) constitute 43% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 43% of the trees in this zone. Red alder (*Alnus rubra*) make up 14% of the trees in this zone. The relative invasion by horsechestnut trees (*Aesculus hippocastanum*) is very serious due to their density and age. Without action this zone is likely to become dominated by horsechestnut trees.

Common native plants in this area include nettle (*Urtica dioica*)-45%, moss-34%, hazelnut (*Corylus cornuta*)-21%and sword fern (*Polysticum munitum*)-20%. This area has a large amount of downed woody debris and snags.

Zone 17 – Scouler's Willow/Sapling Horsechestnut (*Salix scouleriana/Aesculus hippocastanum*) Zone.
Acres: 2
Canopy Closure: Less than 40%
Aspect and Soils: Southern exposure and high clay content soils.
Average Invasive/Native Ratio: 0.53 - Medium
Average Relative Invasion by Horsechestnut: 6 - High
Average % Invasive Plant Cover: 44%
Number of Native Plant Species: 18 - Medium

This zone is at located at the southeastern corner of Camp Long. An open deciduous canopy of Scouler's willows (*Salix scouleriana*) and horsechestnut trees (*Aesculus hippocastanum*), covers most of this zone. Scouler's willow trees (*salix scouleriana*) make up 59% of the trees in this zone. Horsechestnut trees (*Aesculus hippocastanum*) make up 24% of the trees in this zone. The invasion by horsechestnut (*Aesculus hippocastanum*) trees is fairly high and poses a significant threat to the native character of this zone. This high level of horsechestnut invasion is probably due to the close proximity to seed sources in the West Seattle Golf Course.

Other invasive plant species cover significant areas of ground. Common invasive plants in this area include bindweed (*Calystegia silvatica*)-24%, and English ivy (*Hedera helix*)-11%.

Common native plants include red osier dogwood (*Cornus stolonifera*)-23%, snowberry (*Symphoricarpos albus*) – 17% and sword fern (*Polystichum munitum*)-9%. There are significant amounts of downed woody debris and snags.

Zone 18 – Early Mature Poplar (*Populus sp.*) Zone.
Acres: 2.2
Canopy Closure: 0% - 60%
Aspect and Soils: Eastern exposure and highly variable soils (clay, humus, gravel).
Average Invasive/Native Ratio: 0.69 - High
Average Relative Invasion by Horsechestnut: 0.5 – Very low
Average % Invasive Plant Cover: 76% - Medium

Number of Native Plant Species: 27 – High

This zone is dominated by a fairly open deciduous canopy of early mature non-native white poplar trees (*Populus alba*) and Lombardy poplar trees (*Populus nigra* 'Italica'). Poplar trees (*Populus sp.*) make up 30% of the trees in this zone. Poplar trees (*Populus sp.*) are highly invasive plants for Europe that spread by seed dissemination and lateral root sprouts. Western red cedar trees make up 15% of the trees in this zone. Some young native tree species such as Douglas-fir (*Pseudotsuga menziesii*)-9%, western red cedar (*Thuja plicata*)-15%, Scouler's willow (*Salix scouleriana*)-11%, red alder (*Alnus rubra*)-3% and bigleaf maple (*Acer macrophyllum*)-3% are also present. Horsechestnut trees (*Aesculus hippocastanum*) have not invaded this zone significantly, probably due to the distance from a seed source.

Common invasive understory plants include English holly (*Ilex aquifolium*)-11%, and herb-robert (*Geranium robertianum*)-7%.

Common native understory plants in this zone include hazelnut (*Corylus cornuta*) – 21.25%, trailing blackberry (*Rubus ursinus*) – 7% and salal (*Gaultheria shallon*) – 6%. There are significant amounts of downed woody debris, but few snags in this zone.

3.5 Vegetation Zone Analysis

Camp Long's vegetation zones can be grouped together on the basis of similar management needs. Six categories have been identified for management purposes: healthy forest succession zones, zones with stalled forest succession, early seral stage forest zones, lawn areas, high human use areas, and wetlands.

Healthy Succession Category (Zones 15 and 4)

Acres: 4.5

Zones 9 and 12 have progressed in a fairly normal pattern of forest succession for the of the Puget trough. Native conifers have begun to replace the deciduous trees in a typical pattern of forest succession. Significant populations of early mature western red cedar (*Thuja plicata*) trees and shade tolerant native understory species live in the healthy succession areas. The dense shade produced by western red cedar trees (*Thuja plicata*) is probably limiting colonization by invasive plant species. These areas do not, however, have the diversity of native conifer trees that would be expected to occur in an unmanaged forest of the Puget trough (Franklin & Dyrness 1988). None the less the general process of natural succession seems to be occurring.

Zones With Stalled Succession (Zones 5, 6, 10, 12, 13, 14, 16, 17, and 18)

Acres: 33

This category describes the majority of zones at Camp Long. Deciduous canopies of middle seral stage trees, shrubs and herbs dominate this category. While succession has been somewhat successful to a point in these zones, the process of succession has stalled. These zones lack young, shade tolerant coniferous trees, which normally would continue the process of natural succession. Seed sources for native conifer trees are also absent.

The deciduous canopy that dominates these zones does little to prevent understory colonization by invasive plant species. The presence of invasive species prevents healthy development of native understory vegetation. Consequently this area has an impaired ability to support native animal species. One invasive species, the horsechestnut tree (*Aesculus hippocastanum*), threatens to dominate large patches of the canopy and understory.

Early Seral Stage Category (Zones 2 and 3)

Acres: 3.2

Vegetation in this category is in an early seral stage with either completely open canopy or sapling red alder (*Alnus rubra*) forest. Natural succession can be said to be underway, but in a much earlier stage than found in other parts of Camp Long. Large numbers of invasive plant species dominate the vegetation in these early seral stage areas. This is the highest area of invasive plant diversity at Camp Long.

Grass Lawn Category (Zones 1 and 9)

Acres: 3.6

There are large areas of highly maintained grassland at Camp Long. These areas consist of the parade ground, the slopes of the parade ground basin and the edge along 35th Street. A small patch of vegetation including hawthorn trees (Crataegus sp.) and Himalayan blackberry separates the north and south portion of the lawn edge, along 35th Street. Due to ongoing lawn maintenance, these areas are dominated by non-native grass species. Some of these lawns are frequently used by humans, whereas others are not. Very few invasive plant species and virtually no wildlife are capable of surviving the frequent mowing.

High Human Use Category (Zones 7 and 11)

Acres: 5.5

This category consists of open canopy forest composed of a mixture of coniferous and broadleaf trees. Pacific madrone (*Arbutus menziesii*), Douglas fir (*Pseudotsuga menziesii*) and non-native conifers are common trees throughout areas surrounding cabins. Many non-native ornamental plants inhabit this forested area. Many of these non-native plants are not invasive and have been installed intentionally. The understory is a mixture of native and invasive plant species.

Large portions of this area are highly impacted by park visitors. Soils are often compacted and not covered with vegetation at all. Due to soil compaction, trees with high potential for failure (Hazard trees) may be present around cabins. Non-native plants and human presence limit use by wildlife.

The Wetland Category (Zone 8 and the Creek)

Acres: Greater than 0.7

Most of the area surrounding the pond lacks any vegetation. Portions of this zone have been severely trampled by park users. Other areas are highly maintained grass lawns. The root systems of non-native poplar trees (*Poplus sp.*) are sprouting, and spreading

around the pond area. A few small patches of native plants do exist throughout this area. Due to a lack of proper vegetation and downed woody debris, the pond area is very limited in the quality of wildlife habitat that is provided. The stream travels from the pond, down hill, through forested zones.

Bare ground around the pond at Camp Long Park

3.6 Perimeter Vegetation of Camp Long Park

There is little doubt about the sources of invasive plant species at Camp Long. To the west of Camp Long are the backyards of community residents. A plethora of invasive plants such as Himalayan blackberry (*Rubus discolor*), English ivy (*Hedera helix*), English holly (*Ilex aquifolium*), English laurel (*Prunus laurocerasus*) and Poplar trees (*Populus sp.*) can be found in these yards. To the north of Camp Long is a heavily infested zone of invasive plant species such as Himalayan blackberry (*Rubus discolor*) and English ivy (*Hedera helix*). The eastern edge of Camp Long is bordered by a thin zone of mixed deciduous and coniferous forest. This zone is heavily infested with horsechestnut trees (*Aesculus hippocastanum*) and other shade tolerant invasive plants such as English holly (*Ilex aquifolium*). To the south are the side yards of community residents and a neglected green space dominated by Himalayan blackberry (*Rubus discolor*). Many of the yards in this area harbor large populations of shade tolerant invasive plants such as English ivy (*Hedera helix*) and English laurel (*Prunus laurocerasus*). Most of these plants have the ability to continuously invade Camp Long, with the aid of animals that disperse them. As long as these perimeter conditions exist constant monitoring and control of invasives plant species will be necessary to reduce further invasion of Camp Long.

4. Vegetation Management at Camp Long Park

4.1 General Management Recommendations

The original intent of Camp Long was to make a park that would allow urban residents to experience nature typical of the Pacific Northwest. This process of creating a Northwest nature park began in 1937. Camp Long founders, Archie Phelps and William Long probably assumed that by simply stopping the cutting of trees and planting of grass, the area of Camp Long would revert to natural forest. We now understand that because of the isolation of Camp Long from other native forest areas and the invasion by non-native species, the process of natural succession cannot occur without being engineered. Some of the invasive plants that are now plaguing Camp Long were not even present in Pacific Northwest at the dedication in 1941. Even though the original founders of Camp Long may not have had a full understanding of the processes of forest succession, biological invasion and habitat management, their intent was clear. Camp Long Park was intended to become a fragment of the native coniferous forest that once dominated vast areas of the Puget trough. This intent guides the vegetation management recommendations that follow. It is possible to simultaneously promote natural succession, control invasive plants, and improve habitat for native animals in all management categories. Management categories referred to in this section can be seen in **Figure 4-1**.

Healthy Succession Category Management (Zones 4 and 15)

Objective

- To continue the process of healthy forest succession.

Actions required

- Introduce shade tolerant native plant species.
- Monitor for colonization by shade tolerant invasive plant species.

These zones are a low priority for improvement due to their current state of healthy forest succession. These zones might be further improved with the introduction of additional shade tolerant native plant species. Some appropriate plants for these areas can be found in **Appendix -8**, "Recommended Plants for Camp Long Park". In addition these zones should be monitored for colonization by shade tolerant invasive plants such as English ivy (*Hedera helix*), English holly (*Ilex aquifolium*) and English laurel (*Prunus laurocerasus*).

Stalled Succession Category Management (Zones 5, 6, 10, 12, 13, 14, 16, 17, and 18)

Objectives

- Continue the process of healthy forest succession.
- Enhance soil and water quality.
- Enhance wildlife habitat.
- Increase plant species biodiversity.

Actions required

- Control horsechestnut trees (*Aesculus hippocastanum*).
- Control invasive understory plant species such as English ivy, Himalayan blackberry (*Rubus discolor*), English holly, and English laurel.

- Control non-native poplar trees (*Populus sp.*).
- Plant late succession native conifer species such as Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*) and grand fir (*Abies grandis*).
- Introduce native plant species for various forest niches.
- Create snags and retain downed woody debris.
- Monitor for colonization by invasive plant species.

Invasive species do not grow well in the dense shade of a conifer canopy, increasing the amount of continuous shade in these stalled succession zones can reduce the rate of colonization by invasive plants and their growth. Introduction of shade tolerant native conifers should make invasive plant species more manageable in these zones. Conifer succession will also favor the growth of shade tolerant native understory plants. The duff dropped from conifer canopies will increase moisture retention on the forest floor. Native conifer species have high concentrations of compounds called phenolics, which make them resistant to decay. Due to the presence of these phenolic compounds, conifer leaf dropping will lower soil pH favoring shade tolerant natives, which are adapted to these soil conditions.

In keeping with the multiple cohort stand dynamics that are typical of forest succession in the Puget trough, native conifers should be introduced under canopy gaps rather than being evenly distributed throughout the landscape in rows. The conifers themselves, as well as native understory plants, will significantly improve the ability of Camp Long to support native and discourage non-native animal species.

Open canopy patches in these zones should be planted with Douglas fir and Grand fir. Successful establishment of these trees will involve mowing populations of Himalayan blackberry to the ground prior to planting. The introduction of these Douglas fir and Grand fir trees will begin to shade the ground. Reduced sun light exposure will help in the control of shade intolerant invasive species such as Himalayan blackberry. Douglas fir trees and Grand fir trees also provide significant habitat and food for native animal species. Broad areas presently covered by deciduous tree canopy should be planted with western hemlock, and western red cedar. Trees should only be planted in the late fall for best establishment. Proper planting details, aftercare requirements and benefits of using containerized or ball and burlap trees can be found in **Appendix-11** "Planting Method Details for Trees and Shrubs".

After conifer species have become established and begin to grow tall it will be possible to introduce additional native shade tolerant shrubs and herbs, to provide an even richer native animal habitat. A list of suggested native shade tolerant understory plants can be found in **Appendix-8**.

As many horsechestnut trees, of all size classes, as possible should be exterminated. Large horsechestnut can also be converted to wildlife snags or downed woody debris. The creation of snags and downed woody debris will further increase the habitat richness of the forested areas within Camp Long.

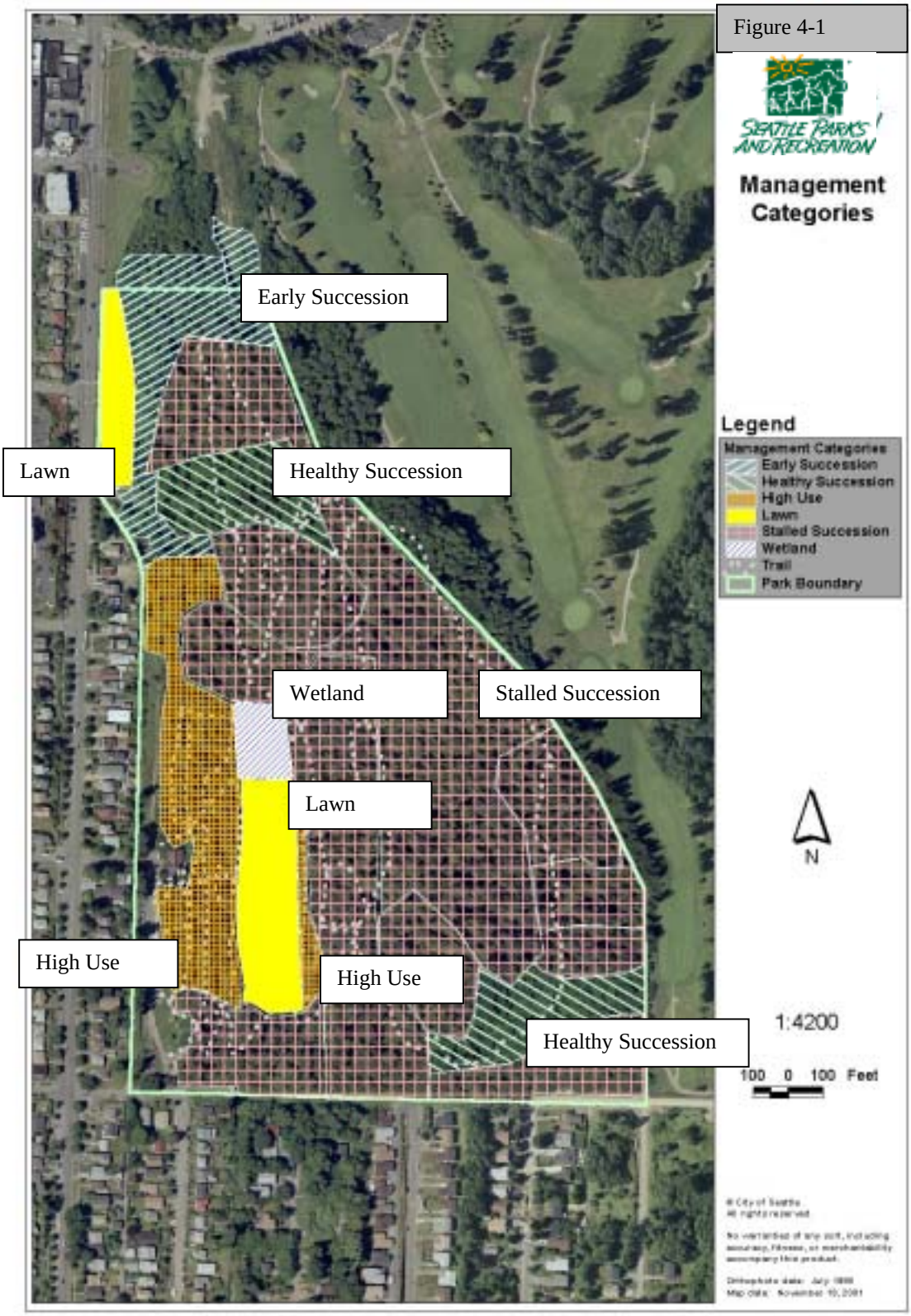
Figure 4-1
Management Categories
Early Succession
Lawn
Healthy Succession
Wetland
Stalled Succession
Lawn
High Use
High Use
Healthy Succession
Legend
Management Categories
Early Succession
Healthy Succession
High Use
Lawn
Stalled Succession
Wetland
Trail
Park Boundary
N
1:4200
100 0 100 Feet

To the largest extent possible, other shade tolerant invasive plant species should be removed from these forested areas. After removing invasive plants it would be desirable to introduce hardy natives in their place to make colonization by additional invasives less likely. Native plants should only be planted in the late fall to maximize survival. Native seed sources can be found in **Appendix-10**.

The south end of this forested area (including vegetation zones 17 and 18) is at particular high risk for continued biological invasion. This area is bordered by the surrounding community, which harbors large populations of invasive plant species. Continuous monitoring and control will be necessary to avoid the re-colonization of these and other forested areas by shade tolerant invasive species such as English ivy and English holly. Zone 18 also contains significant populations of invasive white poplar trees. These trees should all be removed as soon as possible. Techniques for controlling specific invasive plants can be found in **Appendix-7** "General Information on Invasive Plants and Their Control".

Early Succession Category Management (Zones 2 and 3)

Objectives

- Continue the process of healthy forest succession.
- Control invasive plant species.
- Enhance soil quality.

Actions required

- Work with Golf Course grounds managers for vegetation zones that encompass both properties.
- Control invasive understory plant species such as English ivy, Himalayan blackberry, English holly, and English laurel.
- Create snags and retain downed woody debris.
- Monitor for colonization by invasive plant species.
- Allow the formation of a small meadow in non-forested area.

It is unlikely that large portions of this area could support the proper growth of most native conifers species due to low nutrient status and poorly drained soils. The presence of sapling red alders in this area will improve soil conditions over time. Red alder trees (*Alnus rubra*) fix air borne nitrogen and facilitate succession by soil organisms and eventually shade tolerant native plants. All possible downed woody debris should be retained in this area to aid in soil development.

Control of invasive plant species is a key priority in this area. Removal of invasive species must be coupled with the introduction of hardy native plants to make colonization by new invasives less likely. It will be important to work with West Seattle Golf Course grounds managers to control invasive plants in zones 2 and 3, which encompass parts of both properties. Of primary concern in the forested area are shade tolerant invasive species such as horsechestnut trees, English ivy and English holly. Shade tolerant species in these zones can serve as a seed source for the spread of invasive plant species throughout Camp Long.

Removal of invasive shade intolerant species such as Himalayan blackberry and Scotch Broom (*Cytisus scoparius*) may be advisable to allow small prairie formation, and reduce invasive seed sources. Annual mowing and the introduction of native grass seeds can facilitate prairie formation. Prairie areas should only be mowed in the late fall.

Grass Lawn Category Management (Zones 1, and 9)

Objectives

- Enhance soil and water quality.
- Enhance wildlife habitat.
- Increase native plant diversity.

Actions required

- Change mowing cycle to once every 1 or 2 years, in the late fall.
- Introduce native meadow species.
- Monitor for colonization by invasive plant species.

The bottom of the parade ground basin is a high use area and therefore should continue to be maintained as lawn. Mowing these high use lawns to 3 inches or taller provides some shade, reduces soil compaction and can provide limited habitat for invertebrates. The lawn edge along 35th Street should be converted to a meadow state. The grass-covered west slope of the parade ground also should be converted to a meadow area. To accommodate visitors at least two mowed paths will have to be maintained through this meadow area on the west slope of the parade ground basin. Mowed paths should be wide enough to accommodate large groups of park visitors (12 feet wide minimum). Paths through the meadows should be maintained at a height of 3 inches or taller.

Lawn areas can be converted to meadow areas by changing the mowing cycle to once every 1 to 2 years. If woody plants are colonizing the meadow it is time to mow. Mowing should be done as late in the growing season as possible. By waiting until the first frost to mow the meadows, disturbance to wildlife and flowering plants can be minimized. It is necessary to mow these areas every two years at minimum to prevent colonization by woody plant species. By allowing these areas to become meadows their value as wildlife habitat will be increased and soil compaction will be decreased, simultaneously.

Native meadow formation can be further facilitated by the introduction of native meadow grasses such as Idaho fescue (*Festuca idahoensis*), Brome grasses (*Bromus carinatus* and *Bromus marginatus*) and wild rye grass (*Elymus glaucus*) in dry areas. In wet areas, hardy native meadow herbs such as slough sedge (*Carex obnupta*) and Dewey's sedge (*Carex deweyana*) and the common rush (*Juncus effusus*) might be introduced. These grasses might best be introduced by planting seeds or small plants in soil mounds that are at least 4 feet wide and 1 foot tall. Seeding patches of dry and wet meadow areas with appropriate native wildflower seeds can significantly increase the value of these areas to wildlife. Wildflowers can also be planted in mounds. Planting of grass seeds and small plants should be done in the early fall for greatest success. Methods for sowing seeds can be found in **Appendix-9**.

Wetland Category Management (Zone 8 and the Creek)

Objectives

- Enhance soil and water quality.
- Prevent soil erosion.
- Enhance wildlife habitat.
- Maintain access for park visitors.

Actions required

- Apply a 2-4 inch layer of coarse woody mulch to high use areas.
- Create clearly defined paths to direct park visitors.
- Introduce native plant species around the pond edge.
- Increase downed woody debris around the pond edge.

General park visitors and educational groups frequently visit the pond. In order to prevent the continued trampling of soil and vegetation in this area, coarse woody mulch should be spread on areas of the ground not covered by vegetation. Building a boardwalk to allow visitors access to the pond without trampling the ground is an excellent option. While much more expensive, a boardwalk would reduce disturbance to plants and wildlife. Since park users might still continue to trample vegetation around a boardwalk, a combination of boardwalk coarse woody mulch would yield the greatest short term and long term gains.

Portions of the pond perimeter should be planted with hardy native shrubs such as red osier dogwood (*Cornus stolonifera*), snowberry (*Symphoricarpos albus*), thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus spectabilis*) and evergreen huckleberry (*Vaccinium parvifolium*). Planting trees which tolerate moist soils such as vine maple (*Acer circinatum*), Oregon ash (*Fraxinus latifolia*), western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*) and native willows (*Salix sp.*) in the area around the pond will further increase its habitat value.

Portions of the lawn surrounding the pond should be converted to a wet meadow. Maintenance procedures can be found in the section on "Grass Lawn Category Management" immediately preceding this section. Paths still should be mowed to allow large groups access to the pond area.

In very wet areas close to the pond, hardy wetland herbaceous species such as the common rush (*Juncus effusus*), slough sedge (*Carex obnupta*) and water smartweed (*Polygonum amphibium*) should be planted to provide spawning habitat for amphibians. Planting should de done in such a way as to direct park visitors and educational groups to selected locations of the pond edge. The planted area should include a wide area on the eastern side of the pond to create a wildlife corridor from the pond to the surrounding forest. Installing native plants will also provide significant food sources for birds and other wildlife. Posting educational signs and temporary fences around newly installed plants can educate the public while protecting the new plants. These measures will encourage people to stay on trails during the ongoing restoration efforts. Signs also can educate the public about how planting native plants around wetlands can improve wildlife habitat and prevent sedimentation of creeks and ponds. Fences should be sited far

enough away from restoration sites so as not to allow disturbance of plant roots (a minimum of 4 feet away from new plants).

Newly planted native trees will begin to shade the pond after reaching an early mature state, eventually replacing the non-native hornbeam trees (*Carpinus sp.*), which now shade the western bank of the pond. The Hornbeam trees (*Carpinus sp.*) could be turned into snags or removed after their role in shading the pond has been adopted by native trees. It is important to proceed in phases to maintain the health of the pond. Small ponds, which are not adequately shaded, do not provide good habitat for aquatic species. For this reason no Hornbeam trees (*Carpinus sp.*) trees should be removed until ecological function in shading the pond has been replaced by other native tree species.

The pond itself should be dredged, in two phases to minimize disturbance to resident animal species. One half of the pond should be dredged in year one and the remaining half in the following year. After the first half of the pond is dredged, re-vegetation should begin in and around that half. After the second half of the pond is dredged it should be re-vegetated. All dredging should be done during autumn, preferably after first frost, to minimize disturbance to wildlife. Prior to dredging, native plants should be transplanted and stored in nearby plots or a pile of compost. Excess compost can later be reused for mulching the root zones of plants that are introduced around the pond edge.

Transplanting and storage of plants should be done during the late fall. At this time of year plants should be dormant and their rates of transpiration slow. It is important to keep plants watered while they are being stored and to insure that the entire root system of plants is covered with compost to prevent freezing and desiccation. Planting of all areas around the pond should be done only after the process of dredging has been completed, preferably in the late fall. Plant root systems should establish during the winter, prior to the advent of dry demanding summer conditions.

High Human Use Category (Zones 7 and 11)

Objectives

- Assess hazard trees near cabins.
- Mitigate compacted soils.
- Enhance wildlife habitat.

Actions required

- Hazard tree assessment by a tree health care professional.
- Application of a 2-4 inch layer of coarse woody mulch over tree roots around cabins.
- Introduce native plant species.
- Remove invasive plant species such as English ivy, English holly, and Japanese knotweed.

Constant foot traffic in this area has resulted in highly compacted soils. Compacted soils reduce the amount of oxygen and water that can reach the root zone of trees adversely affecting tree root systems. The primary cause of tree failure in trees is root failure. For this reason compacted soils in this high use area pose a significant risk of tree failure. High priority should be placed on having a tree health care professional do a detailed

hazard analysis for all trees surrounding cabins. A layer of coarse woody mulch 2-4 inches thick should be spread around the root zones of these trees.

Clearly defined paths should be established in these zones to direct the flow of park visitors. Areas outside of the paths that are not within the root crown of individual trees should be planted with hardy shade tolerant native plant species. Low plants can be planted right up to paths to aid in directing pedestrians. New species could include red osier dogwood (*Cornus stolonifera*), sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), Oregon grape (*Berberis aquifolium*), mock orange (*Philadelphus lewisii*), snowberry (*Symphoricarpos albus*) and low Oregon grape (*Berberis nervosa*). The presence of these hardy native shrubs at path borders can further direct the flow of visitor foot traffic. A list of suggested native plant species for open forest canopies can be found in **Appendix-8**.

4.2 Prioritized Projects for Improving Specific Zones

Due to limited human and financial resources it is necessary to set priorities amongst vegetation management projects at Camp Long. The objective is to insure the maximum enhancement of Camp Long with the most efficient use of resources. It is not crucial that recommendations are completed quickly, but it is important that they be completed in the order laid out in the following sections. It is highly recommended that various types of volunteer groups be utilized to help implement these management objectives. Many identified projects offer opportunities to educate the public about natural ecosystem processes, landscaping for wildlife, invasive plant management and other relevant issues. Ideally education can be combined with enhancement of Camp Long in a synergistic process.

Highest Priorities for Vegetation Management

- **Hazard Tree Assessment for Trees in High Use Areas Surrounding Cabins.**

All trees that pose a potential hazard to park visitors in areas surrounding the cabins should be assessed. This hazard tree evaluation should be done by a tree health care professional or an International Society of Arboriculture (ISA) certified arborist.

- **Application of Coarse Woody Mulch in High Human use Areas to Reduce Soil Compaction and Manage Hazard Tree Risk.**

Coarse Woody mulch should be applied 2-4 inches thick in all bare soil areas around the cabins. It is important not to pile mulch over the root crown of a tree. Piling mulch against a tree trunk can rot the root crown and seriously weaken trees. When mulching around trees consult an arborist or qualified Department of Parks and Recreation staff. Department of Parks and Recreation City tree crews can provide coarse woody mulch free as needed. Additional information on mulch can be found in Appendix-12.

- **Controlling Blackberry Patches and Planting Native Conifers in Stalled Succession Areas (Zones 9, 12, 1, 2, 3, 4, 5, 5a, 10, 8, and 11).**

Himalayan blackberry (*Rubus discolor*) patches should be mowed to the ground in the fall. Balled and burlapped or containerized, 6-8 foot tall, Douglas fir (*Pseudotsuga menziesii*) and Grand fir (*Abies grandis*) should then be installed in these patches. To further control the mowed blackberry patch, a 2-4 inch thick layer of coarse woody mulch should be applied after tree planting. It is very important not to cover tree root crowns with a thick mulch layer, which will suffocate a young tree. Tree planting instructions can be found in **Appendix-11**.

Shade tolerant native conifers should be planted in areas covered by deciduous canopies. This includes western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*). These shade tolerant plants can be installed in 5 gallon or 1 gallon pot sizes. All conifer trees should be planted in patches that mirror natural gap succession processes, not in "crop rows". Native conifer trees should be spaced a minimum of 15 feet apart.

- **Removal of as Many Horsechestnut Trees (*Aesculus hippocastanum*) as Possible.**

See **Appendix - 7** for specific information on life history and control of horsechestnut trees. Young horsechestnut trees (*Aesculus hippocastanum*) can be pulled out easily by hand, at any time of the year. Because it is harder to identify young trees after they have shed their leaves, spring and summer may be the best time of year for pulling. Larger trees up to 4 inch DBH can be cut off at the base with loppers or hand saw. Trees larger that 4 inch DBH must be approached with caution. Priority should be given to removal of horsechestnut trees (*Aesculus hippocastanum*) from highly invaded areas in the stalled succession category.

Trees near paths should not be girdled, topped or poisoned. Trees near paths, which have been compromised structurally, can pose a significant threat to park visitor safety. Large horsechestnut trees (*Aesculus hippocastanum*) near paths should be cut to a height of 8 feet above the ground by a professional arborist.

The wood from these trees does not have to be removed from the site. Logs can be retained on site for use as path borders, or to supplement downed woody debris where it is needed. The addition of downed woody debris can increase the habitat value to native wildlife. Logs also can be used to create temporary terraces to keep soil from covering the root crowns of newly planted trees and shrubs.

Large horsechestnut trees that are not close to paths should be turned into snags. The addition of new snags at Camp Long will greatly enhance the habitat for native wildlife such as the pileated woodpecker (*Dryocopus pileatus*) and the northern flying squirrel (*Glaucomys sabrinus*). Large horsechestnut trees (*Aesculus hippocastanum*) can be turned into snags in a number of ways. Trees can be topped to create a snag, but this has the potential of creating weakly attached new growth. Trees can also be girdled using a variety of methods. Herbicides can also be introduced into a tree's cambium in

conjunction with girdling in a process called frilling. Volunteer leaders and Camp Long staff should consult with DPR forestry professionals for details on removing large trees.

Educational signs should be posted near vegetation zones that harbor large populations of horsechestnut trees (*Aesculus hippocastanum*). Signs can educate the public about the threat that invasive tree species pose to native ecosystems. These signs should also alert the public to the planned control of this species at Camp Long and how they might volunteer to help.

- **Alteration of Mowing Cycles to Reduce Soil Compaction and Improve Habitat.**

Mower blades should be set at a height of 3 inches above the ground while mowing the flat parade ground basin. The slopes of the parade ground should only be mowed once every 1-2 years, after the first frost of the year in late fall. The lawn area at the edge 35th St. S.W. **(vegetation zone 1)** likewise should only be mowed once every 1-2 years. Two paths should be maintained at a height of 3 inches on the western slope of the parade ground to allow access to the bottom of the parade ground and two more on the eastern slope to allow access to cabins and nature trails.

- **Removal of Shade Tolerant Invasive Plants from Highly Invaded Forested Zones.**

Removal of English ivy should begin with highly invaded areas **(vegetation zones 2, 4, 10 and 17)**. Removal of English holly should begin with highly invaded **areas (vegetation zones 7, 10, 15 and18)**. Removal of English laurel (*Prunus laurocerasus*) should begin with highly invaded areas **(vegetation zones 6 and 10)**. Life histories and specific control methods for these plants can be found in **Appendix - 7**.

- **Removal of Japanese Knotweed (*Polygonum cuspidatum*) from the Northwestern edge of Zone 10.**

There is a relatively small patch of Japanese knotweed (*Polygonum cuspidatum*) located behind the maintenance shed along a fence on the northwest edge of **vegetation zone 7**. While this area is relatively small, it should still be a high priority due to the severe threat of biological invasion by this noxious weed. For recommended control methods see **Appendix-7**.

Secondary Priorities for Vegetation Management

- **Application of Coarse Woody Mulch in High Use Areas around the Pond.**

Coarse Woody mulch should be applied 2-4 inches thick in all bare soil areas around the pond. Care should be taken not to cover root crowns of trees and shrubs with mulch. The application of coarse woody mulch on bare soil will mediate soil compaction, and prepare soils for future planting with native vegetation. Department of Parks and Recreation City tree crews can provide coarse woody mulch free as needed. Additional information on mulch can be found in **Appendix-12**.

- **Removal of Non-native Poplar Trees.**

See **Appendix -7** for specific information on life history and control of non-native poplars. Removal of large non-native poplar trees should only be done by a professional arborist. Priority should be placed on removal of large trees **(vegetation zones 8 and 18)**. Poplar trees are extremely vigorous trees and are capable of growing from root sprouts. For greatest effectiveness trees should be cut and painted with herbicide in the early fall. This will minimize root sprouting by the dying tree. After removal of a large tree, the surrounding area should be monitored for root sprouts.

Logs of poplar trees should not be retained on the ground, as logs are capable or regenerating and forming new trees. The wood should be shredded and used as coarse woody mulch in surrounding area paths.

Signs should be posted near the trees prior to removal. These signs can educate the public about the danger to native ecosystems posed by invasive tree species. The signs should also notify the public about plans to remove large poplar trees in high visibility areas.

- **Planting Native Trees and Shrubs around the Pond Border.**

Planting the pond border with native trees and shrubs should be done prior to installing herbaceous plants closest to the pond. All planting should be done during the late fall to allow plant roots time to establish before the spring. Coarse woody mulch on the surface should be raked back prior to planting native shrubs and trees. After planting the mulch can be re-applied around the newly planted trees and shrubs, taking care not to cover their root crowns. The eastern side of the pond should be planted to create a wildlife corridor that connects the pond to the surrounding forested areas. Suggested species for planting in this zone can be found in section 4.1 under "Wetland Category Management".

- **Planting the Area under the Camp Long Entrance Sign.**

The Camp Long entrance sign serves in essence as an advertisement for the type of park found beyond. For this reason, the area under this sign should reflect the original intent that Camp Long embodies a native Puget trough lowland forest. Small hardy native perennials such as Davidson's penstemon (*Penstemon davidsonii*), pacific bleeding heart (*Dicentra formosa*), Douglas aster (*Aster subspicatus*), Oregon iris (*Iris tenax*), and others would be ideal for this site. Attractive, native plants will draw attention to the sign and increase community awareness of Camp Long and its mission. This area is very small and should not require a large budget to plant. Park staff may wish to consult with adjacent homeowners about what suggested native perennials they prefer. This will help to foster a sense of ownership and pride with the homeowners.

- **Monitoring of Invasive Plants.**

Unless conditions surrounding Camp Long change it is likely that invasive plant species will be continually re-introduced. For this reason areas Camp Long should be periodically monitored for the reintroduction of new invasive species. Attention should also be directed to persistent invasive plant species, which did not previously seem to be a problem.

Other Management Priorities at Camp Long Park.

- **Enhancing the Herbaceous Layer near the Pond.**

After dredging the pond and establishing native trees and shrubs it will be necessary to enhance the herbaceous layer near the pond. This should include hardy wetland herbs that provide food or spawning habitat for birds and amphibians.

- **Introduction of Shade Tolerant Understory Species to Forested Areas.**

After native conifer trees have begun to shade the forested areas of Camp Long the habitat will become conducive to the establishment of shade tolerant native understory species. Seeds of some species can be collected from areas with high native plant diversity **(vegetation zones 4, 5, 6, 13, 14 and 18)** and introduced to areas with low native plant diversity **(vegetation zones 3, 7, 15, 16 and 17)**. Other desirable native plant species may not be present at all. These plants may be introduced by importing seeds and small plants. Some seeds may require pre-treatment before planting. General information on collecting and planting native seeds can be found in **Appendix-9**. Desirable native plants may also be available from salvage work parties in nearby areas.

- **Introduction of Native Grass and Wildflower Species.**

Once the specified lawn areas are converted to meadows it will be possible to introduce native grass and wildflower species. These plants might best be introduced by planting in soil mounds or by removing large strips of sod. Suggested plant species for meadow enhancement can be found in **Appendix-8**. Signs should be posted to educate the public about the introduction of native meadow plants. This may reduce disruption of the planting mounds while simultaneously educating the public.

- **Removal of Shade Intolerant Invasive Plant Species.**

Shade intolerant species such as Himalayan blackberry (*Rubus discolor*) and scotch broom (*Cytisus scoparius*) are unlikely to invade forested zones once native conifer species begin to shade these zones year round. Shade intolerant species may continue to thrive along aquatic zones and forested zone edges. Specific suggestions for controlling invasive species can be found in **Appendix-7**.

4.3 Soils for Clean Water in Longfellow Creek Watershed

The presence of mulch, evergreen trees and evergreen shrubs directly reduce water pollution in the Longfellow Creek Watershed. Any management practice at Camp Long that is likely to result in intercepted rainfall, reduced soil compaction and increased soil water retention time should be accompanied by a sign explaining how this action contributes to cleaner water draining into Longfellow Creek. The signs should also encourage park visitors to try similar practices at home to reduce pollution entering their local watershed.

Rainfall in the Puget trough is highest in the wintertime, when deciduous plants have lost their foliage. Evergreen trees and shrubs intercept rains slowing the rate at which storm water hits the ground. Plant roots break up soil and facilitate oxygen and water

infiltration into the soil. Organic matter from mulch, leaves, needles and branches can act as a sponge on the forest floor. As organic matter, on a forest floor, breaks down it releases organic acids that help to bind soil particles creating pore space (Killham 1996). Plants facilitate the lifecycles of soil microorganisms (bacteria, fungi, etc.) and macrofauna (earthworms, ants, etc.) by providing food from root exudes and fallen organic matter. In the process of completing their lifecycles, soil organisms create pore space and improve soil aggregation (Coyne 1999). Lack of vegetation and compacted soils, on the other hand, allow storm water to run off uninhibited, eliminating the processes that naturally clean water before it enters streams and lakes.

Storm water runoff leads to sedimentation and pollution of water bodies. One of the worst pollutants is known by the general term, biological oxygen demand (BOD). This BOD is a direct result of various forms of organic matter that are suspended in wastewater. Microorganisms (primarily bacteria) break down the suspended organic matter in complex biochemical processes that consumes oxygen. Hence such suspended organic matter is often referred to as causing BOD. Depleted oxygen levels make streams and lakes less habitable to fish that must extract oxygen from water to survive.

Decomposition of organic matter proceeds much faster in aerobic conditions than in anaerobic (without oxygen) conditions (Coyne 1999). This happens because much more energy is available to microbes from the process or aerobic respiration, which by definition only occurs in the presence of oxygen. Aerobic conditions result in much higher populations of microbes given the same amount of available carbon (organic matter). This synergistic effect results in much higher rates of decomposition under aerobic conditions. This is why sewage treatment plants inject oxygen into sewage and waste- water as a primary treatment. Fountains that flow are cleaner than still, stagnant ones due to the presence of oxygen.

The equation is deceptively simple. More evergreen plants and more mulch result in less soil compaction. Less soil compaction will result in more oxygen and wastewater infiltration and retention of wastewater for a longer time period. More oxygen and wastewater penetration into the soil will result in increased levels of aerobic respiration by soil microbes. Increased aerobic respiration will result in higher, more efficient microbial decomposition of suspended organic matter and the resulting BOD. Higher rates of decomposition by these microbes will result in cleaner, more oxygen rich water draining into local streams and lakes. Cleaner, oxygenated water will result in healthier aquatic ecosystems.

5. Wildlife at Camp Long Park

At present Camp Long provides limited habitat for most native animal species. Significant portions of Camp Long habitat are also preferred habitat for non-native animal species. All animal species require food, water, shelter and space. Native animal species have evolved with native plant species. In many cases native animals have special physical or behavioral adaptations that allow them to utilize native plants in ways that may not be available to non-native animals. By implementing the vegetation management recommendations outlined in **Chapter 4** the carrying capacity of Camp Long for native animal species will be greatly enhanced. Reduction or elimination of invasive plant species will reduce food sources for non-native animal species.

Increasing plant biodiversity will enhance the ability of Camp Long to support more diverse native wildlife. Some animal species feed directly on plant leaves, roots, shoots, flowers, fruits and seeds. Other animal species feed on the animals that feed on plant parts. Increasing the biodiversity of plant species will increase the variety and numbers of native animal populations. Individual plant species have evolved to fill particular niches to minimize competition with one another. Individual species flower and fruit at different times of the year. A wide diversity of native plant species insures a constant supply of food sources for native animals.

Within Camp Long itself it is essential to have a vegetated corridor that links the pond **(vegetation zone 8)** to the nearby forested area. Creating vegetation corridors to water sources is essential for animal survival. These areas should be free from human traffic. Ideally a vegetation corridor should link the forested areas of Camp Long with the Longfellow Creek Green Space located at the southeast corner of Camp Long. This would allow wildlife to migrate from the riparian corridor of Longfellow Creek to the forested zones of Camp Long. In order to link these two areas it will be necessary to collaborate with vegetation management of the Longfellow Creek Green Space and the West Seattle Golf Course.

Individual native animal species are adapted to live at different levels within a forest canopy. Some are adapted to life on the forest floor, others are adapted to life in the forest canopy, and still others are adapted to cover in the various shrub layers. To maximize native animal habitat it is necessary to maximize the vegetation structure, and layers, within forested zones. When introducing new native plants to Camp Long their mature size should be taken into consideration to maximize structural diversity.

Some animal species are adapted to find shelter in snags or downed woody debris. Animals may also feed on invertebrates that find shelter in snags and downed woody debris. Old logs should be retained in order to provide food and habitat for animals. Introduction of downed woody debris around the pond area will enhance food sources for native amphibian, reptile, mammal and bird species. Snags should be retained when they do not border paths or otherwise pose a threat as hazard trees. Seventy species of birds and mammals, in the Pacific Northwest, den or nest in snags. Over 40 species of birds and mammals forage for food in snags (Link 1999). Other bird species may use snags as

hunting perches or for mating displays. In high visibility areas signs should be posted on snags to inform the public about the use of snags by native animal species.

The introduction of other wildlife attractants can also be used to educate park visitors, while increasing the carrying capacity of Camp Long. Providing birdbaths, birdhouses, bird feeders, rock piles, and bat houses can provide valuable examples for park visitors on how to manage their own yards for wildlife. Educational signs should be placed near wildlife enhancement features to explain their functions to park visitors. Additional information about wildlife enhancement should be posted on Camp Long kiosks.

**For additional information on wildlife habitat consult:* *(Link 1999)*
(Whitney 1998)

6. Public Education and Outreach

6.1 Existing Programs

Camp Long Park has a long history of serving as an educational resource for children, and adults. Camp Long has an extensive capacity to educate the public about native ecosystems of the Puget trough region. Camp Long employs naturalists that specialize in Pacific Northwest regional ecosystems, to teach classes. Student education programs include an extensive variety of outdoor education classes for students in kindergarten through 6th grade and a limited number of classes for pre-school students. Camp Long classes cover a variety of topics, but most focus on outdoor education.

Work parties are regularly scheduled and posted in the Camp Long newsletter and on the Camp Long web page. A group of concerned citizens called Friends of Camp Long has also been instrumental in raising issues relevant to native habitat restoration at Camp Long. The combined strength of concerned citizens, specialized educational infrastructure and a commitment to sustainable native ecosystems puts Camp Long in an outstanding position to obtain funding and broaden its volunteer base.

6.2 Expanding Educational Outreach

Camp Long Park educational programs should expand to include high school and possibly college level students. Expansion can be facilitated by Friends of Camp Long with the support and advise of Camp Long staff and other DPR employees. High school environmental education and service learning classes could allow high school students to apply classroom lessons to ecosystem restoration at Camp Long. Local high schools should be contacted to pursue this idea.

Non-profit groups should be contacted to pursue this idea. Non-profit groups often find it easier to obtain grants and other funding when there is volunteer support and an educational component included in a proposal. University of Washington professors that specialize in wildlife management, ecological restoration, botany, horticulture, urban ecology and urban forestry should also be contacted. Undergraduate and graduate students in relevant fields may fulfil academic requirements while facilitating particular restoration projects at Camp Long.

6.3 Expanding the Volunteer Base and Funding Management Projects

The focus of Camp Long on native ecosystems provides many opportunities for expanding the volunteer base and funding projects. Volunteer recruitment for invasive removal, native plant introduction, and habitat restoration should be advertised in new venues. Educational signs should be deployed around enhancement sites. These signs should include information on the project as well as contact information for interested volunteers. Park kiosks should also be used to educate the public about ongoing enhancement projects and volunteer opportunities. Educational coordinators at Camp

Long should network with like minded environmental education non-profit organizations. Examples of such local organizations are:

- King County Native Plant Salvage Program: **http://dnr.metrokc.gov/wlr/pi/salvage.htm**
- King County Wetland Plant Cooperative: **(425) 226-4867**
- Seattle Audubon Society: **(206) 523-4483**
- Seattle Earth Corps: **(206) 322-9296**
- Society for Ecological Restoration: **(206) 547-9641**
- TREEmendous Seattle: **(206) 985-6867**
- Washington Native Plant Society**: (206) 527-3210**
- Washington State Department of Natural Resources, Urban and Community Forestry: **http://www.wa.gov/dnr/htdocs/rp/urban/urban.htm**

Announcing work parties in the newsletters of local non-profit organizations can greatly expand readership and volunteer recruitment. Some organizations may be willing to provide direct financial resources. Other organizations may be able to help with volunteer recruitment, provide expert volunteers to instruct and lead work parties and with ideas on generating such resources. Consulting with DPR urban forestry and other staff should yield further ideas on resource procurement.

It is important to record volunteer hours and progress. This can provide documentation of community support for Camp Long restoration projects. Volunteer hours can be used to match cash infusions from environmental enhancement grants. Volunteers and staff at Camp Long can write grants to many organizations to seek funding for implementation of specific enhancement projects. Utilizing naturalists and volunteers with expertise in restoration to instruct and lead volunteer groups can provide a rewarding experience for volunteers. Different strategies may be more or less effective in motivating particular volunteer groups.

- Establishing a committee to oversee vegetation management at Camp Long would facilitate implementation of the broad range of suggested projects. Inviting highly qualified members to serve as chairs on the committee can vastly increase the networking capacity and expertise available for managing Camp Long.
- It is important to foster a sense of collective destiny and community ownership of Camp Long. Allowing volunteers to participate in decision-making, and not just following orders is essential. A sense of community involvement and collective destiny can be a powerful motivator to volunteers. The citizens of Seattle own Camp Long Park. Although this seems obvious it never hurts to remind citizens that “This is your park.”
- Volunteers should be encouraged to participate in activities utilizing their full range of abilities. It is important to keep intelligent volunteers challenged and engaged.
- Recognizing the achievement of volunteers can also be an important reinforcement. Without the participation of volunteers it would be impossible to achieve significant results in vegetation management at Camp Long. Volunteers should be reminded of their valuable contribution and how much it is appreciated.

- Different volunteers may have different interests and abilities. A copy of the overall goals of vegetation management at Camp Long should be made available to volunteers. Interested volunteers should be encouraged to participate in any way that suits their interests and abilities. Vegetation management at Camp Long will be a broad and ongoing process. Many different types of assistance will be needed to restore the functions of this highly altered ecosystem.

Appendix-1. Public Involvement Process Notes

This appendix includes the original public involvement plan and minutes from the subsequent public involvement meetings.

Public Involvement Plan-Camp Long

Signage: One 4X4 sign will be posted in front of the Camp Long Environmental Center. The signs will have the following language:

Camp Long Vegetation Management Plan Development

This Plan will identify areas of the Park that need restoration or management to insure the long-term integrity of the park's vegetation. Proposed projects could include: removal of non-native invasive plant species in forested areas, reforestation of areas with low plant species diversity, and installation of large woody debris for wildlife. Analysis of existing vegetation and reference information will provide a basis for plan development. A public involvement process will be an aspect of the plan. Public meeting notices will be posted throughout the Park and sent to neighbors living within 300' of the park boundary. This plan is a part of the Parks Major Maintenance Program, funded by the City's Cumulative Reserve Fund.

Anticipated Completion: Fall of 2001

Public Meetings:

- April 10, 2001- Introduce Plan Process to Public/Initial vegetation findings
- June 5, 2001- Present Draft to Public

An additional meeting will be scheduled if deemed necessary by the Steering Committee. For each meeting there will be six 11X17 signs posted in the park and a mailing will be sent to neighbors within 300' of the park.

Interested Parties:

- Friends of Camp Long
- Mailing list for Camp Long Newsletter

April 10, 2001 Meeting Notes.

Issues

POND

- Carpinus sp. is becoming invasive around the pond area.
- Need to address glade/meadow area adjacent to pond
- Red-legged frogs and long toed salamanders breed in the pond area. We should consider planting vegetation that will provide more habitat for these species.
- A phased approach needs to be taken when the pond is dredged. Vegetation will be removed during this process which will affect the amphibians that live in the pond.
- Buffer area around pond with native shrubs to provide habitat for wildlife that lives not only in aquatic habitats, but also upland habitats.

MEADOW

- The north and southeast open areas as well as the parade grounds should have some portions managed as a meadow. Imagine areas of meadow within a mowed lawn area.
- Need to establish areas of native, local, endemic grasses throughout the park and decrease non-native grasses.
- In order to manage wild areas within high-use areas we should use native shrubs and log barriers to keep people from trampling vegetation.
- Area parallel to 35th St. should become a meadow area.

TRAILS

- Paths should be established through wild areas within open areas (north and southeast areas and the parade grounds).
- The social trails that exit near the north end of the park may need to become official trails.
- Camp Long staff will be completing a trail maintenance plan for this plan.
- Trail layer (GIS map) needs to be included in the plan.

INVASIVES

- Parks department staff need to realize that non-volunteers should be hired to remove invasives. These efforts should be followed by restoration efforts.
- Scattering seeds is also a good way to propagate plants after invasives are removed.
- Natural succession will take hold when invasives are removed.

Overall VMP

- Monitoring and maintenance plans will also be apart of the vegetation management plan.
- When setting goals in the monitoring plan, make sure these goals are attainable.
- Overall goals for vegetation management plan need to be park specific.
- The next meeting for the VMP will likely be held in late July.
- The mailers for the next meeting will be sent to those living within 300' and those who attend the meeting.
- There are not any notable problems of illegal activity within the park ie. illegal campsites, but there may be some issues with an adjacent business owner and the

dumping of substances from an auto mechanic shop. Seattle Public Utilities may be called to do water quality testing.

ANALYSIS AREAS

- The corridor between Longfellow Creek and Camp Long needs to be looked at in terms of wildlife connectivity.
- The buffer between the golf course and Camp Long needs to be analyzed.

PESTICIDES

- Pesticide use has been decreased at city owned golf courses over the past few years.
- Five city-owned golf courses will be pesticide free in the upcoming year.
- The Parks department Pesticide Reduction program is also working with alternative treatments such as compost tea and mycorrhizal fungi.

TREES

- It needs to be determined if the flying squirrel population in Camp Long heavily relies upon Horse chestnuts as a food source before any trees are considered to be removed.
- If deciduous trees are removed consider replacing them not only with conifers, but also broadleaf species.

ENVIRONMENTAL EDUCATION

- Camp Long may want to invest in some mobile, interpretive, native vegetation and wildlife signs for school children.
- Cabin renters should be involved in the care of natives near cabins, ie. watering.

Sept. 17, 2001

CAMP LONG VEGETATON MANAGEMENT PLAN - PUBLIC MEETING NOTES

Attending from DPR., Urban Forestry Program: Mark Mead, Elliza Davis, Ann Hirschi, David Bergendorf. DPR Staff: Lynn Havsall, Stewart Wechsler. Public: Roberta Roberts, Robbie Woods, Steve Bomkamp, Dorothy Degottoca, Laura M. Tyler.

Meeting began at 7:15 in the Camp Long lodge. David Bergendorf presented a Power Point slide show on the findings and recommendations of the Vegetation Management Plan. (see attached copy)

Questions raised during the presentation and discussion afterward included the following:

- **How will wildlife migrate to Camp Long from other green areas?** (This will require working with neighbors of Camp Long to create corridors. Vegetation managers of the West Seattle Golf Course and Longfellow Creek Greenspace should be contacted.)

- **Will flying squirrels be able to survive without horsechestnut trees?** (Flying squirrels eat a variety of foods, not just nuts. Nuts are almost the exclusive diet of the eastern gray squirrel. By eliminating eastern gray squirrel diet/habitat there will be more food for flying squirrels. The addition of conifer trees and other native plants to the forested zones will enhance habitat for flying squirrels.)
- Will it be necessary to introduce other native animals to Camp Long? (The habitat that can sustain native animals must be present before they will introduce themselves, or can be introduced.)

- **If horse chestnut trees are topped, is that an effective management strategy or will they re-sprout?** (The plan is to create snags from the existing horsechestnut trees. This allows for the removal of an invasive species and habitat enhancement at the same time. They should die off after toping.)

- **Does "managed succession" as described in the slide show, include entire areas being planted simultaneously, or is the succession stage progressive as in nature?**
- (Normal forest succession in the lowlands of the Puget trough does not occur as a result of major disturbance, like clear cutting or burning. Usually succession occurs in gaps that are created in the tree canopy when large trees fail. This results in multiple aged stands. Introduction of native conifers in forested zones should follow this pattern of gap succession.)

- **What about the new meadow areas that are proposed in the VMP? How will they be established and maintained?**

- (They will start out as “no-mow” areas. These areas should be cut once every one to two years to prevent colonization by woody plants. Pathways will be mowed through them to allow access for park visitors. After meadows have been established it will be possible to introduce native grass species and wildflowers with a variety of methods.)

- **Are there “priority zones” for management? Do you have an idea of what order those priorities fall in?** (The highest priority should be placed on park visitor safety. For this reason hazard tree assessment and the application of coarse woody mulch around cabins should be high priorities. Other large priorities are continuing the process of forest succession in the primarily deciduous forested zones, where succession has stalled. Controlling invasive horsechestnut trees and shade tolerant invasive plants (English ivy, English holly) are also large priorities. Pond enhancement, meadow creation and general habitat enhancement are other priorities.)

- **When will maintenance work on the pond be happening and how will that affect wildlife already there as well as new plantings?**
- (Although not yet scheduled, Pond dredging and restoration should happen in the next 2 years, and hopefully will be performed in stages to minimize disturbance to amphibian populations in the pond.)

- **Can you plant western hemlocks in the forested area?**
- (Shade intolerant species such as Douglas fir and grand fir should be planted under gaps in the canopy. By mowing himalayan blackberry patches to the ground and then planting the mowed area with these species they will begin to shade out the blackberry plants. This will allow us to kill two birds with one stone. Shade tolerant species such as western hemlock and western red cedar can be planted in smaller sizes since they will still grow under deciduous canopies.)

September 17, 2001

Presentation of Camp Long VMP Draft by David Bergendorf

HISTORY

- Started in 1937 by Archie Phelps and William Long
- Tree cutting, grass planting stopped.
- Possible site for Boy Scout camping.
- Met with 17 youth group representatives.
- Clark Shurman
    - Designed Climbing Rock
    - Camp Long only to be used for camping and climbing
    - Emulate NW nature

Current State of Camp Long Vegetation

- Majority of Camp Long is red alder and bigleaf maple in middle seral state.
- Invasive species
- Native species

Pond Area

- Sedimentation
- Trampled vegetation
- Lacking corridor to forested areas for wildlife

Areas Near Cabins

- Compacted soils
- Trampled vegetation
- Possible hazard trees

Grass Areas

- Currently high maintenance
- Low wildlife value
- Contrary to original intent of Camp Long

Engineering Forest Succession

- Natural forest succession in the Puget trough
- Introduce later seral stage conifer trees to Camp Long
- Control invasive plants
- Introduce new native plant species

Invasive Plant Removal

- Compete with native plants
- Have mutualistic associations with non-native animals
- Form monocultures
- Horsechestnut tree and association with eastern gray squirrel
- Shade tolerant invasives (English ivy, English holly)

Dredging the Pond

- Direct human traffic
- Apply coarse woody mulch to compacted, bare soils
- Vegetation enhancement to prevent sedimentation and improve habitat
- Corridor to the forest for wildlife

Lawn Area Management

- Change mowing cycles to allow meadow formations (slopes of parade ground and edge along 35th St.)
- Improve habitat
- Educational opportunities

Managing Areas Around Cabins

- Apply coarse woody mulch
- Direct human traffic
- Hazard tree assessment
- Plant native shrubs

Wildlife Enhancement

- Increase native plant diversity
- Increase structural diversity
- Creation of snags
- Forest to pond corridor
- Decrease invasive plant presence

Educational Opportunities

- Classes in alternatives to invasive plants
- Landscaping for wildlife
- Continuing current programs

Appendix – 2. Downed Woody Debris and Snags by Sample Plot

Sample Plot #	Aspect	Seral Stage	#DWD	#Snags
1	E	4	9	0
2	S	4	5	4
3	E	3	10	3
4	NE	4	12	4
5	E	6	6	1
6	E	3	30	1
7	NE	4	2	0
8	E	3	19	1
9	W	4	10	4
10	NE	4	16	0
11	E	4	7	2
12	NE	3	10	0
13	NW	4	7+3 stump	0
14	E	5	15	4
15	E	3	21	0
16	E	4	11	5
17	E	4	30	2
18	E	3	0	1
19	E	5	0	1
20	E	5	50	0
21	S	6	0	0
22	N	0	0	0
23	NE	3	21	4
24	E	4	13	2
25	W	4	14	4
26	E	6	0	0
27	E	3	5	2
28	E	6	0	0

Seral stage codes.
1 – old growth – approximately $\geq$ 180 years old
2 – late mature – approximately 120 – 180 years old
3 – mid-mature – approximately 60 -120 years old
4 – early mature – approximately 30 – 60 years old
5 – sapling – small tree > 1” to 5” DBH
6 – shrub pioneer less than 10% canopy closure of trees

For Appendices 2, 3, and 4 refer to Figure A-1 for plot locations.

Figure A-1


26
28
22
21
19
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16
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3
15
24
1
2
SEATTLE PARKS AND RECREATION
Camp Long
VMP
Plot Locations
Legend
Trail
Park Boundary
N
1:4200
100 0 100 Feet

Appendix-3. Dominant Plant Distribution by Sample Plot.

Plot	Dominant Tree	Shrub 1	%	Shrub2	%	Shrub 3	%	Soil	Canopy closure
1	POSP	COCO	33.75	RUAR	19	ILAC	13.63	CLAY	40-60%
2	SASC	CASI	24.13	COST	22.5	HEHE	11.25	CLAY	0-40%
3	THPL	BENE	56.25	COCO	10.8	GASH	9	SA/DF	>80%
4	ACMA	RUAR	30.75	URDI	18.5	POMU	15.5	DUFF	40-60%
5	N/A	GASH	38.75	COCO	23.8	POMU	14.75	CL/DF	0-40%
6	ALRU	AEHI	6TR	POMU	32	TEGR	21.25	CL/DF	40-60%
7	ACMA/ALRU	RUUR	28.75	RUDI	19.3	POMU	17.5	S/C/D	>80%
8	ALRU	SARA	76.25	ILAQ	15	RUUR	15	DUFF	>80%
9	ACMA	POMU	71.25	COCO	4.5	HODI	3.25	CL/SA	>80%
10	ACMA/AEHI	POMU	51.25	SARA	39	RUUR	15	CL/DF	>80%
11	ALRU/AEHI	SARA	18.25	POMU	12	HEHE	6.25	CL/DF	60-80%
12	CASP	POMU	38.75	COCO	20.5	HEHE	18.75	CLAY	60-80%
13	ACMA/AEHI	POMU	36.25	RUUR	9.25	URDI	6.375	CLAY	60-80%
14	ACMA/ALRU	POMU	22.5	RUUR	17.5	TEGR	5.75	CLAY	>80%
15	ACMA	HEHE	31.25	POMU	29.8	RUDI	22.25	CL/DF	60-80%
16	AEHI	URDI	45	COCO	20.8	POMU	19.5	SA/DF	40-60%
17	ALRU/CONU	RUUR	43.75	URDI	28.8	POMU	13	CL/DF	40-60%
18	ALRU	POMU	32.5	RUUR	18.3	URDI	14.5	CL/DF	>80%
19	ALRU	RUPA	0.5	POMU	0.25	GEMA	0.25	CLAY	60-80%
20	ALRU/ACMA	HEHE	41.25	POMU	15.5	RUUR	14.5	CLAY	>80%
21	N/A	CYSC	20.75	GAAP	4.75	CIVU	4.125	SAND	0-40%
22	N/A	AGCA	24.25	RUDI	13.5	CRMO	6.25	SAND	0-40%
23	THPL/ACMA	POMU	52	RUSP	17.8	COCO	10.75	CL/DF	40-60%
24	PONI/SASC	GRASS	37.5	COCO	8.75	RUUR	8	HUMUS	0-40%
25	ARME/ACMA	GASH	19.25	ILAQ	8.75	RUUR	8.5	S/C/DF	40-60%
26	N/A	RUDI	95.25	CYSC	22.5	EQTO	15.75	SAND	0-40%
27	PSME/ARME	GASH	13.75	REDTOP	12.5	COCO	9.5	S/C/DF	0-40%
28	LAAN	RUDI	68.25	EQTE	37.5	CYSC	15.5	SAND	0-40%

*** Species codes for individual plants can be found in Appendix – 5 "All Plants found in Camp Long Park".**

Appendix-4. Map Statistics and Key.

Plot #	Invasive/Native ratio	Relative Inv. by AEHI	% Invasive Cover	# Native sp.
1	0.454	0	52%	17
2	0.533	6	44%	18
3	0.063	1	7%	18
4	0.200	0	32%	24
5	0.392	0	61%	23
6	0.258	5	2%	21
7	0.121	2	20%	16
8	0.250	0.5	22%	24
9	0.239	2.5	3%	18
10	0.435	5	2%	16
11	0.348	9.5	10%	18
12	0.667	1	31%	12
13	0.233	4	3%	25
14	0.235	11.5	7%	16
15	0.143	0	57%	17
16	0.250	6	1%	19
17	0.154	0.5	6%	20
18	0.143	1	11%	23
19	0.105	0	99%	11
20	0.210	2.5	62%	21
21	2.300	0	47%	6
22	7.500	0	39%	2
23	0.194	1	9%	23
24	0.935	1	56%	27
25	0.223	0	26%	23
26	0.438	0	100%	13
27	0.369	0	19%	15
28	1.714	0	100%	7

Plot number refers to the vegetation sample plot surveyed between the autumn of 2000 and the spring of 2001. The column labeled “Invasive/Native ratio” is a measure of invasive vs. native plant diversity. Numbers over 1 indicate that there are more invasive than native plants in a plot. The column labeled “Relative Invasion by of AEHI” is a measure of the biological significance being exerted by the Horsechestnut tree (*Aesculus hippocastanum*) in a particular plot. The column labeled “% Invasive cover” displays the percentage of ground in a particular plot that is covered with invasive plant species. The column labeled “# Native sp.” displays the total number of native plant species found in a particular plot.

Appendix-5. All Plants Found in Camp Long Park

Plants by Scientific Name

Type	Scientific name	Code	Common name	Status
Herbs	Stellaria species	STSP	Starwort	?
Herbs	Veronica sp.	VESP	Speeswell, unknown	?
Herbs	Vicia species	VISP	Vetch, unknown	?
Shrubs	Ligustrum sp.	LISP	Privet, unknown	?
Shrubs	Rosa sp.	ROSP	Rose, unknown	?
Trees	Pinus sp.	PISP	Pine, unknown	?
Trees	Prunus sp.	PRSP	Cherry, unknown	?
Trees	Ulmus sp.	ULSP	Elm, unknown	?
Herbs	Achillea millefolium	ACMI	European yarrow	Invasive
Herbs	Agropyron repens	AGRE	Quackgrass	Invasive
Herbs	Alliaria petiolata (officinalis)	ALPE	Garlic mustard	Invasive
Herbs	Bellis perennis	BEPE	English daisy	Invasive
Herbs	Brassica species	BRSP	Mustard, unknown	Invasive
Herbs	Calystegia silvatica	CASI	Bindweed	Invasive
Herbs	Campanula rotundifolia	CARO	Bluebell	Invasive
Herbs	Cardamine species	CASP	Bittercress	Invasive
Herbs	Cirsium arvense	CIAR	Canada thistle	Invasive
Herbs	Cirsium vulgare	CIVU	Bull thistle	Invasive
Herbs	Conyza canadensis	COCA	Canada Fleabane	Invasive
Herbs	Foeniculum vulgare	FOVU	Fennel	Invasive
Herbs	Hypericum perforatum	HYPE	Common St. John's wort	Invasive
Herbs	Hypochaeris radicata	HYRA	Cat’s ear	Invasive
Herbs	Lactuca serriola	LASE	Prickly lettuce	Invasive
Herbs	Lamium amplexicaule	LAAM	Giraffe head	Invasive
Herbs	Lapsana communis	LACO	Nipplewort	Invasive
Herbs	Medicago lupulina	MELU	Black medick	Invasive
Herbs	Oenothera species	OESP	Evening primrose	Invasive
Herbs	Phalaris arundinacea	PHAR	Reed canary-grass	Invasive
Herbs	Plantago lanceolata	PLLA	Plantain, English	Invasive
Herbs	Plantago major	PLMA	Plantain, common	Invasive
Herbs	Polygonum cuspidatum (japonicum)	POCU	Japanese knotweed	Invasive
Herbs	Ranunculus repens	RARE	Creeping buttercup	Invasive
Herbs	Senecio vulgaris	SEVU	Common Groundsel	Invasive
Herbs	Solanum dulcamara	SODU	Climbing nightshade	Invasive
Herbs	Taraxcum officinale	TAOF	Dandelion	Invasive
Herbs	Veronica chamaedrys	VECH	Germander speedwell	Invasive
Shrubs	Buddleia davidii	BUDA	Butterfly bush	Invasive
Shrubs	Cytisus scoparius	CYSC	Scotch Broom	Invasive
Shrubs	Daphne laureola	DALA	Spurge laurel	Invasive
Shrubs	Geranium robertianum	GERO	Herb robert	Invasive
Shrubs	Hedera helix	HEHE	English Ivy	Invasive
Shrubs	Hypericum performatum	HYPE	St. John’s-wort, common	Invasive
Shrubs	Prunus laurocerasus	PRLA	English laurel	Invasive

Shrubs	Rubus discolor	RUDI	Blackberry, himalayan	Invasive
Trees	Aesculus hippocastanum	AEHI	Horsechestnut, common	Invasive
Trees	Carpinus sp.	CASP	Hornbeam	Invasive
Trees	Crataegus monogyna	CRMO	Hawthorn, common	Invasive
Trees	Ilex aquifolium	ILAQ	English holly	Invasive
Trees	Laburnum anagyroides	LAAN	Goldenchain tree	Invasive
Trees	Populus alba	POAL	White poplar	Invasive
Trees	Populus nigra 'Italica'	PONI	Lombardy poplar	Invasive
Trees	Prunus laurocerasus	PRLA	Laurel, English	Invasive
Ferns	Blechnum spicant	BLSP	Deer fern	Native
Ferns	Dryopteris expansa	DREX	Northern buckler fern	Native
Ferns	Polypodium glycrrhiza	POGL	Licorice fern	Native
Ferns	Polystichum munitum	POMU	Sword fern	Native
Ferns	Pteridium aquilinum	PTAQ	Bracken fern	Native
Ferns	Adianthum pedatum	ADPE	Western maidenhair	Native
Ferns	Athyrium filix-femina	ATFI	Lady fern	Native
Ferns	Azolla filiculoides	AZFI	Duckweed fern	Native
Herbs	Anaphalis margaritacea	ANMA	Pearly everlasting	Native
Herbs	Asarum caudatum	ASCA	Western wild ginger	Native
Herbs	Caryx deweyana	CADE	Dewey's sedge	Native
Herbs	Caryx obnupta	CAOB	Slough sedge	Native
Herbs	Circaea alpina	CIAL	Enchanter's Nightshade	Native
Herbs	Claytonia (Montia) sibirica	CLSI	Candyflower	Native
Herbs	Dicentra formosa	DIFO	Western bleeding-heart	Native
Herbs	Elymus glaucus	ELGL	Western wild-rye	Native
Herbs	Epilobium ciliatum	EPCI	Purple-leaved willowherb	Native
Herbs	Epilobium ssp. watsonii	EPWA	Willowherb	Native
Herbs	Equisetum telmateia	EQTE	Giant horsetail	Native
Herbs	Galium Aparine	GAAP	Goosegrass	Native
Herbs	Geum macrophyllum	GEMA	Bigleaf avens	Native
Herbs	Lactuca tatarica ssp. pulchella	LAPU	Blue lettuce	Native
Herbs	Lemna trisulca	LETR	Star duckweek	Native
Herbs	Nemophila parviflora	NEPA	Wood Nymph	Native
Herbs	Prunella vulgaris ssp. lanceolata	PRVU	American heal all	Native
Herbs	Ranunculus uncinatus	RAUN	Little buttercup	Native
Herbs	Scirpus microcarpus	SCMI	Smallfruited bulrush	Native
Herbs	Tellima grandiflora	TEGR	Fringecup	Native
Herbs	Tolmiea menziesii	TOME	Piggy-back plant	Native
Herbs	Trientalis borealis	TRBO	Starflower	Native
Herbs	Trillium ovatum	TROV	Western trillium	Native
Herbs	Urtica dioica	URDI	Stinging nettle	Native
Herbs	Veronica americana	VEAM	Brooklime	Native
Herbs	Veronica serpyllifolia var. humifusa	VESE	Spreading speedwell	Native
Herbs	Vicia nigricans ssp. gigantea	VINI	Giant vetch	Native
Herbs	Viola sempervirens	VISE	Violet, trailing yellow	Native
Moss	Plagiomnium insigne	PLIN	Coastal Leafy Moss	Native
Shrubs	Acer circinatum	ACCI	Maple, Vine	Native
Shrubs	Amalanchier alnifolia	AMAL	Western serviceberry	Native
Shrubs	Arctostaphylos uva-ursi	ARUV	Kinniknnick	Native

Shrubs	Berberis (Mahonia) aquifolium	BEAQ	Oregon Grape	Native
Shrubs	Berberis (Mahonia) nervosa	BENE	Oregon Grape, low	Native
Shrubs	Castilleja hispida	CAHI	Harsh paintbrush	Native
Shrubs	Cornus stolonifera (sericea)	COST	Red osier dogwood	Native
Shrubs	Corylus cornuta	COCO	Hazelnut	Native
Shrubs	Gaultheria shallon	GASH	Salal	Native
Shrubs	Holodiscus discolor	HODI	Ocean spray	Native
Shrubs	Lonicera ciliosa	LOCI	Orange honeysuckle	Native
Shrubs	Lonicera involucrata	LOIN	Twinberry, black	Native
Shrubs	Philadelphus lewisii	PHLE	Mock orange, wild	Native
Shrubs	Ribes bracteosum	RIBR	Blue currant	Native
Shrubs	Ribes lacustre	RILA	Gooseberry, black swamp	Native
Shrubs	Ribes sanguineum	RISA	Redflower currant	Native
Shrubs	Rosa gynmocarpa	ROGY	Wild rose	Native
Shrubs	Rubus leucodermis	RULE	Western blackcap raspberry	Native
Shrubs	Rubus parvifolius	RUPA	Thimbleberry	Native
Shrubs	Rubus spectabilis	RUSP	Salmonberry	Native
Shrubs	Rubus ursinus	RUUR	Trailing blackberry	Native
Shrubs	Sambucus racemosa	SARA	Red elderberry	Native
Shrubs	Spiraea douglasii	SPDO	Hardhack	Native
Shrubs	Symphoricarpos albus	SYAL	Snowberry	Native
Shrubs	Taxus brevifolis	TABR	Yew, western	Native
Shrubs	Typha latifolia	TYLA	Cattail, common	Native
Shrubs	Vaccinium ovatum	VAOV	Evergreen huckleberry	Native
Shrubs	Vaccinium parvifolium	VAPA	Red huckleberry	Native
Trees	Acer circinatum	ACCI	Vine maple	Native
Trees	Acer macrophyllum	ACMA	Bigleaf maple	Native
Trees	Alnus rubra	ALRU	Red alder	Native
Trees	Amalanchier alnifolia	AMAL	Western serviceberry	Native
Trees	Arbutus menziesii	ARME	Madrone, pacific	Native
Trees	Crataegus douglasii	CRDO	Black hawthorn	Native
Trees	Fraxinus latifolia	FRLA	Oregon Ash	Native
Trees	Pinus contorta	PICO	Shore pine	Native
Trees	Pinus monticola	PIMO	Western white pine	Native
Trees	Populus tricocarpa	POTR	Black cottonwood	Native
Trees	Prunus emarginata	PREM	Cherry, bitter	Native
Trees	Pseudotsuga menziesii	PSME	Douglass fir	Native
Trees	Rhamnus purshiana	RHPU	Cascara	Native
Trees	Salix scouleriana	SASC	Scouler’s willow	Native
Trees	Taxus brevifolis	TABR	Yew, western	Native
Trees	Thuja plicata	THPL	Western red cedar	Native
Trees	Tsuga heterophylla	TSHE	Western hemlock	Native
Trees	Cornus nuttallii	CONU	Dogwood, pacific	Native
Trees	Oemlaria (Osmaronia) cerasiformus	OECE	Indian Plum	Native
Herbs	Agrostis capillaris	AGCA	Colonial bentgrass	Non-native
Herbs	Callitriche stagnalis	CAST	Pond Water-Starwort	Non-native
Herbs	Dactylis glomerata	DAGL	Orchard grass	Non-native
Herbs	Digitalis purpurea	DIPU	Foxglove	Non-native
Herbs	Holcus lanatus	HOLA	Velvet grass	Non-native

Herbs	Juncus effusus	JUEF	Soft rush	Non-native
Herbs	Lolium perenne	LOPE	English (Perennial) ryegrass	Non-native
Herbs	Melilotus albus	MEAL	White sweet-clover	Non-native
Herbs	Mycelis muralis	MYMU	Wall lettuce	Non-native
Herbs	Nymphaea odorata	NYOD	White Waterlilly	Non-native
Herbs	Oxalis oregona	OXOR	Redwood sorrel	Non-native
Herbs	Rumex obtusifolius	RUOB	Bitter dock	Non-native
Herbs	Stellaria media	STME	Chickweed	Non-native
Herbs	Trifolium pratense	TRPR	Red clover	Non-native
Herbs	Trifolium repens	TRRE	Dutch clover	Non-native
Herbs	Vicia sativa	VISA	Vetch, common	Non-native
Herbs	Yucca spp.	YUSP	Yucca	Non-native
Shrubs	Cotoneaster simonsii	COSI	Simons' contoneaster	Non-native
Shrubs	Cotoneaster sp.	COSP	Cotoneaster, unknown	Non-native
Shrubs	Geranium dissectum	GEDI	Cutleaf geranium	Non-native
Shrubs	Ligustrum ovalifolium	LIOV	California privet	Non-native
Shrubs	Ligustrum vulgare	LIVU	Privet, common	Non-native
Shrubs	Prunus lusitanica	PRLU	Portugal laurel	Non-native
Shrubs	Pyrocantha coccinea	PYCO	Firethorn	Non-native
Shrubs	Rubus arcticus	RUAR	Dwarf Nagoonberry	Non-native
Shrubs	Taxus baccata	TABA	Yew, English	Non-native
Shrubs	Viburnum tinus	VITI	Laurustinus	Non-native
Shrubs	Vinca minor	VIMI	Periwinkle, lesser	Non-native
Trees	Liquidambar styraciflua	LIST	Sweetgum, american	Non-native
Trees	Populus balsamifera	POBA	Balm-of-gilead	Non-native
Trees	Prunus avium	PRAV	Cherry, wild	Non-native
Trees	Quercus species	QUSP	Oak	Non-native
Trees	Sorbus aucuparia	SOAU	European mountain ash	Non-native
Trees	Taxus baccata	TABA	Yew, English	Non-native
Herbs	Euphorbia peplus	EUPE	Petty spurge	Non-native
Herbs	Lathyrus latifolius	LALA	Everlasting pea	Non-native
Shrubs	Taxus sp.	TASP	Yew, unknown	Non-native

Plants by Common Name

Type	*Common Name*	*Scientific Name*	*Code*	*Status*
Herbs	Speeswell, unknown	Veronica sp.	VESP	?
Herbs	Starwort	Stellaria species	STSP	?
Herbs	Vetch, unknown	Vicia species	VISP	?
Shrubs	Privet, unknown	Ligustrum sp.	LISP	?
Shrubs	Rose, unknown	Rosa sp.	ROSP	?
Shrubs	Yew, unknown	Taxus sp.	TASP	?
Trees	Cherry, unknown	Prunus sp.	PRSP	?
Trees	Elm, unknown	Ulmus sp.	ULSP	?
Trees	Pine, unknown	Pinus sp.	PISP	?
Herbs	Bindweed	Calystegia silvatica	CASI	Invasive
Herbs	Bittercress	Cardamine species	CASP	Invasive
Herbs	Black medick	Medicago lupulina	MELU	Invasive
Herbs	Bluebell	Campanula rotundifolia	CARO	Invasive

Herbs	Bull thistle	Cirsium vulgare	CIVU	Invasive
Herbs	Canada Fleabane	Conyza canadensis	COCA	Invasive
Herbs	Canada thistle	Cirsium arvense	CIAR	Invasive
Herbs	Cat’s ear	Hypochaeris radicata	HYRA	Invasive
Herbs	Climbing nightshade	Solanum dulcamara	SODU	Invasive
Herbs	Common Groundsel	Senecio vulgaris	SEVU	Invasive
Herbs	Common St. John's wort	Hypericum perforatum	HYPE	Invasive
Herbs	Creeping buttercup	Ranunculus repens	RARE	Invasive
Herbs	Dandelion	Taraxcum officinale	TAOF	Invasive
Herbs	English daisy	Bellis perennis	BEPE	Invasive
Herbs	European yarrow	Achillea millefolium	ACMI	Invasive
Herbs	Evening primrose	Oenothera species	OESP	Invasive
Herbs	Fennel	Foeniculum vulgare	FOVU	Invasive
Herbs	Garlic mustard	Alliaria petiolata (officinalis)	ALPE	Invasive
Herbs	Germander speedwell	Veronica chamaedrys	VECH	Invasive
Herbs	Giraffe head	Lamium amplexicaule	LAAM	Invasive
Herbs	Japanese knotweed	Polygonum cuspidatum (japonicum)	POCU	Invasive
Herbs	Mustard, unknown	Brassica species	BRSP	Invasive
Herbs	Nipplewort	Lapsana communis	LACO	Invasive
Herbs	Plantain, common	Plantago major	PLMA	Invasive
Herbs	Plantain, English	Plantago lanceolata	PLLA	Invasive
Herbs	Prickly lettuce	Lactuca serriola	LASE	Invasive
Herbs	Quackgrass	Agropyron repens	AGRE	Invasive
Herbs	Reed canary-grass	Phalaris arundinacea	PHAR	Invasive
Shrubs	Blackberry, himalayan	Rubus discolor	RUDI	Invasive
Shrubs	Butterfly bush	Buddleia davidii	BUDA	Invasive
Shrubs	English Ivy	Hedera helix	HEHE	Invasive
Shrubs	English laurel	Prunus laurocerasus	PRLA	Invasive
Shrubs	Herb robert	Geranium robertianum	GERO	Invasive
Shrubs	Scotch Broom	Cytisus scoparius	CYSC	Invasive
Shrubs	Spurge laurel	Daphne laureola	DALA	Invasive
Shrubs	St. John’s-wort, common	Hypericum performatum	HYPE	Invasive
Trees	English holly	Ilex aquifolium	ILAQ	Invasive
Trees	Goldenchain tree	Laburnum anagyroides	LAAN	Invasive
Trees	Hawthorn, common	Crataegus monogyna	CRMO	Invasive
Trees	Horsechestnut, common	Aesculus hippocastanum	AEHI	Invasive
Trees	Laurel, English	Prunus laurocerasus	PRLA	Invasive
Trees	Lombardy poplar	Populus nigra ‘Italica’	PONI	Invasive
Trees	White poplar	Populus alba	POAL	Invasive
Ferns	Bracken fern	Pteridium aquilinum	PTAQ	Native
Ferns	Deer fern	Blechnum spicant	BLSP	Native
Ferns	Licorice fern	Polypodium glycrrhiza	POGL	Native
Ferns	Northern buckler fern	Dryopteris expansa	DREX	Native
Ferns	Sword fern	Polystichum munitum	POMU	Native
Ferns	Duckweed fern	Azolla filiculoides	AZFI	Native
Ferns	Lady fern	Athyrium filix-femina	ATFI	Native
Ferns	Western maidenhair	Adianthum pedatum	ADPE	Native
Herbs	American heal all	Prunella vulgaris ssp. lanceolata	PRVU	Native
Herbs	Bigleaf avens	Geum macrophyllum	GEMA	Native

Herbs	Blue lettuce	Lactuca tatarica ssp. pulchella	LAPU	Native
Herbs	Brooklime	Veronica americana	VEAM	Native
Herbs	Candyflower	Claytonia (Montia) sibirica	CLSI	Native
Herbs	Dewey's sedge	Caryx deweyana	CADE	Native
Herbs	Enchanter's Nightshade	Circaea alpina	CIAL	Native
Herbs	Fringecup	Tellima grandiflora	TEGR	Native
Herbs	Giant horsetail	Equisetum telmateia	EQTE	Native
Herbs	Giant vetch	Vicia nigricans ssp. gigantea	VINI	Native
Herbs	Goosegrass	Galium Aparine	GAAP	Native
Herbs	Little buttercup	Ranunculus uncinatus	RAUN	Native
Herbs	Pearly everlasting	Anaphalis margaritacea	ANMA	Native
Herbs	Piggy-back plant	Tolmiea menziesii	TOME	Native
Herbs	Purple-leaved willowherb	Epilobium ciliatum	EPCI	Native
Herbs	Slough sedge	Caryx obnupta	CAOB	Native
Herbs	Smallfruited bulrush	Scirpus microcarpus	SCMI	Native
Herbs	Spreading speedwell	Veronica serpyllifolia var. humifusa	VESE	Native
Herbs	Star duckweek	Lemna trisulca	LETR	Native
Herbs	Starflower	Trientalis borealis	TRBO	Native
Herbs	Stinging nettle	Urtica dioica	URDI	Native
Herbs	Violet, trailing yellow	Viola sempervirens	VISE	Native
Herbs	Western bleeding-heart	Dicentra formosa	DIFO	Native
Herbs	Western trillium	Trillium ovatum	TROV	Native
Herbs	Western wild ginger	Asarum caudatum	ASCA	Native
Herbs	Western wild-rye	Elymus glaucus	ELGL	Native
Herbs	Willowherb	Epilobium ssp. watsonii	EPWA	Native
Herbs	Wood Nymph	Nemophila parviflora	NEPA	Native
Moss	Coastal Leafy Moss	Plagiomnium insigne	PLIN	Native
Shrubs	Blue currant	Ribes bracteosum	RIBR	Native
Shrubs	Cattail, common	Typha latifolia	TYLA	Native
Shrubs	Evergreen huckleberry	Vaccinium ovatum	VAOV	Native
Shrubs	Gooseberry, black swamp	Ribes lacustre	RILA	Native
Shrubs	Hardhack	Spiraea douglasii	SPDO	Native
Shrubs	Harsh paintbrush	Castilleja hispida	CAHI	Native
Shrubs	Hazelnut	Corylus cornuta	COCO	Native
Shrubs	Kinniknnick	Arctostaphylos uva-ursi	ARUV	Native
Shrubs	Maple, Vine	Acer circinatum	ACCI	Native
Shrubs	Mock orange, wild	Philadelphus lewisii	PHLE	Native
Shrubs	Ocean spray	Holodiscus discolor	HODI	Native
Shrubs	Orange honeysuckle	Lonicera ciliosa	LOCI	Native
Shrubs	Oregon Grape	Berberis (Mahonia) aquifolium	BEAQ	Native
Shrubs	Oregon Grape, low	Berberis (Mahonia) nervosa	BENE	Native
Shrubs	Red elderberry	Sambucus racemosa	SARA	Native
Shrubs	Red huckleberry	Vaccinium parvifolium	VAPA	Native
Shrubs	Red osier dogwood	Cornus stolonifera (sericea)	COST	Native
Shrubs	Redflower currant	Ribes sanguineum	RISA	Native
Shrubs	Salal	Gaultheria shallon	GASH	Native
Shrubs	Salmonberry	Rubus spectabilis	RUSP	Native
Shrubs	Snowberry	Symphoricarpos albus	SYAL	Native
Shrubs	Thimbleberry	Rubus parvifolius	RUPA	Native

Shrubs	Trailing blackberry	Rubus ursinus	RUUR	Native
Shrubs	Twinberry, black	Lonicera involucrata	LOIN	Native
Shrubs	Western blackcap raspberry	Rubus leucodermis	RULE	Native
Shrubs	Western serviceberry	Amalanchier alnifolia	AMAL	Native
Shrubs	Wild rose	Rosa gynmocarpa	ROGY	Native
Shrubs	Yew, western	Taxus brevifolis	TABR	Native
Trees	Bigleaf maple	Acer macrophyllum	ACMA	Native
Trees	Black cottonwood	Populus tricocarpa	POTR	Native
Trees	Black hawthorn	Crataegus douglasii	CRDO	Native
Trees	Cascara	Rhamnus purshiana	RHPU	Native
Trees	Cherry, bitter	Prunus emarginata	PREM	Native
Trees	Douglass fir	Pseudotsuga menziesii	PSME	Native
Trees	Madrone, pacific	Arbutus menziesii	ARME	Native
Trees	Oregon Ash	Fraxinus latifolia	FRLA	Native
Trees	Red alder	Alnus rubra	ALRU	Native
Trees	Scouler's willow	Salix scouleriana	SASC	Native
Trees	Shore pine	Pinus contorta	PICO	Native
Trees	Vine maple	Acer circinatum	ACCI	Native
Trees	Western hemlock	Tsuga heterophylla	TSHE	Native
Trees	Western red cedar	Thuja plicata	THPL	Native
Trees	Western serviceberry	Amalanchier alnifolia	AMAL	Native
Trees	Western white pine	Pinus monticola	PIMO	Native
Trees	Yew, western	Taxus brevifolis	TABR	Native
Trees	Dogwood, pacific	Cornus nuttallii	CONU	Native
Trees	Indian Plum	Oemlaria (Osmaronia) cerasiformus	OECE	Native
Herbs	Bitter dock	Rumex obtusifolius	RUOB	Non-native
Herbs	Chickweed	Stellaria media	STME	Non-native
Herbs	Colonial bentgrass	Agrostis capillaris	AGCA	Non-native
Herbs	Dutch clover	Trifolium repens	TRRE	Non-native
Herbs	English (Perennial) ryegrass	Lolium perenne	LOPE	Non-native
Herbs	Foxglove	Digitalis purpurea	DIPU	Non-native
Herbs	Orchard grass	Dactylis glomerata	DAGL	Non-native
Herbs	Pond Water-Starwort	Callitriche stagnalis	CAST	Non-native
Herbs	Red clover	Trifolium pratense	TRPR	Non-native
Herbs	Redwood sorrel	Oxalis oregona	OXOR	Non-native
Herbs	Soft rush	Juncus effusus	JUEF	Non-native
Herbs	Velvet grass	Holcus lanatus	HOLA	Non-native
Herbs	Vetch, common	Vicia sativa	VISA	Non-native
Herbs	Wall lettuce	Mycelis muralis	MYMU	Non-native
Herbs	White sweet-clover	Melilotus albus	MEAL	Non-native
Herbs	White Waterlilly	Nymphaea odorata	NYOD	Non-native
Herbs	Yucca	Yucca spp.	YUSP	Non-native
Shrubs	California privet	Ligustrum ovalifolium	LIOV	Non-native
Shrubs	Cotoneaster, unknown	Cotoneaster sp.	COSP	Non-native
Shrubs	Cutleaf geranium	Geranium dissectum	GEDI	Non-native
Shrubs	Dwarf Nagoonberry	Rubus arcticus	RUAR	Non-native
Shrubs	Firethorn	Pyrocantha coccinea	PYCO	Non-native
Shrubs	Laurustinus	Viburnum tinus	VITI	Non-native
Shrubs	Periwinkle, lesser	Vinca minor	VIMI	Non-native

Shrubs	Portugal laurel	Prunus lusitanica	PRLU	Non-native
Shrubs	Privet, common	Ligustrum vulgare	LIVU	Non-native
Shrubs	Simons' contoneaster	Cotoneaster simonsii	COSI	Non-native
Shrubs	Yew, English	Taxus baccata	TABA	Non-native
Trees	Balm-of-gilead	Populus balsamifera	POBA	Non-native
Trees	Cherry, wild	Prunus avium	PRAV	Non-native
Trees	European mountain ash	Sorbus aucuparia	SOAU	Non-native
Trees	Hornbeam	Carpinus spp.	CASP	Non-native
Trees	Oak	Quercus species	QUSP	Non-native
Trees	Sweetgum, american	Liquidambar styraciflua	LIST	Non-native
Trees	Yew, English	Taxus baccata	TABA	Non-native
Herbs	Everlasting pea	Lathyrus latifolius	LALA	Non-native
Herbs	Petty spurge	Euphorbia peplus	EUPE	Non-native

Appendix-6. Preferred Habitat of Native Plants Found in Camp Long Park

Plants by Scientific Name

Type	Scientific name	Preferred Habitat
Tree	Acer circinatum	Wet to dry forest shade and openings
Tree	Acer macrophyllum	Moist to dry open woods
Tree	Alnus rubra	Moist to wet open woods, stream banks
Tree	Amalanchier alnifolia	Forest openings
Tree	Arbutus menziesii	Dry forest, sun
Tree	Cornus nuttallii	Dry forest, sun
Tree	Crataegus douglasii	Moist open woods
Tree	Fraxinus latifolia	Moist to wet open woods, stream banks
Tree	Oemlaria (Osmaronia) cerasiformis	Forest openings and shade
Tree	Pinus contorta	Highly adaptable, open woods
Tree	Pinus monticola	Moist to dry open slopes
Tree	Populus tricocarpa	Moist to wet open woods, stream banks
Tree	Prunus emarginata	Moist forest, forest openings, stream banks
Tree	Pseudotsuga menziesii	Dry forest, sun
Tree	Rhamnus purshiana	Dry forest, shade
Tree	Salix scouleriana	Open forests, stream banks, edges
Tree	Taxus brevifolis	Moist forest, shade
Tree	Thuja plicata	Moist to wet forest, shade
Tree	Tsuga heterophylla	Dry to moist forest, shade
Shrub	Acer circinatum	Wet to dry forest, shade and openings
Shrub	Amalanchier alnifolia	Forest openings
Shrub	Arctostaphylos uva-ursi	Sandy dry forests and openings
Shrub	Berberis (Mahonia) aquifolium	Dry forest openings
Shrub	Berberis (Mahonia) nervosa	Forest shade
Shrub	Cornus stolonifera (sericea)	Stream banks, open areas
Shrub	Corylus cornuta	Moist to dry forest, sun or shade
Shrub	Gaultheria shallon	Dry forest, shade
Shrub	Holodiscus discolor	Dry forest openings
Shrub	Lonicera ciliosa	Forests and thickets
Shrub	Lonicera involucrata	Wet areas
Shrub	Oemlaria (Osmaronia) cerasiformis	Forest openings and shade
Shrub	Philadelphus lewisii	Open dry forests
Shrub	Ribes bracteosum	Moist to wet areas
Shrub	Ribes lacustre	Moist to dry forest, stream banks
Shrub	Ribes sanguineum	Dry open sites, disturbance areas
Shrub	Rosa gynmocarpa	Forest openings
Shrub	Rubus leucodermis	Disturbed sites, open forest
Shrub	Rubus parvifolius	Moist forest openings
Shrub	Rubus spectabilis	Wet areas, forest openings
Shrub	Rubus ursinus	Disturbed sites, dry open forests

Shrub	Sambucus racemosa	Dry forest shade or openings
Shrub	Spiraea douglasii	Stream banks, wet meadows
Shrub	Symphoricarpos albus	Dry forest openings
Shrub	Taxus brevifolis	Moist forest, shade
Shrub	Typha latifolia	Wet lands, slow-flowing or quiet water
Shrub	Vaccinium ovatum	Forest shade
Shrub	Vaccinium parvifolium	Moist forest, on stumps and nurse logs
Herb	Anaphalis margaritacea	Open forests, clearings, rocky soil
Herb	Asarum caudatum	Moist forest, shade
Herb	Caryx deweyana	Clearings, stream banks
Herb	Caryx obnupta	Wet forest openings, stream banks
Herb	Circaea alpina	Moist forest, flood plains, stream banks
Herb	Claytonia (Montia) sibirica	Moist, shade, meadows, stream banks
Herb	Dicentra formosa	Forest shade
Herb	Elymus glaucus	Open forests, dry to moist, clearings
Herb	Epilobium ciliatum	Moist meadows, disturbed sites
Herb	Epilobium ssp. watsonii	Moist meadows, disturbed sites
Herb	Equisetum telmateia	Moist to wet, stream banks, standing water
Herb	Galium Aparine	Moist fields, clearings, open forests
Herb	Geum macrophyllum	Open areas, open forests
Herb	Lactuca tatarica ssp. pulchella	Moist meadows and thickets
Herb	Lemna trisulca	Quiet streams, standing water
Herb	Nemophila parviflora	Shaded forests
Herb	Prunella vulgaris ssp. lanceolata	Moist clearings, fields
Herb	Ranunculus uncinatus	Moist forests, shade, meadows stream banks
Herb	Scirpus microcarpus	Swamps, stream banks, wet ditches
Herb	Tellima grandiflora	Moist forests, stream banks
Herb	Tolmiea menziesii	Moist forests, stream banks
Herb	Trientalis borealis	Bogs, swamps, boggy forest, wet thickets
Herb	Trillium ovatum	Moist to wet woods, stream banks, shade
Herb	Urtica dioica	Meadows, stream banks, open forest
Herb	Veronica americana	Muddy shores, shallow water, wet ditches
Herb	Veronica serpyllifolia var. humifusa	Moist meadows, stream banks, clearings
Herb	Vicia nigricans ssp. gigantea	Disturbed sites, openings, edges
Herb	Viola sempervirens	Moist forests
Fern	Adianthum pedatum	Moist, shaded areas
Fern	Athyrium filix-femina	Moist to wet forests, openings and stream banks
Fern	Azolla filiculoides	Shallow ponds and moist soil
Fern	Blechnum spicant	Moist to wet forests, stream banks
Fern	Dryopteris expansa	Moist forests and openings
Fern	Plagiomnium insigne	Moist forest, shade, open areas
Fern	Polypodium glycrrhiza	Wet mossy ground, logs, tree trunks and branches
Fern	Polystichum munitum	Moist forest
Fern	Pteridium aquilinum	Meadows, dry to wet forests, lake shores

Plants by Common Name

Type	Common name	Habitat
Trees	Bigleaf maple	Moist to dry open woods
Trees	Black cottonwood	Moist to wet open woods, stream banks
Trees	Black hawthorn	Moist open woods
Trees	Cascara	Dry forest, shade
Trees	Cherry, bitter	Moist forest, forest openings, stream banks
Trees	Dogwood, pacific	Dry forest, sun
Trees	Douglass fir	Dry forest, sun
Trees	Indian Plum	Forest openings and shade
Trees	Madrone, pacific	Dry forest, sun
Trees	Oregon Ash	Moist to wet open woods, stream banks
Trees	Red alder	Moist to wet open woods, stream banks
Trees	Scouler's willow	Open forests, stream banks, edges
Trees	Shore pine	Highly adaptable, open woods
Trees	Vine maple	Wet to dry forest shade and openings
Trees	Western hemlock	Dry to moist forest, shade
Trees	Western red cedar	Moist to wet forest, shade
Trees	Western serviceberry	Forest openings
Trees	Western white pine	Moist to dry open slopes
Trees	Yew, western	Moist forest, shade
Shrubs	Blue currant	Moist to wet areas
Shrubs	Cattail, common	Wet lands, slow-flowing or quiet water
Shrubs	Evergreen huckleberry	Forest shade
Shrubs	Gooseberry, black swamp	Moist to dry forest, stream banks
Shrubs	Hardhack	Stream banks, wet meadows
Shrubs	Hazelnut	Moist to dry forest, sun or shade
Shrubs	Indian plum	Forest openings and shade
Shrubs	Kinniknnick	Sandy dry forests and openings
Shrubs	Maple, Vine	Wet to dry forest, shade and openings
Shrubs	Mock orange, wild	Open dry forests
Shrubs	Ocean spray	Dry forest openings
Shrubs	Orange honeysuckle	Woods and thickets
Shrubs	Oregon Grape	Dry forest openings
Shrubs	Oregon Grape, low	Forest shade
Shrubs	Red elderberry	Dry forest shade or openings
Shrubs	Red huckleberry	Moist forest, on stumps and nurse logs
Shrubs	Red osier dogwood	Stream banks, open areas
Shrubs	Redflower currant	Dry open sites, disturbance areas
Shrubs	Salal	Dry forest, shade
Shrubs	Salmonberry	Wet areas, forest openings
Shrubs	Snowberry	Dry forest openings
Shrubs	Thimbleberry	Moist forest openings
Shrubs	Trailing blackberry	Disturbed sites, dry open forests

Shrubs	Twinberry, black	Wet areas
Shrubs	Western blackcap raspberry	Disturbed sites, open forest
Shrubs	Western serviceberry	Forest openings
Shrubs	Wild rose	Forest openings
Shrubs	Yew, western	Moist forest, shade
Herbs	American heal all	Moist clearings, fields
Herbs	Bigleaf avens	Open areas, open forests
Herbs	Blue lettuce	Moist meadows and thickets
Herbs	Brooklime	Muddy shores, shallow water, wet ditches
Herbs	Candyflower	Moist, shade, meadows, stream banks
Herbs	Dewey's sedge	Clearings, stream banks
Herbs	Enchanter's Nightshade	Moist forest, flood plains, stream banks
Herbs	Fringecup	Moist forests, stream banks
Herbs	Giant horsetail	Moist to wet, stream banks, standing water
Herbs	Giant vetch	Disturbed sites, openings, edges
Herbs	Goosegrass	Moist fields, clearings, open forests
Herbs	Little buttercup	Moist forests, shade, meadows stream banks
Herbs	Pearly everlasting	Open forests, clearings, rocky soil
Herbs	Piggy-back plant	Moist forests, stream banks
Herbs	Purple-leaved willowherb	Moist meadows, disturbed sites
Herbs	Slough sedge	Wet forest openings, stream banks
Herbs	Smallfruited bulrush	Swamps, stream banks, wet ditches
Herbs	Spreading speedwell	Moist meadows, stream banks, clearings
Herbs	Star duckweek	Quiet streams, standing water
Herbs	Starflower	Bogs, swamps, boggy forest, wet thickets
Herbs	Stinging nettle	Meadows, stream banks, open forest
Herbs	Violet, trailing yellow	Moist forests
Herbs	Western bleeding-heart	Forest shade
Herbs	Western trillium	Moist to wet woods, stream banks, shade
Herbs	Western wild ginger	Moist forest, shade
Herbs	Western wild-rye	Open forests, dry to moist, clearings
Herbs	Willowherb	Moist meadows, disturbed sites
Herbs	Wood Nymph	Shaded forests
Ferns	Bracken fern	Meadows, dry to wet forests, lake shores
Ferns	Coastal Leafy Moss	Moist forest, shade, open areas
Ferns	Deer fern	Moist to wet forests, stream banks
Ferns	Duckweed fern	Shallow ponds and moist soil
Ferns	Lady fern	Moist to wet forests, openings and stream banks
Ferns	Licorice fern	Wet mossy ground, logs, tree trunks and branches
Ferns	Northern buckler fern	Moist forests and openings
Ferns	Sword fern	Moist forest
Ferns	Western maidenhair	Moist, shaded areas

Appendix-7. Information on Specific Invasives and Their Control.

General Information on Invasive Plants

Invasive Plant Species

An invasive plant species is one that can spread rapidly by seed, rhizomes, or stolons. Invasive plants tend to form monocultures, which do not allow diverse plant communities to survive. Occasionally native plants can become invasive, usually when an ecosystem experiences a serious disturbance. Most often invasive plants are non-native and tend to displace native plant species.

Since non-native, invasive plants did not evolve in the Puget trough area, they may experience ecological release. Ecological release occurs when a plant or animal species is introduced to an area that does not impose the same type of population control on the species as in the plant's native ecosystem. Herbivores that feed on a particular plant species and diseases that attack the species may not be present in the new ecosystem. Harsh environmental conditions that normally limit the growth of a particular plant species may also be absent. Most invasive species thrive in disturbed, sunny areas and have what ecologists call an r-selection life history (Begon, et.al. 1996). Plants with an r-selection life history produce many propagules and can rapidly increase in population. Human disturbance often creates conditions suitable to such shade intolerant invasive species. Other shade tolerant invasive species are capable of invading even forested and undisturbed sites.

One common type of interaction between native and invasive vegetation is competition. In any given site there is a limited pool of resources available for the growth and maintenance of individual plants. Invasive plants are usually better at obtaining these resources in direct, exploitative interactions with native plants. Resources such as light access, water and nutrients are monopolized by the invasive plant species. Competition for seed distributors and pollinators can affect native plant populations. Invasive plants can work in mutualistic associations with non-native animals in such a way as to increase both populations in a reciprocal interaction (Begon, et.al. 1996). Non-native animals that feed on an invasive plant often spread the propagules of that plant after ingestion. This in turn makes the environment increasingly favorable for the non-native animal species since more invasive plants provide more food for the non-native animal species. In this way the two species can work together to invade an ecosystem. This mutualistic association can rapidly result in the displacement of native animal species from an area as the habitat increasingly favors non-native animal survival. Even non-native fungi and other microorganisms may find favorable habitat in invasive plant dominated zones. Mycorrhizal fungi, or fungi associated with plant roots, are often host specific. When an invasive plant species comes to dominate an area it is also likely that the soil ecosystem will be significantly altered (Killham 1996). This in turn can limit the ability of an ecosystem to recover to a natural state.

Most of the species of invasive plants found during the 2000-2001 vegetation survey are shade intolerant. As would be expected, these invasive species are found in the open areas in greatest numbers and in smaller numbers in the open deciduous forest areas.

Other invasive species are capable of invading shaded and undisturbed sites. Even though there are less species of shade tolerant invasive species present at Camp Long they undoubtedly pose the most significant threat to the native character of Camp Long vegetation. These species are capable of rapidly invading the forested areas that make up most of Camp Long vegetation.

Horsechestnut tree (Aesculus hippocastanum)

Horsechestnut trees (*Aesculus hippocastanum*) made up 9.9% of the total trees found in sample plots during the 2000-2001 survey at Camp Long. In highly invaded areas **(Zones 5, 6, 10, 12, 16 and 17)** horsechestnut trees were found to make up between 18% and 43% of the total trees.

The horsechestnut tree is native to uninhabited mountainous areas of Greece and Albania. This tree was introduced to the United States as an ornamental plant. It escaped cultivation early in the 20th century and has become naturalized in parts of the eastern United States. More recently, populations have begun to invade many areas along the West Coast of the United States. It can not be known how this species first arrived in Camp Long. Large groves of this species were planted at the adjacent West Seattle Golf Course. While the golf course may have not provided the original seed source for Camp Long, it undoubtedly provides seed at the present. This tree grows rapidly and can reach 100 feet at maturity, with a spread of over 70 feet. Horsechestnut trees grow best in full sun, but can also thrive in partial shade. The fruit is a spiny round capsule with three cells. Each cell may bear a single seed. Individual trees can begin to bear fruit after 8 years. A mature horsechestnut tree can produce hundreds of capsules each year. In the autumn, these capsules split open to release seeds. The cool, wet winter climate that Camp Long experiences is ideal for maintaining viability of horsechestnut seeds. Research has shown that storing horsechestnut seeds for up to 6 months at a low temperature (32-50 °F) facilitates dormancy loss and germination at low temperatures (Pritchard, et.al. 1999). This finding implies that in particularly wet, cold years horsechestnut seeds may begin growth long before deciduous trees leaf out. This is because most deciduous trees break dormancy in response to an increase in ambient temperatures.

A mutualistic association with the eastern gray squirrel (*Sciurus carolinensis*) also facilitates the spread of this invasive tree. Eastern gray squirrels feed primarily on nuts and instinctively bury them (Link 1999). This behavior by the eastern gray squirrel prevents desiccation of seeds and allows horsechestnut seeds to take root with ease after germination. Native rodents may feed on horsechestnut seeds in some measure, but this is not a primary food source for them as they have evolved in the absence of horsechestnut trees.

English Ivy (*Hedera helix*)

During the 2000-2001 survey of Camp Long, English ivy (*Hedera helix*) was found to cover an average of 4.4% of the ground in sample plots. In highly invaded areas **(Zones 2, 4, 10, 17)** English ivy was found to cover between 7.5% to 20.6% of the ground.

English ivy (*Hedera helix*) is one of the most common invasive plants in western Washington. It is also one of the most common invasive plant species in Seattle's public parks. This species is native to Europe and probably was introduced to the United States as an ornamental plant.

English Ivy is very tolerant of even dense shade. It prefers dry, upland areas and may have trouble invading wetlands (Thomas 1998). This plant has two distinct phases of its lifecycle. In the juvenile growth phase this species grows as a vine. In the adult phase, it becomes woody and grows in shrub form.

English ivy is highly aggressive and tends to form monocultures. It can propagate both from seeds and from vegetative parts. English ivy often grows up tree trunks, weighing down branches and rooting into the tree. The leaves contain toxic compounds such as Saponins and Cyanogenic glycosides, which reduce or eliminate herbivory by animals (Barnea, et.al. 1993). Mature plants form berry-like drupes that turn black when mature each contain 2-5 seeds. Drupes are borne in globose umbels starting in late September (A mature English ivy plant can produce thousands of seeds each year). These fleshy fruits do not contain toxic compounds and are readily consumed by birds. (Barnea, et.al. 1993). Birds later disperse seeds after they pass through the bird's gut unharmed. It is this mutualistic interaction with birds and the unique adaptations of this plant that causes English ivy to be so invasive.

Himalayan blackberry (*Rubus discolor*)

Himalayan blackberry (*Rubus discolor*) was found to cover an average of 14.3% of the ground in plots, during the 2000-2001 survey of Camp Long. In highly invaded areas **(Zones 2, 3, 10, 13)** Himalayan blackberry was found to cover between 9.3% and 60% of the ground.

Himalayan blackberry (Rubus discolor) is an invasive species that was introduced from Western Europe, not the Himalayan region. This species had naturalized along the West Coast of the United States by 1945. Himalayan blackberry is a robust, semi-evergreen shrub that tends to form thickets. Individual stems can grow to 10 feet tall and ground-trailing stems can reach over 20 feet long. Stems are armed with prickles that are up to ½ inch long. Himalayan blackberry thickets form along forest edges, in grasslands, and in open deciduous forests, and other low nutrient, exposed areas. Black, round, succulent fruits ripen in the late summer and fall. This aggressive invader can reproduce by seeds, stems that touch the ground, pieces of stem or root and from root sprouts. A Himalayan blackberry can produce 7,000 to 13,000 seeds per square meter every year. Birds, mammals and moving water can spread these seeds. Seeds are small and photodormant. Seeds can remain dormant and viable for years. Individual canes can grow 21 feet in a year and a single cane can form a thicket 15 feet in diameter in two years (tncweeds.ucdavis.edu). This plant species does not survive well in the dense shade of conifer forests. Dense shade or burial will inhibit the germination of these photodormant seeds.

English holly (Ilex aquifolium)

English holly (*Ilex aquifolium*) was found to cover an average of 2.3% of the ground in plots, during the 2000-2001 survey of Camp Long. In highly invaded areas **(Zones 15, 18)** English holly was found to cover between 6.3% and 10.8% of the ground.

English holly is an evergreen tree that is native to Europe and North Africa. This tree can grow to a height of over 40 feet with a spread of 15 feet or more, with an erect branching habit. Female plants produce clumps of bright red berries in the autumn. Both male and female plants have to be present for pollination and berry production. English holly plants are shade tolerant, but prefer full sun. This species prefers to inhabit well-drained soil with moderate to high organic matter content. The leaves of this plant are thick, waxy and spiny. The leaves and stems contain toxic compounds including Cyanogenic glycosides and Saponins (Barnea 1993). This leaf and stem type is highly resistant to herbivory. Berries are a favorite food source for many birds. The seeds, contained within the berries, remain viable after passing through the gut of birds. This mutualistic association allows this plant species to quickly spread into areas that will support its growth. Simply cutting back this tree to the ground will result in vigorous sprouting from the base.

White Poplar (*Populus alba*)

White poplar (*Populus alba*) trees have invaded portions of **zone 18** at Camp Long. This tree is native to the region of south central Europe through western Siberia. It has become extensively naturalized in the United States following its introduction in 1784. White poplar can grow to 90 feet in height with a broad, rounded crown. Only female plants bear seeds, but this is not their only means of self-propagation. This tree is adapted to colonizing large areas by root sprouts. White poplars excel at drawing water from the soil environment through extensive root systems. As a result soil dries out, threatening the survival of other plant species living within the root zone.

Poplar trees have exceedingly brittle wood and can become a hazard if located near human use areas. The noted horticulturist Michael A. Dirr said of this plant "I hesitate to recommend this tree for anyone since it becomes a nuisance and liability after a time; wood is brittle, roots will clog drain tiles, sewers and water channels; avoid this pest." (Dirr 1998). Simply girdling or cutting down an individual tree will not stop this pervasive organism. Roots can continue to sprout for an indeterminate period of time, living on stored carbohydrates. Other species of (*Populus sp.*) such as Lombardy poplar (*Populus nigra* 'Italica') can exhibit attributes similar to white poplar.

English Laurel (*Prunus laurocerasus*)

English laurel (*Prunus laurocerasus*) was found to cover an average of only 0.4% of the ground in plots, during the 2000-2001 survey. This plant species should be closely monitored due to its rapid growth and ability to reach great size.

English laurel (*Prunus laurocerasus*) is native to southeastern Europe and Asia Minor. It was introduced to the United States in 1576. This evergreen tree is commonly used to form ornamental hedges. English laurel plants grow rapidly and can reach a height of 30 feet tall and over 30 feet wide. This plant prefers a partially shady environment and is an

aggressive competitor with other plants. Leaves contain Cyanogenic compounds that reduce or eliminate herbivory. The fruit is a round purple-black drupe that resembles the fruit of a close relative, the cherry tree. These fruits are consumed by birds and may be spread for short distances. Secondary growth from root sprouts is also common for this species. Cutting back this shrub to the ground will result in vigorous sprouting of new shoots.

Japanese Knotweed (*Polygonum cuspidatum*)

Japanese knotweed (*Polygonum cuspidatum*) does not cover large portions of Camp Long at this time. Due to the extreme aggressiveness of this plant species it should be closely monitored. A large population of Japanese knotweed is thriving in the northwestern corner of **zone 7**.

Japanese knotweed (*Polygonum cuspidatum*) is a native of Japan. Japanese knotweed is a deciduous perennial plant that has escaped from cultivation. It tends toward the formation of large clumps up to 8 feet tall and much wider. Japanese knotweed is a very aggressive invader and crowds out any other existing vegetation, other than large trees. Established colonies are very difficult to control due to a dense mat of rhizomes (roots) that can be over 15 feet long each. Self-propagation can occur by seeds, rhizome sprouts or the vegetative reproduction of small fragments of stem or rhizome. This species prefers to grow in fairly open, moist areas such as riverbanks. The presence of Japanese knotweed at Camp Long poses a serious threat to the native character of Camp Long, particularly in the northwest corner of zone 7 and around the pond creek.

Horsechestnut Tree (*Aesculus hippocastanum*)

Horsechestnut trees are best controlled in the late spring to summer. Adult trees set fruit in the summer. These fruits mature in September to October. To avoid successful seed dissemination is important to control seeds before this time.

- Seedling trees can be mechanically removed with ease. Trees that are under 8 years of age should not be capable of fruiting and are a lower priority for dispersal. This tree grows rapidly and even sapling trees can compete with native vegetation.
- Trees up to 4" DBH can be cut horizontally at ground level with loppers or a hand saw. If these continue to re-sprout it may be necessary to paint the tree stem with a systemic herbicide such as glyphosate or triclopyr. Consult with DPR staff before using any herbicides. **Only non-persistent herbicide should be used.**
- Trees with >4" DBH near paths (closer to the path than the height of the tree) should **only be removed by a professional arborist**. These trees should be cut horizontally at ground level. A 25% solution of glyphosate (ie. Roundup) or triclopyr (ie. Garlon) should immediately be applied to the cut stump, making sure to cover the outer 20% of the stump.
- Trees with >4" DBH, **which are further away from the path than the height of the tree,** should be girdled. Girdling a tree is an effective way to kill a tree that avoids the use of herbicides. To girdle a large tree, use a hatchet to cut through the bark encircling the base of a tree, approximately 6 inches above ground level. Make sure that the cut goes well below the bark of the tree. If substantial re-sprouting occurs it may be necessary to re-girdle the tree below the original cut and apply a systemic herbicide to the new cut. The best time to do this procedure is in the summer before the tree has seeded. Trees will also have minimal carbohydrate stores in roots during the summer time.
- **Treatments to trees should be recorded and monitored for effectiveness.**

English Ivy (*Hedera helix*)

Immature ivy plants can be controlled at any time of the year. Adult plants, with woody stems, are best controlled in the late summer before seed dissemination.

- A waxy layer on ivy leaves prevents the absorption of water-soluble herbicides. Herbicides are only effective if the stems of the plant are first cut by mowing. Even after mowing, control could require periodic reapplication of herbicides.
- Mechanical removal is the most effective method of control.
- It is important to remove entire root systems when pulling out plants.
- Pulling slowly on thick vines or following them to the base and digging out roots is an effective way to remove ivy. Pulling on several vines simultaneously will most likely result in breakage of vines and intact root systems.
- Ivy can re-sprout from roots, it can vegetatively reproduce from leaves and stems and it can grow from seeds. When pulling ivy it is essential to remove all parts of the plant.

- Twisting ivy vines when pulling can reduce the tendency of vines to fracture.
- When pulling ivy around native plants it may be preferable to cut a hand full of vine at a time to the ground. Then it is possible to go back and remove the root system.
- When pulling ivy on a hillside, it is easier to move back and forth along the hillside rather then going up and down. For steep areas it is best to work from the down hill side to the top.
- Making several passes over an area is ideal. The first pass can focus on clearing away the bulk of the ivy. A second pass can focus on smaller shoot and root removal. Loppers may be effective for the first pass in ivy monocultures.
- Screwdrivers and lopper blades can be effective in removing ivy stems that are growing up trees.
- **When pulling ivy it important to minimize disturbance to shoots and roots of desirable native plant species.**
- Carefully tie-up fern fronds or woody plant branches to avoid breakage, before ivy removal in areas with high native plant populations.
- The only way to truly remove ivy is to be extremely systematic.
- Records should be kept about different techniques used to control ivy in park areas. These areas should also be monitored to determine the effectiveness of particular treatments.
- **Periodically updated information on English ivy (*Hedera helix*) removal can be found at:**
- **www.noivyleague.com**
- **www.invasive.org**

Himalayan Blackberry (*Rubus discolor*)

Adult Himalayan blackberry (*Rubus discolor*) are best controlled in the summer time. This can result in reduced fruit/seed set and reduced seed bank germination.

- Use of herbicides may cause lateral root sprouting and would involve periodic reapplication. For this reason the use of herbicides is impractical in controlling this plant.
- Mechanical removal is the best way to remove adult plants. Mowing large monocultures to the ground and raking up the stems is a good technique. Individuals with thick gloves and loppers are needed for control of this plant in areas shared with native plants. This still leaves a large seed bank available for re-growth.
- To avoid seed germination after mowing it is necessary to shade a site. This can be done with a thick (4 inch) layer of mulch applied continuously to a surface. Planting a mowed site with fast growing shrubs is another way to introduce shade and prevent germination of blackberry seeds.

English Holly (*Ilex aquifolium*)

- For small plants, mechanical removal is possible by simply pulling plants out of the ground. This is impractical with larger plants due to their deep lateral root systems.
- Smaller plants can be dug out with a shovel or pried out using a weed wrench.

- Attempting to girdle this plant will result in result in vigorous basal sprouting.
- Large plants should be cut horizontally at ground level. A 25% solution of glyphosate (ie. Roundup) or triclopyr (ie. Garlon) should immediately be applied to the cut stump, making sure to cover the outer 20% of the stump.
- Cut stumps should be monitored for re-growth. Shoots growing back should be continuously discouraged with cutting.

English Laurel (*Prunus laurocerasus*)

- Small plants can be easily pulled from the ground.
- Larger plants can often be dug out of the ground.
- Very large plants may have substantial root systems that make them difficult to dig out. These plants should be cut to the ground. A 25% solution of glyphosate (ie. Roundup) or triclopyr (ie. Garlon) should immediately be applied to the cut stump, making sure to cover the outer 20% of the stump.
- In sunny areas stumps should be monitored for re-growth. In shaded areas cutting back re-growth one to two times should be enough to exhaust the stump.

Non-native Poplar Trees (*Populus sp.*)

Before removing any poplar trees (*Populus sp.*) it is important to correctly identify the tree to the species level. There are 35 species of poplar tree worldwide and at least three species present at Camp Long. **One species, the black cottonwood (*Populus balsamifera ssp. trichocarpa*) is a native plant and should not be removed.** Other species such as the white poplar (*Populus alba*) should be removed. The best time to remove a large poplar tree is in the late summer to early fall.

- Removal of large poplar trees should **only be performed by a professional arborist.**
- Non-native poplar trees should be cut off horizontally at ground level. A 25% solution of glyphosate (ie. Roundup) or triclopyr (ie. Garlon) should immediately be applied to the cut stump, making sure to cover the outer 20% of the stump. If this is done in the late summer to early fall the plant will internalize the herbicide into roots.
- Lateral roots may continue to sprout for some time, even if the stump is treated with herbicide. For this reason it may be necessary to dig up major lateral roots, that are sprouting.
- Never treat root sprouts with a systemic herbicide without mechanically removing the tree whose roots are producing the sprouts. Systemic herbicides applied to root sprouts can travel back to the parent plant, making tree failure likely. This can create a hazardous situation.
- Remove or shred logs and roots of this plant. Branches and roots are capable of re-sprouting and forming new trees if left on the ground.

Japanese Knotweed (*Polygonum cuspidatum*)

- Remove entire plants, including all roots and runners, by digging carefully around patches. Any roots that are not removed will re-sprout.
- Dispose of all plant parts by disposing in sealed trash bags, or other means that will not allow the plant to re-sprout.

Control can also be achieved with the use of herbicides. To do this it is first necessary to cut off stems, a few inches above ground level. Then pour a 25% solution of glyphosate (ie. Roundup) or triclopyr (ie. Garlon) into the hollow stems. Even after such treatment it will be necessary to monitor for new seedlings and resprouts. This method should only be used in the plant is growing near desirable plant species.

Appendix - 8. Plants Recommended for Camp Long Park.

This list is not a comprehensive list of all native plants that may grow well at Camp Long Park. This list is only a starting point for plants that are suited to growth within the climactic limitations of the Puget trough lowlands. Plants are grouped by preferred site and growth form. Refer to Appendix-11 before installing any trees or shrubs.

Preferred Site	Form	Scientific Name	Common Name
Dappled Shade	Fern	Woodwardia fimbriata	Chain fern
Dappled Shade	Herb	Achlys triphylla	Vanilla leaf
Dappled Shade	Herb	Aconitum columbianum	Monk's hood
Dappled Shade	Herb	Aquilegia formosa	Columbine
Dappled Shade	Herb	Arnica cordifolia	Arnica
Dappled Shade	Herb	Aruncus sylvester	Goat's beard
Dappled Shade	Herb	Asarum caudatum	Wild ginger
Dappled Shade	Herb	Dicentra formosa	Bleeding heart
Dappled Shade	Herb	Disporum sp.	Fairy bells
Dappled Shade	Herb	Erythronium oreganum	Fawn lily
Dappled Shade	Herb	Fragaria vesca	Strawberry
Dappled Shade	Herb	Heuchera micrantha	Alum root
Dappled Shade	Herb	Iris tenax	Iris
Dappled Shade	Herb	Lilum columbianum	Tiger lily
Dappled Shade	Herb	Maianthemum dilatatum	False lily-of-the-valley
Dappled Shade	Herb	Nothochelone nemorosa	Woodland penstemon
Dappled Shade	Herb	Oxalis oregona	Wood sorrel
Dappled Shade	Herb	Petasites frigidus	Coltsfoot
Dappled Shade	Herb	Smilacina racemosa	False Solomon's seal
Dappled Shade	Herb	Tellima grandiflora	Fringe-cup
Dappled Shade	Herb	Thalictrum sp.	Meadow rue
Dappled Shade	Herb	Tiarella trifoliata	Foam-flower
Dappled Shade	Herb	Tolmiea menziesii	Youth-on-age
Dappled Shade	Herb	Trientalis arctica	Star flower
Dappled Shade	Herb	Trillium ovatum	Western wake-robin
Dappled Shade	Small shrub	Cornus canadensis	Bunchberry
Dappled Shade	Small shrub	Gaultheria ovatifolia	Oregon wintergreen
Dappled Shade	Tall shrub	Linnaea borealis	Twinflower
Dappled Shade	Tall shrub	Oemleria cerasiformis	Indian plum
Dappled Shade	Tall shrub	Physocarpus capitatus	Ninebark
Dappled Shade	Tall shrub	Ribes lacustre	Swamp gooseberry
Dappled Shade	Tall shrub	Rosa gymnocarpa	Bald-hip rose
Dappled Shade	Tall shrub	Rosa nutkana	Nootka rose
Dappled Shade	Tall shrub	Rubus parvifolius	Thimbleberry
Dappled Shade	Tall shrub	Spiraea douglasii	Hardhack
Dappled Shade	Tall shrub	Symphoricarpos albus	Snowberry
Dappled Shade	Tall shrub	Vaccinium membranaceum	Black huckleberry

Dappled Shade	Tree	Cornus nuttallii	Western dogwood
Dappled Shade	Tree	Fraxinus latifolia	Oregon ash
Dappled Shade	Tree	Malus fusca	Pacific crabapple
Dappled Shade	Tree	Picea sitchensis	Sitka spruce
Dappled Shade	Tree	Rhamnus purshiana	Cascara
Dappled Shade	Tree	Salix hookeriana	Hooker willow
Dappled Shade	Tree	Salix scouleriana	Scouler willow
Dappled Shade	Vine	Lonicera ciliosa	Trumpet honeysuckle
Dry/Sun	Grasslike	Carex deweyana	Dewey's sedge
Dry/Sun	Grasslike	Festuca idahoensis var. idahoensis	Idaho fescue
Dry/Sun	Grasslike	Xerophyllum tenax	Bear-grass
Dry/Wet	Grasslike	Scirpus acutus	Hardstem bulrush
Shade	Small shrub	Berberis nervosa	Low Oregon grape
Shade	Tall shrub	Corylus cornuta	Hazelnut
Shade	Tall shrub	Gaultheria shallon	Salal
Shade	Tall shrub	Lonicera involucrata	Twinberry
Shade	Tall shrub	Rhododendron macrophyllum	Pacific rhododendron
Shade	Tall shrub	Rubus spectabilis	Salmon berry
Shade	Tall shrub	Vaccinium ovatum	Evergreen huckleberry
Shade	Tall shrub	Vaccinium parvifolium	Red huckleberry
Shade	Tree	Thuja plicata	Western red cedar
Shade	Tree	Tsuga heterophylla	Western hemlock
Shade/Sun	Fern	Polystichum munitum	Sword fern
Shade/Sun	Herb	Vancouveria hexandra	Inside-out flowr
Shade/Sun	Tall shrub	Acer circinatum	Vine maple
Shade/Sun	Tall shrub	Garrya elliptica	Silk-tassel bush
Shade/Sun	Tall shrub	Taxus brevifolia	Western yew
Sun	Small shrub	Arctostaphylos uva-ursi	Kinnickinnick
Sun	Small shrub	Pachistma myrsinites	Oregon box
Sun	Tall shrub	Amelanchier alnifolia	Serviceberry
Sun	Tall shrub	Berberis aquifolium	Oregon grape
Sun	Tall shrub	Holodiscus discolor	Oceanspray
Sun	Tall shrub	Philadelphus lewisii	Mock-orange
Sun	Tall shrub	Ribes sanguineum	Red flowering currant
Sun	Tall shrub	Sambucus cerulea	Blue elderberry
Sun	Tree	Arbutus menziesii	Pacific madrone
Sun	Tree	Betula papyrifera	Paper birch
Sun	Tree	Pseudotsuga menziesii	Douglas fir
Sun	Tree	Quercus garyana	Garry oak
Sun/Shade	Tree	Abies grandis	Grand fir
Wet/Sun	Grasslike	Carex lenticularis	Kellog's sedge
Wet/Sun	Grasslike	Carex mertensii	Merten's sedge
Wet/Sun	Grasslike	Carex obnupta	Slough sedge
Wet/Sun	Grasslike	Carex vesicaria var. major	Inflated sedge
Wet/Sun	Grasslike	Creeping spike-rush	Eleocharis palustris
Wet/Sun	Grasslike	Glyceria elata	Tall mangrass
Wet/Sun	Grasslike	Juncus effusus	Soft rush
Wet/Sun	Grasslike	Red fescue	Festuca rubra spp. littoralis
Wet/Sun	Grasslike	Scirpus microcarpus	Small-fruited bulrush

Appendix-9. Collection and Sowing of Seeds.

- Seed propagation is an inexpensive way to populate areas with native plants. Growing native plants from seed can also be a fun and educational experience for all participants. Propagation by seed also preserves the genetic diversity that enables plants to adapt to different microclimates and to self-regenerate.
- The source for seeds is of the greatest importance in how a seed will perform. This will determine the cold hardiness, growth rate, flowering time and many other characteristics. Seeds used at Camp Long should be from the park itself or from other similar areas of the Puget trough lowlands.
- It is very important to record the location that seeds were collected from as well as the genus and species of the plant.
- Fruits, which surround seeds, do not serve a useful purpose for human propagators. Fruits evolved to allow natural dispersal of seeds. Seeds should be cleaned before use in propagation to insure maximum viability of seeds. Seeds can be removed from fruit and dried by a number of methods. Propagation books should be consulted for specific species.
- Seeds should be stored for as little time as possible to maximize viability. Cool, fairly dry conditions are the best for seed storage.
- Some seeds will require pre-treatment to maximize viability. The pre-treatment required by a plant species' seed is most often provided by the natural environment in which it evolved. To maximize viability it may be necessary to imitate these conditions. Two common types of pre-treatment needed by seeds are stratification and scarification.
- Stratification involves exposing seeds to heat or soaking in cold water for extended periods of time.
- Scarification involves mechanically or chemically breaking the hard exterior coat of a seed in order to facilitate the penetration of water and air.

For information on propagation see: (Hartmann, et.al. 1997)
For information on propagation of NW native plants see: (Rose, et.al. 1984)

Appendix-10. Native Seed Source Nurseries

- **Abundant Life Seed Foundation**
  http://csf.colorado.edu/perma/abundant/
  PO Box 772
  Port Townsend, WA 98368-0772
  360-385-5660 FAX 360-385-7455
  abundant@olypen.com
  Tessa Gowans (Mail Order, Retail)
- **Frosty Hollow Ecological Restoration**
  PO Box 53
  Langley, WA 98260-0053
  360-579-2332
  Marianne Edain, Steve Erickson
  (Mailorder, Wholesale)
- **Inside Passage**
  PO Box 639
  Port Townsend, WA 98368-0639
  360-385-6114 FAX 360-385-5760
  inspass@whidbey.net
  Forest Shomer
  (Wholesale)
- **Judd Creek Nursery**
  20929 111th Ave SW
  Vashon, WA 98070-6467
  206-463-9641
  jb4juddcreek@webtv.net
  Vicki and John Brown
  (Wholesale)
- **Methow Natives**
  http://www.methow.com/~mnatives/
  19 Aspen Lane
  Winthrop, WA 98862
  509-996-3562
  methownatives@methow.com
  Rob Crandall and Heidi Steckler

- **Native Seed Foundation**
  Star Route
  Moyie Springs, ID 83845
  208-267-7938 FAX 208-267-3265
  David Ronniger
  (Mail Order, Wholesale)
- **Northplan/Mountain Seed**
  PO Box 9107
  Moscow, ID 83843-1607
  208-882-8040 FAX 208-882-7446
  Loring Jones
  (Mail Order, Retail, Wholesale)
- **Rainier, Inc.**
  1404 4th Street
  Davenport, WA 99122
  800-828-8873 FAX 509-725-7015
  Karen Krych
  (Mail Order, Retail, Wholesale)
- **Redwood City Seed Co.**
  Box 361
  Redwood City, CA 94064
  (415) 325-7333
  Craig G. Dremann
  (Native Grass Seeds)

Appendix-11. Planting Method Details for Trees and Shrubs.

The best time to plant trees in the Puget trough is in the late fall. Tree roots do not go dormant during the winter months. The transpiration rate for deciduous plants is at a minimum after leaf drop. Water loss by transpiration is also minimized for all plants by cool wet conditions. Planting in the late fall will result in maximum root growth by the next year's growing season. Some tree species are capable of living for hundreds of years, so it is worth a little extra time to make sure a tree is planted properly!

Trees are available for planting in containers, balled and burlapped (B&B) or bare rooted. There are advantages and disadvantages to each type of plant. Bare rooted and B&B plants can be purchased in larger sizes. Since bare rooted and B&B plants have 90%-95% of their roots removed, they take more time to establish and begin growth. Container grown plants are only available in smaller sizes. They have intact root systems and take less time to establish. It is very important to watch out for circling roots. Improper planting technique is a major cause of failure in establishing new trees.

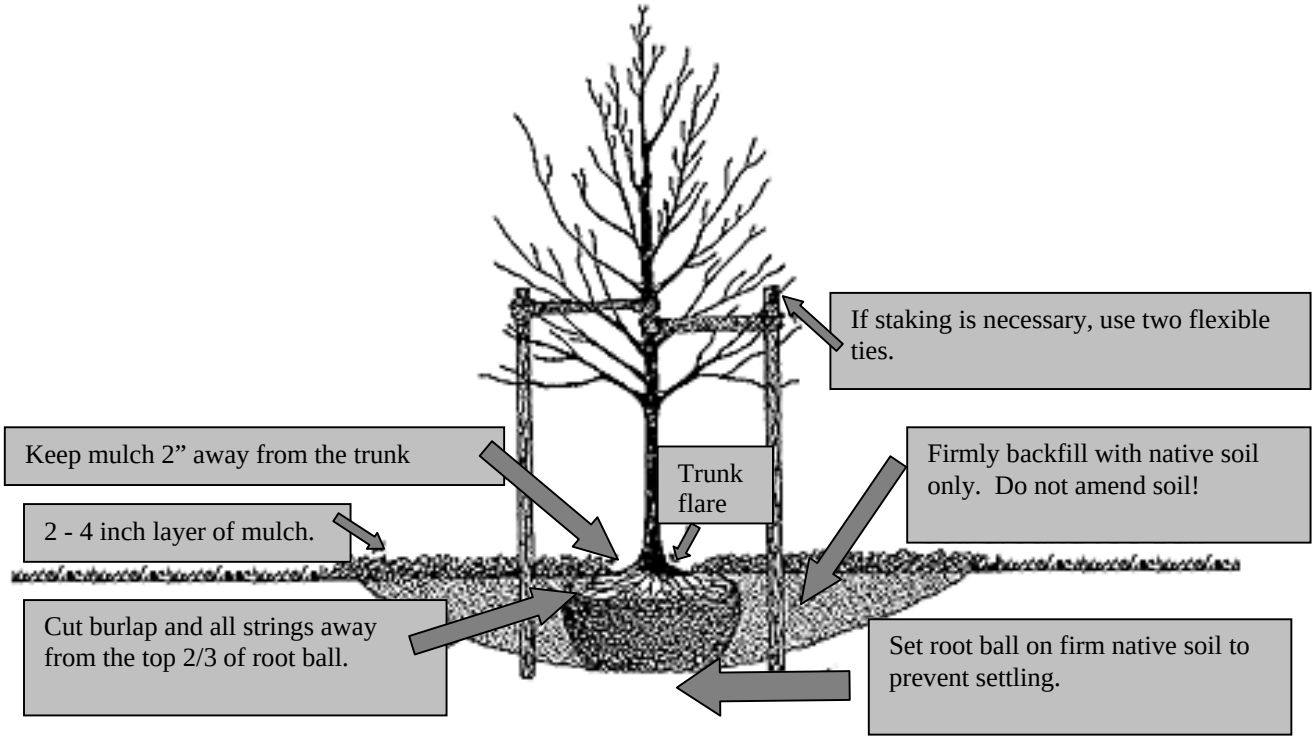
1. **Dig a shallow broad planting hole for the tree or shrub.**
    - Make the planting hole at least twice as wide as the root ball, but no deeper than the root ball. Making the hole wide will allow water and air infiltration into the area surrounding the root ball. This will encourage new root growth in to the surrounding soil.
    - Do not plant trees in saturated soils. This will destroy soil structure, which will prevent water and oxygen from reaching tree roots.
2. **Identify the trunk flare and root crown on a tree or shrub.**
    - The trunk flare is the region on the trunk where the trunk spreads into roots. The root crown is the uppermost portion where the root system connects to the tree trunk. The trunk flare must be visible after the tree has been planted. The root crown should be at or slightly above the surrounding soil level.
    - Be cautious of B&B plants. The soil level when the burlap is removed is probably not the proper level to plant at. Soil on the top of the ball should be carefully brushed away to reveal the trunk flare and root crown.
3. **Place the tree or shrub in the hole at the proper depth (SEE DIAGRAM).**
    - Measure the depth of the planting hole before placing a tree in it. Using a shovel handle to measure the hole should suffice. Make sure that when the tree is placed in the planting hole the root crown will not be buried.
    - Planting trees too deep will result in root suffocation and retarded growth or death for the tree. It is better to plant a tree too high than to plant it at or below the surrounding soil level.
    - Remove any wire baskets before placing a tree into a planting hole.
    - Lift the tree by the root ball into the planting hole (not by the trunk!).
    - Place bare root trees in the planting hole so that their roots spread out from the center.
    - Straighten the tree in the hole
4. **Remove burlap and cut circling roots.**

- For B&B trees it is necessary to remove the burlap. After the tree or shrub has been placed in the planting hole, at the proper depth it is time to remove the burlap. Be sure to cut all strings that are securing the burlap to the root ball. Once the tree is secure in the planting hole, cut off the top 2/3 of burlap with a very sharp blade. If this is not possible then roll down the burlap as far into the planting hole as possible.
- For container grown plants it will be necessary to score the sides and bottom of the root ball to loosen and separate roots. Plants that have been in containers for too long often develop circling roots. Circling roots are roots that grow away from a tree or shrub in a circling manner, rather than laterally away from the center. Circling roots will kill a tree as the tree matures if they are not removed. Circling roots should be cut off at the point where they begin to circle.

5. **Carefully backfill the planting hole.**
    - Backfill the planting hole with native soil only. Never amend a planting hole! Planting hole amendment can result in a tree growing circling roots. Planting hole amendment can also result in a tree settling. This will result in the same condition as if the tree had been planted too deep in the first place.
    - Gently, but firmly press in the soil around the base of the root ball. Watering after planting is ideal but not necessary.
6. **Apply 2-4 inches of mulch around the root ball.**
    - After successful planting it is time to apply 2-4 inches of mulch around the root ball. It is important not to bury the trunk flare in this procedure! Burying the trunk flare with mulch is as bad as planting it too deeply in the first place.
    - Mulching can be done with a variety of materials. If using fine mulches it is better to use only 2 inches of mulch. If using coarse mulch it is better to use 4 inches of mulch.
    - Mulching greatly improves the survival rate for newly planted trees.
    - Most trees will not need any staking. Trees that are not staked will develop stronger trunks and root systems. Staking should only be done if planting in very windy areas. If any trees are staked the stakes must be removed after one year to prevent stem girdling as the tree grows. If a tree is staked, make sure that the stakes are flexible and allow at least some movement of the tree.
7. **Watering the new tree of shrub for one year.**
    - Successful establishment will be greatly enhanced if a newly planted tree or shrub in given adequate water for the first year. New plants need to have a deep watering at least once a week. Too much watering can cause root rots and root suffocation. To little water will inhibit the ability of the plant to photosynthesize.

For more information consult: *(Harris, et.al. 1999)*

How to Properly Plant a Tree at Camp Long Park.



Appendix-12. Mulching

- Mulch can be defined as any material that is spread on the surface of the soil to protect plant roots from the effects of raindrops, soil crusting, freezing and evaporation.
- Compost can be defined as organic residues, or a mixture of organic residues and soil, that have been piled, moistened, and allowed to undergo biological decomposition.
- Mulches have many benefits for plants when applied properly. These benefits may vary depending on the type of mulch used. In general organic mulches include the following benefits.
    - Conservation of soil moisture.
    - Reduction of soil erosion and water loss.
    - Improvement of soil structure (ie. pore space and aggregation)
    - Reduction of soil compaction.
    - Moderation of soil temperatures.
    - Mulches can also prevent the spread of diseases.
- Coarse woody mulches (large wood chips) have the ability to reduce soil compaction from foot traffic and rainfall when at least 2 inches are applies.
- Coarse woody mulches should not be incorporated into soil. This can rob the soil of essential nutrients by inducing a microbial population explosion. Coarse woody mulches should only be applied to the soil surface.
- Application of mulch over 4 inches thick can inhibit soil aeration and may be harmful to plant roots.
- It is essential when applying mulch around a tree or shrub not to bury the tree trunk in mulch. Leave a minimum of 2 inches between mulch and the trunk of a tree.
- Even when coarse woody mulches obtained from diseased plants are used, there are no apparent ill affects to adult plants (Harris, et. al. 1999).
- Mulches of some plants that contain toxic chemicals should not be used as mulches particularly by bodies of water. This includes mulch from plants such as western red cedar (*Thuja plicata*) and coast redwood (*Sequoia sempervirens*). Allowing these mulches to compost in rainy conditions may allow toxic chemicals to leach out (Harris, et. al. 1999).
- Animal manure is sometimes used as mulch. Many weed seeds can pass through an animal's digestive tract without reducing, and sometimes increasing viability. Applying animal manure as mulch can spread weed seeds to an area, if the animals have been consuming weed seeds.
- Coarse woody mulches can often be obtained for free from City of Seattle tree crews or professional arborists.

There is little information in scientific literature on mulches. So to obtain an accurate picture of current thinking on mulches, three local experts were queried. Their responses follow.

Date: Tue, 14 Aug 2001 18:11:42 -0700
From: Chuck Henry <clh@u.washington.edu>
To: david william bergendorf <davidwb@u.washington.edu>
Subject: Re: A quick question

Define mulches - my definition is a surface application of C-rich material of > 1" depth. Purpose to reduce weed growth and retain soil moisture (i.e., compost is NOT normally a mulch unless it is improperly composted and N deficient). Maybe it even looks nice...

With that definition, no, I don't think it will generally spread disease. Best type follows my definition. Since my mulch is surface applied, it will generally not affect soil properties other than the secondary effects of moisture retention.

david william bergendorf wrote:
>
> I have been doing some research on mulches lately. To make a long
> story short there is a paucity of information in journals on mulch. So I
> am soliciting your expert opinion. Do you feel that mulch can (or is
> likely to) spread diseases to a landscape when applied. Is there a "best"
> type of mulch to apply to a landscape? Does the application of mulch
> really help decrease soil compaction, increase soil gas exchange, and
> facilitate microbial activity?
>
> Thank you very much for any opinions that you can offer on this subject.
>
> David Bergendorf
> davidwb@u.washington.edu
> 206-545-3586
> Box 354114
> The Center for Urban Horticulture
> 3501 Northeast 41st Street
> Seattle, WA 98105

Date: Thu, 16 Aug 2001 16:11:04 -0700 (PDT)
From: Robert Edmonds <bobe@u.washington.edu>
To: david william bergendorf <davidwb@u.washington.edu>
Subject: Re: A quick question

David:

I don't think the use of mulch will spread diseases. Some people have expressed concern to me that wood chips from a stump infected with Armillaria might spread this root disease. However, I think that Armillaria gets replaced pretty easily by other fungi. Also mulches may be beneficial if a site has Phytophthora root disease since walking on the mulch surface can't spread spores on boots or shoes like walking on bare soil.

Bob
****
Robert L. Edmonds, Associate Dean
College of Forest Resources
Box 352100
University of Washington
Seattle, WA 98195
Phone 206 685-0953
FAX 206 685-3091

On Tue, 14 Aug 2001, david william bergendorf wrote:

> I have been doing some research on mulches lately. To make a long
> story short there is a paucity of information in journals on mulch. So I
> am soliciting your expert opinion. Do you feel that mulch can (or is
> likely to) spread diseases to a landscape when applied. Is there a "best"
> type of mulch to apply to a landscape? Does the application of mulch
> really help decrease soil compaction, increase soil gas exchange, and
> facilitate microbial activity?
>
> Thank you very much for any opinions that you can offer on this subject.
>
> David Bergendorf
> davidwb@u.washington.edu

Date: Mon, 20 Aug 2001 18:01:30 -0700
From: Linda Chalker-Scott <lindacs@u.washington.edu>
To: david william bergendorf <davidwb@u.washington.edu>
Subject: RE: solicitation of your expert opinion

Hi David -

My opinion is the coarser the mulch the less likely it is to spread weed seeds. If compost is used as a mulch, it needs to be properly aged (i.e. heated) before it can be considered relatively weed free.

The question about disease is a good one. I have yet to see a tree infected by coarse wood chips, and often I'm sure wood chips carry harmful fungi and bacteria. Without a host, though, they shouldn't be a problem. So if armellaria-infected wood is chipped then it theoretically carries the disease but if the roots are healthy of the trees that are mulched it will be outcompeted by beneficials.

Does that help?

~%
Linda Chalker-Scott, Associate Professor
Environmental Horticulture
University of Washington
Box 354115
Seattle, WA 98195-4115

Phone: (206) 685-2595
FAX: (206) 685-2692
URL: http://faculty.washington.edu/lindacs/

-----Original Message-----
From: david william bergendorf [mailto:davidwb@u.washington.edu]
Sent: Monday, August 20, 2001 5:47 PM
To: lindacs@u.washington.edu
Subject: solicitation of your expert opinion

Linda, I was wondering if you could give me your expert opinion on wether different types of mulch applied to the surface of the soil can spread disease and or weed seeds.
Thanks,

David Bergendorf
davidwb@u.washington.edu

Appendix-13. Wildlife Potentially Inhabiting Camp Long, and Their Food Sources

This list is not intended to be a comprehensive list of all animals inhabiting Camp Long Park or their food preferences. It is hoped that this list will provide general guidelines to food source enhancement.

Marsupials:

***Common Opossum** (*Didelphis virginiana*)- Can consume rats, snakes. Mostly subsist on insects, fruit, carrion, nuts, grains, reptiles, birds, birds' eggs and snails.

Insectivores:

Dusky Shrew (*Sorex maonicolus*)- Eat insects, worms, larvae.
Pacific Mole (*Scapanus orarius*)- Eat burrowing insects and worms. Do not eat plants.
Shrew-mole (*Neutrotrichus gibbsii*)- Eat burrowing insects and worms. Do not eat plants.
Towsend's Mole (*Scapanus towsendii*)- Eat burrowing insects and worms. Do not eat plants.
Vagrant Shrew (*Sorex vagrans*)- Eat insects, worms, larvae.

Bats:

Big Brown Bat (*Eptesicus fuscus*)- Small beetles and night flying insects.
Hoary Bat (*Lasiurus cinereus*)- Night flying insects.
Little Brown Myotis (*Myotis lucifugus*)- Eat aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies
Silver-haired Bat (*Lasionycteris noctivagans*)- Eat primarily soft-bodied invertebrates.

Carnivores:

Coyote (*Canis latrans*)- Eat rodents, rabbits, domestic cats, domestic dogs, chickens, insects, fruit and berries.
Raccoon (*Procyon lotor*)- Eat frogs, crawfish, freshwater mussels, berries, insects, birds' eggs, garbage, and pet food.

***Red Fox** (*Vulpes vulpes*)- Eat insects, rabbits, rodents, birds, fruits, berries and grasses.

Rodents:

Beaver (*Aplodontia rufa*)- Eat twigs, branches, bark of young trees and shrubs, aquatic plants, other flowering plants.
Black Rat (*Rattus rattus*)- Eat a variety of human waste and naturally occurring materials. Highly omnivorous.
Creeping Vole (*Microtus oregoni*)- Eat grasses, bulbs, roots, tree bark, seeds and berries.
Deer Mouse (*Peromyscus maniculatus*)- Eat seeds, nuts, berries, and insects.
***Eastern Gray Squirrel** (*Sciurus carolinensis*)- Eat fruits, bulbs, seeds, refuse, and nuts stored under ground.
***House Mouse** (*Mus musculus*)- Eat seeds, green stems and leaves. Will also eat insects, and meats when available
Mountain Beaver (*Aplodontia rufa*)- Strictly herbivorous. Eat shoots of native plants (sword ferns, bracken ferns, nettles, salal, huckleberry, and vine maple). They may also eat non-native plant shoots.
Northern Flying Squirrel (*Glaucomys sabrinus*)- Eat seeds, nuts, fungi, berries, fruits and blossoms, insects and small birds' eggs. They may also feed from bird feeders at night.
***Norway Rat** (*Rattus norvegicus*)- Eat a variety of human waste and naturally occurring materials. Highly omnivorous.
Towsend's Chipmunk (*Tamias townsendii*)- Eat seeds primarily. May also feed on fruits, leaves, stems, corn, fungi and insects.
Pacific Jumping Mouse (*Zapus trinotatus*)- Eat seeds, nuts, berries, and insects.

Snakes:

Western Garter snake (*Thamnophis elegans*)- Eats earthworms, slugs, snails, salamanders and frogs.

Salamanders and Newts:

Long-toed salamander (*Ambystoma macrodactylum*)- Eat spiders, crickets, larvae, and other invertebrates.
Northwestern salamander (*Ambystoma gracile*)- It eats soft bodied invertebrates (slugs and worms)
Redback salamander (*Plethodon cinereus*)- Eats spiders, crickets, larvae, and other invertebrates.

Frogs:
Red-legged frog (*Rana aurora*)- Eats mostly invertebrates.

* *Introduced or invasive animal species.*

For more information consult: *Link, 1999*
http://www.batcon.org/
Whitney, 1998

Appendix-14. Wildlife Value for Selected Native Plant Species

Northern Flying Squirrel:

Habitat and Food:
**Pseudotsuga menziesii* (Douglas fir)
Abies grandis (Grand fir)
Picea sitchensis (Sitka spruce)
**Tsuga heterophylla* (Western hemlock)
**Thuja plicata* (Western red-cedar)

Food:
**Acer circinatum* (Vine maple)
*Acer macrophyllum (Big-leaf maple)
**Alnus rubra* (Red alder)
**Corylus cornuta* (Hazelnut)
**Philadelphus lewisii* (Mock-orange)
Other berry and fruit plants listed below

Food plants for animals that eat berries or fruits:

Amelanchier alnifolia (Serviceberry)
**Arbutus menziesii* (Pacific Madrone)
Cornus canadensis (Bunchberry)
**Cornus nuttallii* (Pacific dogwood)
**Cornus stolonifera* (Red osier dogwood)
**Gaultheria shallon* (Salal)
**Arctostaphylos uva-ursi* (Kinnikinnik)
**Lonicera ciliosa* (Orange honey suckle)
**Lonicera involucrata* (Twinberry)
**Mahonia aquifolium* (Tall Oregon grape)
**Mahonia nervosa* (Low Oregon grape)
**Rhamnus purshiana* (Cascara)
**Ribes sanguineum* (Red-flowering currant)
**Rubus parviflorus* (Thimbleberry)
**Rubus spectabilis* (Salmonberry)
**Sambucus racemosa* (Red elderberry)
**Symphoricarpos albus* (Snowberry)
**Vaccinium parvifolium* (Red huckleberry)
**Vaccinium ovatum* (Evergreen huckleberry)

Dry Meadow Food Plants:
Bromus sitchensis (Brome grass)
Calamagrostis nutkaensis (Pacific reed grass)
**Elymus glaucus* (Wild rye grass)
Festuca idahoensis (Idaho fescue)
Festuca rubra (Red fescue)
Melica subulata (Onion grass)
Xerophyllum tenax (Bear-grass)

Wet Meadow Food Plants:
Carex mertensii (Merten's sedge)
**Carex deweyana* (Dewey's sedge)
**Carex obnupta* (Slough sedge)
Eleocharis palustris (Creeping spike-rush)
Glyceria elata (Tall mangrass)
**Juncus effusus* (Common rush)

Spawning vegetation for Camp Long amphibians:

(Pacific treefrog, Long-toed salamander)
Eleocharis palustris (Creeping spike-rush)
**Scirpus microcarpus* (Small-fruited bulrush)
Juncus acuminatus (Taper-tipped rush)
Polygonum amphibium (Water smartweed)

(Red-legged frog, Northwestern salamander)
Carex rostrata (Beaked sedge)
**Carex obnupta* (Slough sedge)
Juncus bufonius (Toad rush)
Oenathe sarmentosa (Water-parsley)
Polygonum amphibium (Water smartweed)

**** Plant species currently found at Camp Long Park***
****For more information consult:*** ***Kruckeberg (1996)***
Link (1999)
Pojar & McKinnon (1994)
Whitney (1998)

Appendix – 15. Vegetation Management Plan Definitions

The following definitions refer to how these terms are used in this publication.

Annual. A species with a life cycle of twelve months or less.
Biodiversity. 1) The variety of life. 2) An index of richness in a community ecosystem landscape and the relative abundance of these species. There are commonly five levels of biodiversity: a) genetic diversity refering to the genetic variation within a species: b) species diversity refering to the variety of species in an area: c) community or ecosystem diversity referring to the variety of communities or ecosystems in an area: d) landscape diversity referring to the variety of ecosystems across a landscape: and e) regional diversity referring to the variety of species communities, ecosystems or landscapes within a specific geographic region. Each level of biodiversity has three different components: i) compositional diversity or the number of parts or elements within a system and is indicated by measures such as the number or species, genes, communities or ecosystems: ii) structural diversity or the variety of patterns or organizations within a system such as habitat, structure, population structure, or species morphology: and iii) functional diversity or the number of ecological processes within a system such as disturbance regimes, roles played by species within a community and nutrient cycling within a forest.
Broadleaf evergreen. A plant that does not have needles or scales for foliage and also retains its leaves for more than one year. A new set of leaves is formed before the old leaves have been shed.
Canopy. 1) The overhead or dominant trees in a forest. 2) The overhead branches and leaves of streamside vegetation.
Cohort. A group of individuals born during the same short period (often 1 year) of time.
Competition. The direct and exploitative interference of one organism with another which results in a reduction in resource availability.
Conifer. A member of the major subgroup of the gymnosperms the Pinopsida, flowerless seed-bearing woody plants mostly with needle-like leaves, representing a lower and earlier evolutionary level than the flowering plants.
Cover. 1) Horizontal area occupied by vegetation or foliage. 2) Anything that provides protection for aquatic or terrestrial animals from predators or ameliorates adverse conditions and/or seasonal changes in metabolic costs.
Cover type. A designation for plant species forming a plurality of composition across a given area. (eg. Alder-Big leaf Maple, Western red cedar-Alder).
DBH. Diameter at breast height. This is the diameter of a tree stem measured 4.5 feet from the base of the tree.
Deciduous. A plant that loses all of its leaves each year to be replaced by another set later in the year. This typically occurs in the autumn in the Pacific Northwest.
Dominant plant species. 1)That component of a community, typically a species which exerts the greatest influence on its character because of its life-form and/or great abundance. 2) Generally an individual or species of the upper layer of the canopy.
Downed woody debris. Any piece of dead woody material that is large enough to provide animal habitat.
Duff. Fine organic matter that accumulates on the soil surface in forest ecosystems.

Ecological release. When a non-native organism finds a new ecosystem to inhabit which does not include the biotic and abiotic factors which limit its growth and reproduction in its native ecosystem.
Ecosystem. 1) All the interacting parts of the physical and biological worlds in time and space. 2) Any system containing a living organism or a complex of living organisms that "we isolate mentally for purposes of study". 3) A community of different organisms interdependent on each other together with their non-living environment, which is relatively self-contained in terms of energy flow and is distinct from neighboring communities.
Evergreen. A plant that retains its leaves for more than one year. A new set of leaves is formed before the old leaves have been shed.
Forest. 1) Generally an ecosystem characterized by a more or less dense and extensive tree cover. 2) More particularly, a plant community predominately of trees and other woody vegetation, growing more or less closely together.
Forest cover. 1) All trees and other plants occupying the ground in a forest, ie. including any ground cover. 2) All woody growth occupying the ground in a forest, as distinct from the ground cover. 3) A category of forest site including all the interchangeable phases of vegetation that it supports defined mainly by the general nature of the ground cover.
Ground cover. Herbaceous plants (including grasses and ferns) and the lowest shrubs occupying an area.
Growth form. The characteristic general appearance, shape, posture and mode of growth rather than size or color of an organism. With plants, preferably termed the growth habit.
Habitat. 1) The unit area of environment (ie. Natural range). 2) The abode, natural or otherwise of a plant or animal considered particularly in relation to all environmental influences affecting it. 3) The place where a plant and/or animal population lives and its surroundings, both living and nonliving: includes the provision of life requirements such as food and shelter. 4) The environment where a plant or animal will naturally be found.
Herbivory. The consumption of living plant material.
Herb. A plant which does not have a woody stem. An herb may or may not die back every year.
Herbaceous. A class of vegetation dominated by non-woody plants known as herbs.
Infiltration. The process by which water moves from a surface body into the ground water system.
Invasive plant. Plant species that spread rapidly by seed, rhizomes, or stolons, often displacing native vegetation. Also a plant with the potential to spread in this manner.
Invasive species. Invasive species are plant or animal species that spread from human inhabited areas into wild areas. Invasive species are capable of reproducing and displacing native species. Invasive species are usually non-native species.
K-Selection. Selection of life-history traits that promote an ability to make large proportionate contribution to a population which stays close to its carrying capacity.
Landslide. Fall or slide of soil, debris or rock on or from a steep slope.
Microclimate. The climate within a very small area. This is often influenced by topography and vegetation.
Monoculture. An area that is dominated by a single plant species.

Mulch. A material that is spread over the ground to retain water and discourage weed growth.
Mutualism. An interaction between two or more species in which the growth, growth rate, and/or population size of both are increased in a reciprocally beneficial association.
Mycorrhiza. A mutualistic relationship between a plant root and a fungus in which the fungus provides the root with water and minerals and the root provides the fungus with carbohydrates.
Native plant. A plant that is growing in the same local region to which it is known to be indigenous (within the span of human history).
Nitrogen fixation. A process by which bacteria are able to fix gaseous nitrogen, from the atmosphere, into a form that is usable by plants.
Nitrogen fixing plant. A plant that has developed a symbiotic relationship with bacteria in which the plant provides carbohydrates to the bacteria and the bacteria fixes gaseous nitrogen that is used by the plant.
Non-native plant. In the United States this is usually defined as plants that have been introduced since the time of European settlement.
Overstory. The trees layer, which makes up the tallest canopy layer in a forest.
Perennial. A plant species that persists for several years.
Photodormancy. Seeds that require a high amount of unfiltered solar radiation in order to germinate.
Pollution. The presence of matter or energy whose nature, location or quantity produces undesired environmental effects.
Pond. Body of standing water smaller than a lake.
r-Selection. Selection of life-history traits which promote an ability to rapidly multiply in numbers.
Regeneration. A parent plant's establishment of progeny.
Richness. The number of species occupying a particular area.
Ruderal. A plant that grows on wasteland, old fields, waysides, or highly disturbed sites.
Seral stage. A temporal and intermediate stage in the process of succession.
Shade tolerant. A plant that is a better competitor under shaded conditions.
Shrub. A woody, perennial plant differing from a perennial herb in its persistent and woody stem and less definitely from a tree in its lower stature and the general absence of a well-defined main stem.
Snag. A dead tree that is still standing upright.
Species. The main category of taxonomic classification into which genera are subdivided, comprising a group of similar interbreeding individuals having a number of correlated characters. Note: there is generally a sterility barrier between species or at least reduced fertility in interspecific hybrids.
Succession. The gradual supplanting of one community of plants by another, the sequence of communities being a sere and each seral stage. Succession is primary (by pioneers) on sites that have not previously borne vegetation, secondary after the whole or part of the original vegetation has been supplanted: allogenic when the causes of succession are external to and independent of the community and autogenic when the developing vegetation is itself the cause.
Temperate. Geographically, regions that have an average temperature of 50 degrees Fahrenheit or 10 degrees Celsius or above for only 2 to 4 months of the year.

Tolerance. 1) The ability of an organism or biological process to subsist under a given set of environmental conditions.
Transpiration. The evaporation of water from a plant surface.
***Tree*.** A woody plant with a single main trunk (at lease when a sapling) that reaches a height in excess of fifteen feet.
Understory. The ecological niche located beneath a forest canopy.
Understory plant. A plant that currently inhabits the understory.
Vegetation cover. A broad term comprising the cover of all vegetation occupying an area.
Watershed. 1) The region or area drained by a stream or river. 2) Can also include regions and small watersheds in which rivers/streams lead into larger bodies of water such as certain lakes.
***Weed*.** A weed is any plant that is out of place. This term can be applied to any plant depending on its location in the landscape. Often a valueless, troublesome, or noxious plant, often exotic growing wild.
Wetland. Land where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Soil or substrate that are at least periodically saturated with or covered by water and differ from adjoining non-inundated areas. A general term for any poorly-drained, uncultivated tract, whatever its vegetation cover and soil.
Woody plant. A plant that does not die back annually and grows in girth annually by the addition of vascular cambium layers.
Xeric. Of sites or habitats characterized by decidedly dry conditions.

****For more information consult:*** ***Begon, Harper and Towsend (1996)***
Coyne (1999)
Gale (1996)
Turner and Wasson (1997)

Appendix-16. References used for Camp Long VMP

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