2013

Hamlin Park Planting Project

2013 Year Two Monitoring Report

EARTH CORPS

Hamlin Park Planting Project

2013 Year Two Monitoring Report

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Prepared for: City of Shoreline

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1. Report Introduction

This report summarizes the results of second year monitoring activities following two seasons of plant establishment at a ¼ acre site in Hamlin Park, Shoreline, WA. Included are a project overview, a description of the monitoring methods, and a summary of the monitoring results. Recommendations for ensuring future success of the project are also included. Baseline monitoring of the site occurred in September of 2011 and the site was planted in November of 2011. Post-planting baseline data was collected in January of 2012 with year one monitoring occurring in early November of 2012. This report describes the second year monitoring that occurred in late October of 2013.

2. Project Overview

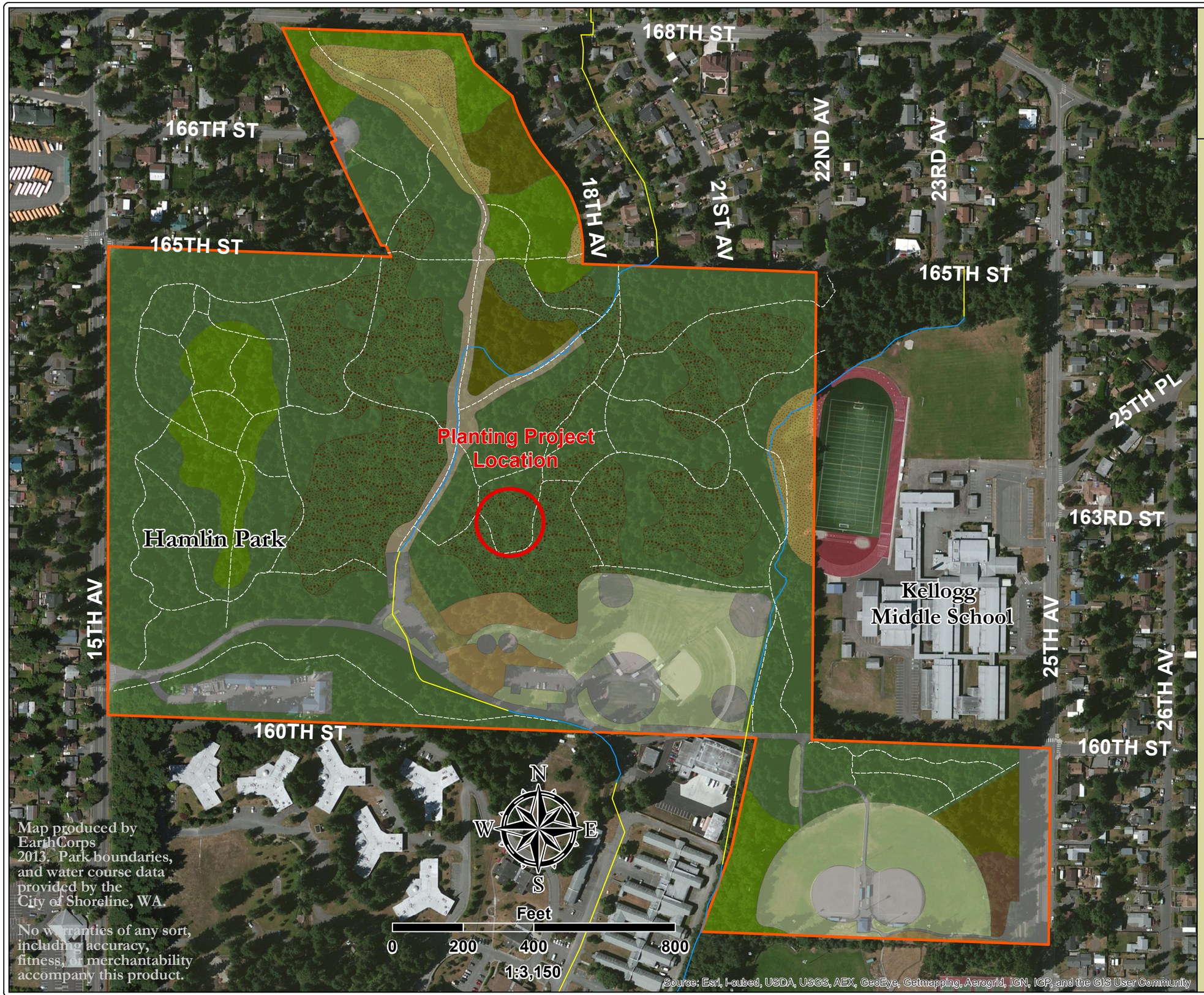
The Hamlin Park planting project was designed to revegetate a ¼ acre portion of the park that formerly had very sparse presence of understory native plants. More information regarding the history of the revegetation project at Hamlin Park can be found in the Hamlin Park test plot experiment report (EarthCorps, 2012a) and the Vegetation Management Plan for the park (Seattle Urban Nature, 2008).

The planting site is located just north of the playground facilities near the parking lots in the southern portion of the park, to the west of experimental test plots 1 and 2 (Map 1). The area was chosen for its central location with high visibility and to help reduce the high off-trail traffic this area has historically received. The revegetation effort was designed to: increase awareness and appreciation for the natural areas of the park; educate the public on the importance of habitat restoration and management; and ultimately increase the overall function and value of the forest. Outcomes from this planting project can be replicated and expanded to other areas of the park.

The planting project consisted of the installation of more than 3,400 plants (3,207 groundcovers, 139 shrubs, and 60 trees) in an approximately ¼ acre area. A fence was installed around the project area to protect the new plantings and a sprinkler irrigation system was installed to provide water during the summer months. Signs along the perimeter of the site describe the purpose and goals of the project and also provide information identifying and describing the plants selected for installation.

First year monitoring results were reported in December, 2012 (EarthCorps, 2012b). Second year monitoring results are presented below. Overall, monitoring results indicate that the installed vegetation on the site continues to spread and is becoming well established throughout the site. Most species appeared healthy with only minor mortality noted. Native plant cover increased within plots by 8% overall from 2012 (from 33% in fall of 2012 to 41% in fall 2013, a 22% increase from the previous year). Minor infill planting could occur on site to replace some of the limited plant mortality, although this is not considered a high priority at this time. It is recommended that irrigation is continued on site through the 2014 growing season.

Hamlin Park
Planting Project Location



Map produced by EarthCorps
2013. Park boundaries, and water course data provided by the City of Shoreline, WA.

No warranties of any sort, including accuracy, fitness, or merchantability accompany this product.

Legend

- Park Boundaries (80.4 Acres)
- Trails
- Hamlin Creek
- Piped Water Course

Habitat Types (Acres)

- Conifer Forest (33.9)
- Conifer-No Understory (15.3)
- Conifer-Deciduous Forest (7.0)
- Conifer-Madrone Forest (2.8)
- Deciduous-Madrone Forest (0.4)
- Trail Corridor (1.5)
- Grassland (0.7)
- Shrubland (2.5)
- Landscaped Shrubland (0.3)
- Landscaped Forest (1.3)
- Landscaped Grassland (7.6)
- Developed (7.1)

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3. Monitoring Methods

A total of four plots were established to monitor the installed vegetation on site: two 10m by 10m square plots in the interior zone and two 10m by 3m rectangular plots in the narrow edge zone. All plot corners are marked with two foot rebar with orange caps punded flush with the ground. Please refer to the 2012 monitoring report for more initial planting information (EarthCorps, 2012b).

To evaluate cover of vegetation within the plots, one edge of each plot was established as a baseline. Line transects were placed perpendicular to (and including) the baselines at regular intervals, every three meters for interior plots (C1 and C2) and two meters for edge plots (E1 and E2), for a total of twelve 10m long transects. See Figure 1 for a schematic of the plot and transect layout. Cover of all vegetation and bare ground was estimated using the line intercept method along these transects. All vegetation intercepting the transect was identified and the length recorded in 10cm increments. The sum of the canopy intercept lengths was then divided by the total length to calculate an aerial cover value. Cover of different species may overlap to create percent cover greater than 100%. If there were no understory species present, bare ground was recorded for that length of transect. If a transect passed through a living tree, it was recorded as tree bole.

In order to evaluate survivorship, all planted stock that was rooted more than halfway within the plots was enumerated following planting. Plants were installed in mid to late November 2011 and baseline data was collected on January 13th, 2012. See the 2012 monitoring report (EarthCorps, 2012b) for a list of the 27 planted species and their quantities installed throughout the entire project area. Plots were re-sampled at the end of the second growing season on October 30th, 2013 and numbers were compared to the November 1st, 2012 sample in order to determine year two plant survival.

In addition, photo monitoring occurred at each plot. Four photos were taken from the perimeter of each interior plot at the midpoint of each side facing towards the center. Two photos were taken at each edge plot along the perimeter from the midpoint of the 3m long side facing towards the center. Photos were taken during the pre-planting baseline monitoring (September 2011) and during post-season one monitoring (November 2012). See the 2012 report (EarthCorps, 2012b) for photo monitoring pictures from September 2011 and November 2012. Photo monitoring pictures from October 2013 are included in Appendix A.

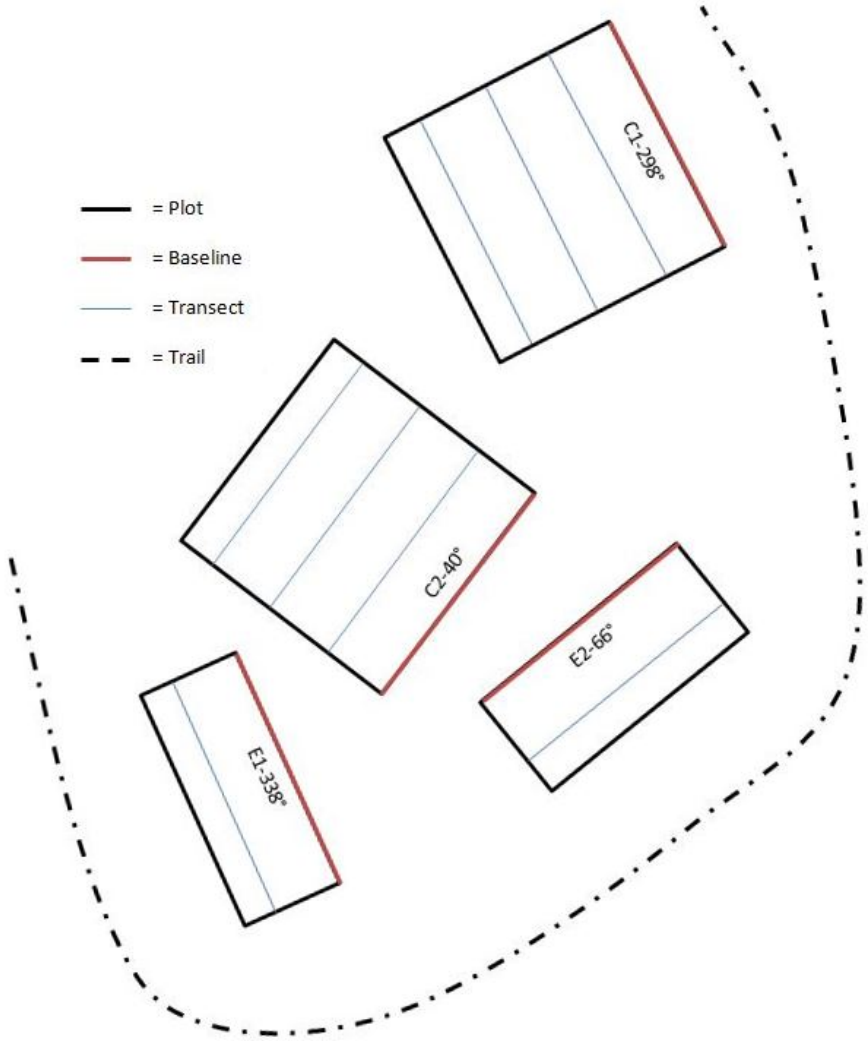

Figure 1. Schematic diagram showing the general plot layout and baseline directional bearings (in degrees) for the Hamlin Park planting project. Diagram is not to scale.

4. Monitoring Results

4.1 Vegetation Cover Monitoring

Vegetation cover monitoring results indicate that the current cover of native installed and naturally occurring plants is approximately 41% (Table 1). This represents a 22% overall increase from 2012. A total of 12 species showed some increase in cover, three species showed no change, and seven native species showed some decrease in overall cover. Species showing the greatest increases included vanilla leaf (267% increase from the previous year), redwood sorrel (233%), and inside-out flower (124%) while orange

honeysuckle (-46%) and kinnickinnick (-24%) showed the greatest decrease (Table 1). Herbaceous cover showed the greatest increase in cover from 21% in 2012 to 26% in 2013, an overall increase of 21%. Shrub cover also showed a marked increase from 12% to 14%, a 17% increase from the previous year. Overall tree cover decreased due to western white pine mortality (Table 1).

Note that in 2012 both *Symphoricarpos* species were recorded as *S. albus*, resulting in a cumulative decrease in snowberry species cover of 16%. It should also be noted that species with very low overall percent covers may show marked increases or decreases in percent change based on very little actual change in cover. For example, orange honeysuckle only decreased from 0.92% to 0.50%, which represents a -46% change from 2012. Overall bare ground on all plots showed a nine percent, decrease from 65% in 2012 to 59% in 2013.

Of the 20 species of plants found along transects in the 2012, a total of 19 species were captured in the 2013 line-transect sampling. Only western white pine was not present in 2013, and dead trees of this species were noted within monitoring plots. Sword fern (18.75%), low Oregon grape (5.75%), and evergreen huckleberry (4.83%) continue to be the dominant species across all plots.

4.2 Survivorship Monitoring

Density monitoring indicates that survival of most of the planted species has been very successful. Only four out of 24 installed species showed any decline in numbers, and only two of these (western white pine and spreading snowberry) were substantial (Table 2). Even then, these species combined to account for a decline of only 12 individual species (out of 675 plants counted in 2012, or less than two percent). Several species also exhibited substantial increases, including starflower, fringecup, indian plum, and redwood sorrel. Overall, individual plant numbers increased from 675 in 2012 to 1,114 in 2013, a 60% increase. Most of this increase was a result of numerous starflower plants that accounted for 50% of the entire increase. However, other plant species numbers increased by a combined 67 individuals, or 10% of the total from the previous year.

Two native species that were not planted (bracken fern and trailing blackberry) have also established on site (Table 2). Additionally, three species of non-native invasive weedy species were noted in low numbers within the plots.

The majority of installed species showed little or no mortality after the first two growing seasons. Dead or stressed plants were noted within plots for kinnickinick, oceanspray, western white pine, and spreading snowberry. Declines in sword fern were negligible and could be due to counting error. Other planted tree species that were installed in low numbers across the site (and not captured within the density plots) were observed and some stress and mortality was noted for Pacific madrone, shore pine, and Pacific dogwood trees.

Table 1. . List of all species by functional group comparing their percent covers recorded along line transects in Hamlin Park in November 2012 and October 2013.

Scientific Name	Common Name	Nov 2012	Oct 2013	% Change
Herbaceous		**20.92%**	**26.42%**	**21%**
Achlys triphylla	**vanilla leaf**	**0.25%**	**0.92%**	**267%**
Blechnum spicant	deerfern	1.00%	0.83%	-17%
*Geranium robertianum**	herb Robert	0.08%	0.00%	-100%
Lonicera ciliosa	orange honeysuckle	0.92%	0.50%	-46%
Oxalis oregana	**redwood sorrel**	**0.25%**	**0.83%**	**233%**
Polystichum munitum	sword fern	15.00%	18.75%	25%
Pteridium aquilinum	bracken fern	1.58%	1.92%	21%
Tellima grandiflora	fringecup	0.83%	0.67%	-20%
Trientalis borealis ssp. latifolia	**starflower**	**0.33%**	**0.50%**	**52%**
Vancouveria hexandra	**inside-out flower**	**0.67%**	**1.50%**	**124%**
Shrubs		**12.25%**	**14.33%**	**17%**
Arctostaphylos uva-ursi	kinnickinnick	0.33%	0.25%	-24%
Corylus cornuta	beaked hazelnut	0.33%	0.33%	0%
Gaultheria shallon	**salal**	**1.00%**	**1.50%**	**50%**
Mahonia nervosa	low Oregon grape	4.50%	5.75%	28%
Oemleria cerasiformis	Indian plum		0.08%	N/A
Rhododendron macrophyllum	western rhododendron	0.25%	0.25%	0%
Symphoricarpos albus	snowberry	1.58%	0.58%	-63%
Symphoricarpos hersperius	spreading snowberry		0.75%	N/A
Vaccinium ovatum	evergreen huckleberry	4.25%	4.83%	14%
Trees		**0.75%**	**0.58%**	**-23%**
Abies grandis	**grand fir**	**0.33%**	**0.50%**	**52%**
Acer macrophyllum	bigleaf maple	0.08%	0.08%	0%
Pinus monticola	western white pine	0.33%	0.00%	-100%
Total Native Cover		***33.81%***	***41.33%***	***22%***
Non-Vegetated		**66.25%**	**60.42%**	**-8.80%**
	Bare Ground	65.00%	59.17%	-9%
	Tree Bole	1.25%	1.25%	0%

* indicates that species is not native to the Pacific Northwest
Species in red are highlighted to show declines and species in bold are highlighted to show substantial (> 50%) increases.

Table 2. List of all species found in plots sampled in Hamlin Park and comparing numbers present in January 2012 (baseline), November 2012, and October 2013.

Scientific	Common	Jan 2012[1]	Nov 2012	Oct 2013	Change (Nov 2012-2013)[2]	% Change (Nov 2012-2013)
Native Species						
Abies grandis	grand fir	2	2	2	0	0%
Acer macrophyllum	bigleaf maple	1	1	1	0	0%
Achlys triphylla	vanilla leaf	0[1]	38	42	4	11%
Arctostaphylos uva-ursi	kinnickinnick	14	14	12	-2	-14%
Blechnum spicant	deerfern	16	18	18	0	0%
Corylus cornuta	beaked hazelnut	3	3	3	0	0%
Epilobium ciliatum	fringed willowherb	0	0	3	3	N/A
Frangula purshiana	cascara	1	1	1	0	0%
Gaultheria shallon	salal	32	32	33	1	3%
Holodiscus discolor	oceanspray	8	4	5	1	25%
Lonicera ciliosa	orange honeysuckle	0[1]	13	14	1	8%
Mahonia nervosa	low Oregon grape	106	143	164	21	15%
Oemleria cerasiformis	**indian plum**	**1**	**2**	**6**	**4**	**200%**
Oxalis oregana	**redwood sorrel**	**0[1]**	**2**	**6**	**4**	**200%**
Pinus monticola	western white pine	5	3	0	-3	-100%
Polystichum munitum	sword fern	119	122	121	-1	-1%
Pteridium aquilinum	bracken fern	0	0	21	21	N/A
Rhododendron macrophyllum	western rhododendron	13	13	13	0	0%
Rubus ursinus	creeping blackberry	0	0	5	5	N/A
Symphoricarpos albus	snowberry	7	8	8	0	0%
Symphoricarpos hersperius	spreading snowberry	0[1]	11	5	-6	-55%
Tellima grandiflora	**fringecup**	**0[1]**	**21**	**53**	**32[2]**	**152%**
Thuja plicata	western red cedar	3	3	3	0	0%
Trientalis borealis ssp. latifolia	**starflower**	**0[1]**	**86**	**426**	**340**	**395%**
Tsuga heterophylla	western hemlock	1	1	1	0	0%
Vaccinium ovatum	evergreen huckleberry	68	70	72	2	3%
Vancouveria hexandra	inside-out flower	0[1]	64	76	12	19%
	Total	**400**	**675**	**1114**	**407**	**60%**
Non-Native Species						
*Hedera helix**	English ivy	0	0	3	3	N/A
*Ilex aquifolium**	English holly	0	0	1	1	N/A
*Mycelis muralis**	wall-lettuce	0	0	3	3	N/A
	Total	**0**	**0**	**7**	**7**	**N/A**

[1] indicates that this species was dormant during the baseline survey completed in January 2012.
[2] Tellima was not counted in one plot in 2012, increase indicated is not necessarily accurate.
Species in red are highlighted to show declines and species in bold are highlighted to show substantial increases.

5. Discussion and Recommendations

Monitoring after two growing seasons indicates that the installed plants are successfully establishing on site. Overall native plant cover has increased from 2012 and the planted stock is exhibiting very little mortality. The vast majority of the plants look healthy and the site appears to be developing into a stable native plant community. Line transect monitoring indicates that the vegetation cover has increased substantially from 2012. While some species exhibited declines in cover, these drops were generally very small (Table 1). Density data indicates that most of these species are not experiencing any substantial decrease in numbers.

On a whole, both cover and density data indicate a positive trend in overall plant establishment and survival. However, the majority of the planted area continues to be dominated by bare ground which makes up nearly 60% of the entire area (Table 2). Because of the generally upland, closed canopy conditions of the planting area, it would not be expected that shrub and understory cover would quickly spread and dominate the site. It will take some time for the planted stock to mature and develop. During this time, some mortality and dieback is expected.

It is reasonable to consider an overall understory cover target in the range of 60% to 80% after five years of establishment. For example, the Shoreline Municipal Code calls for 80% cover of understory vegetation for their wetland mitigation performance standards and requirements (SMC 20.80.350 G.3.c). In the absence of any formal performance standards, continued increases in overall native cover and numbers should be seen as progress towards meeting general project goals.

Because of the very low measured mortality rates across all plots, no additional planting is recommended to occur at this time. Some infill planting should be planned in the future to compensate for species that have shown measurable declines. For example, additional tree and shrub species installations should be considered for the 2014/2015 winter planting season. Trees and shrubs that have shown the most stress and mortality include: western white pine, shore pine, Pacific madrone, spreading snowberry, kinnickinnick, and oceanspray. These species should not be re-planted. No additional herbaceous groundcovers are recommended at this time. All replacement species should be chosen from successful species noted in Tables 1 and 2 and could also include grand fir, western red cedar and western hemlock trees. Planting in early winter of 2014 is recommended to allow the newly installed plants to establish during the natural rainy season.

A small infestation of yellow archangel (*Lamiastrum galeobdolon*) was observed within the planting site outside of the plots towards the eastern edge of the planting area (Figure 2). A fast spreading perennial, yellow archangel is designated as a Class C noxious weed in King County and should be prioritized for removal before it becomes more established (King County, 2013).

Figure 2. Yellow archangel (*Lamiastrum galeobdolon*) observed growing outside of the plots within the Hamlin Park planting area in October, 2013.

No other formal maintenance is recommended for the site at this time. Other non-native species presence is very low and does not currently pose a threat to native plant establishment. However, the presence of English ivy and English holly suggests that future maintenance will be necessary to prevent these species from becoming established on site. The perimeter fence is in good condition and should be inspected periodically to ensure that it continues to effectively deter walkers and off-leash dogs within the planting area. A permanent fence design should be considered for a long-term solution.

It is recommended that the planting site at Hamlin Park continues to receive vegetation monitoring through year five, or at least for two seasons after irrigation is no longer occurring on site. However, because of the year two results showing favorable increases in plant cover and establishment, less formal monitoring could take place in years three and four. Photo monitoring should continue yearly during this time. End of season photo monitoring (October-November) should take place in this way until at least 2015, and thereafter at an interval deemed appropriate according to vegetation monitoring results. Irrigation occurred regularly during the 2013 growing season (three to seven times per week) and the site should continue to receive irrigation in the summer for at least the 2014 growing season.

6. References

EarthCorps. 2012a. Hamlin Park Test Plot Monitoring Report-2010. http://www.earthcorps.org/pdfs/resource/29/Hamlin%20Park%20Test%20Plot%20Monitoring%20Report-2010.pdf

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C1-N


C1-E


C1-S


C1-W


C2-N

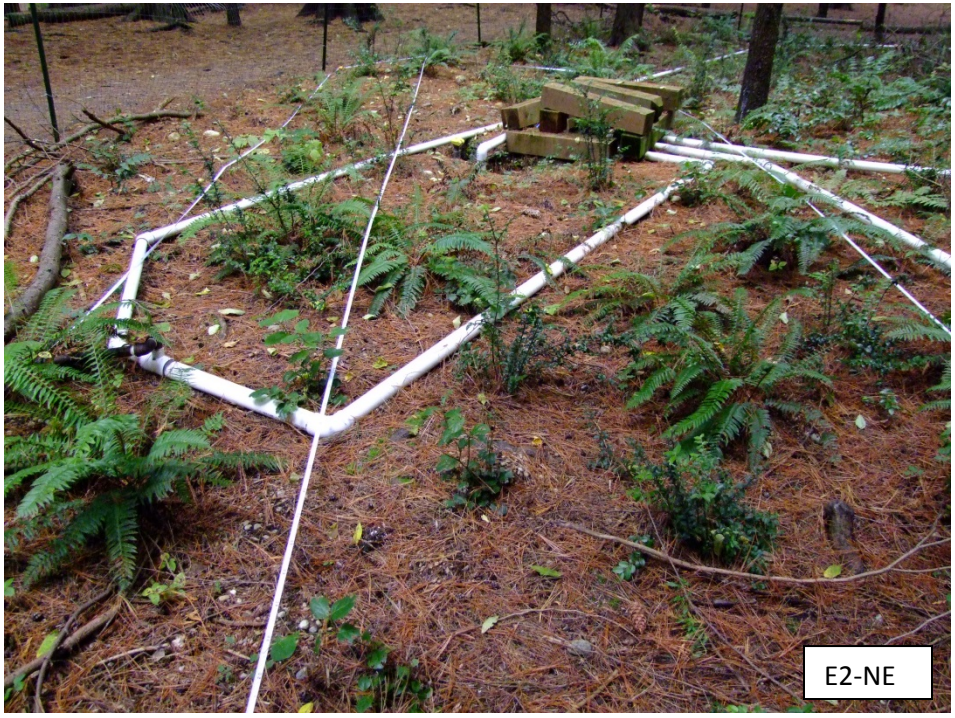

C2-E


C2-S


C2-W


E1-NW


E1-SE


E2-NE


E2-SW