Staff Report: Field Work Costs & Efficiency

Executive Summary

The Green Seattle Partnership (GSP) is a unique program in that it relies heavily on both volunteers and professionals to both organize and participate in forested parkland field work. As part of an evaluation to inform future work planning strategies, Seattle Parks & Recreation staff have used past expenditures and work logs to estimate the cost per hour of each labor type and the expected return in terms of field work. This analysis reveals that:

- work conducted by volunteers, and particularly Forest Steward volunteers provide the most value to the program in all phases of restoration, except in weed-infested areas that require integrated pest management actions not suitable for volunteers;
- the value volunteers bring in comparison to professional crews is strongest when planting, watering easily accessible plants, or conducting manual invasive removal (where mechanized tools or herbicide are not appropriate); and
- on a per hour basis, staff Natural Area Crew are less expensive than contracted crew work, and with proper training and experience, may prove greater value to the program.

With these points in mind, recommendations for the program include:

- strategically employ crew hours for phase I work that qualifies for use of herbicide;
- continue (and perhaps expand) efforts to recruit, support, and retain Forest Stewards; and
- increase training opportunities and incentives to reduce turnover in the natural area crew.

Prepared by: Oliver Bazinet

Last Revision: October 9, 2015

Staff Report: Field Work Costs & Efficiency

Composition & Cost

The Green Seattle Partnership (GSP) is a unique program in that it relies heavily on both volunteers and professionals to both organize and participate in field work. As part of an evaluation to inform future work planning strategies, Seattle Parks & Recreation staff have used past program expenditures and work logs to estimate the cost per hour of each labor type and the expected return in terms of field work.[1]

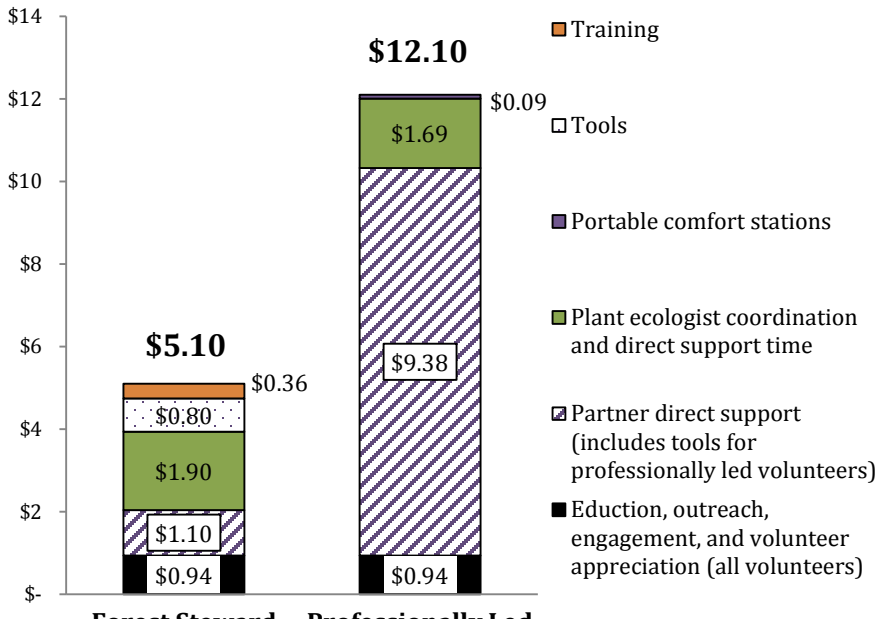
Volunteers

Volunteers are recruited to work in natural areas by non-profit partners that lead them in the field, or by volunteer Forest Stewards that have been trained, supplied and given permission to work in parks by GSP. As seen on the right, the major costs associated with all volunteers are the staff time necessary to support them.

In addition to providing more consistent and diligent eyes on the sites that they care for, and despite the training and ongoing support, **Forest Stewards** and their volunteers cost less to the program than volunteers that have to be directly supervised in the field by professionals. For this reason, the GSP has made it a goal to recruit Forest Stewards for each park suitable for volunteer work.

Where Forest Stewards are not present, partnering with organizations that provide **professionals to lead volunteers** remains a cost-effective method for completing work in the field and increasing awareness, community support, and education around restoration efforts.

Estimated Cost of an Average GSP Volunteer Hour



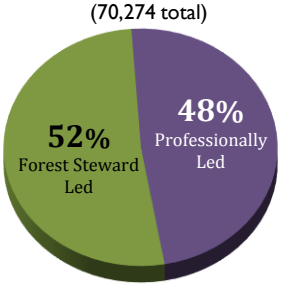
Forest Steward Volunteers

Volunteers organize, recruit, and direct other volunteers with material and technical support.

Professionally Led Volunteers

Volunteers are recruited and organized by professionals, mostly non-profit partner staff.

2014 Reported Volunteer Hours
(70,274 total)



Source: 2011 – 2014 Green Seattle Partnership work logs and Seattle Parks & Recreation expenditure database

Over the course of the 10 years of the GSP, the number and ratio of Forest Steward-led volunteer hours has steadily increased, providing greater, more efficient and effective person-power and community support to restoration efforts. Recruiting and supporting Forest Stewards is a major goal of the GSP in the next 10 years. On a per hour basis, there is no question that volunteers, both

[1] Green Seattle Partnership (GSP) program expenditures in this report refers primarily to expenditures by Seattle Parks and Recreation with some support provided by Seattle Public Utilities and past support provided by Forterra.

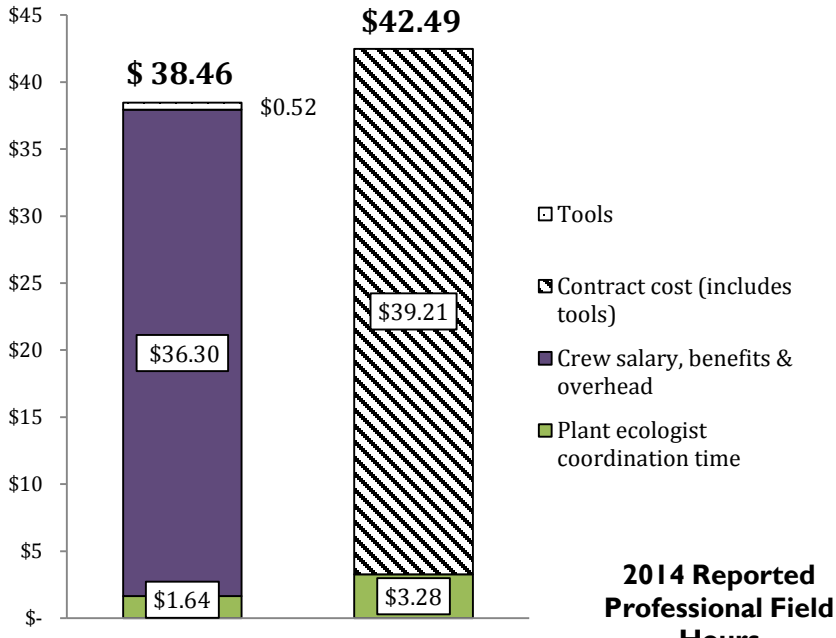
Forest Steward-led and professionally-led, provide a fantastic value compared to either staff or contracted crew work in the field, but they still require staff time for recruitment, training, support, and oversight.

Professional Crews

Not all of the field work in natural areas is suitable for volunteers. Work on steep slopes and work involving the use of chemical pesticides or motorized equipment are examples of instances in which professional crews must be called in. For these jobs, GSP turns to either the in house Seattle Parks & Recreation **Natural Area Crew** (NAC) or **private contractors** from the City of Seattle's blanket contracts.

As seen on the right, the **NAC** offers the less expensive alternative per hour. This difference is due to both economies of scale in the cost of overhead at the City as well as reduced need for plant ecologists to coordinate contracts and scopes of work. More crews will be added to Seattle Parks & Recreation staff as the capital portion of the GSP comes to an end and acres are brought into long term monitoring and maintenance.

Estimated Cost of an Average GSP Professional Field Hour



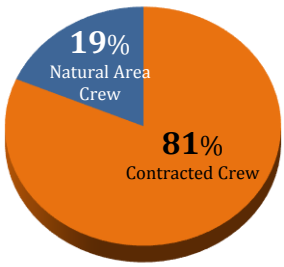
Natural Area Crew (Staff)

Professionals on staff at Seattle Parks & Recreation to restore and maintain park natural areas.

Contracted Crew

Outside professionals hired for descrete projects.

2014 Reported Professional Field Hours
(15,592 total)



Source: 2011 – 2014 Green Seattle Partnership work logs and Seattle Parks & Recreation expenditure database

Contracted crews have been used for much of the professional work in the past for a number of reasons, the most important of which is there hasn't been a long term commitment to fund the staff needed to take on the volume of work required. It is also true that in the past, the NAC have had varying levels of experience and expertise in comparison to the contracted crews. This, however, is changing with a more consistent staff and set of trainings. Another reason that NAC field hours have trailed contracted crews is that they are often tasked with support, rather than direct, field roles: making deliveries, installing irrigation lines, preparing materials, or otherwise aiding other groups' work in the field.[2]

[2] Unfortunately, a tracking system hasn't been in place that would allow for a good estimate as to how this work quantitatively contributes to other field labor.

While volunteers are often emphasized within the GSP literature and message, professional crews have always, and will remain, an essential part of Seattle Parks & Recreation restoration strategy. Both the NACs and contracted crews bring expertise and capacities that volunteers cannot match, despite their higher price.

Efficiency

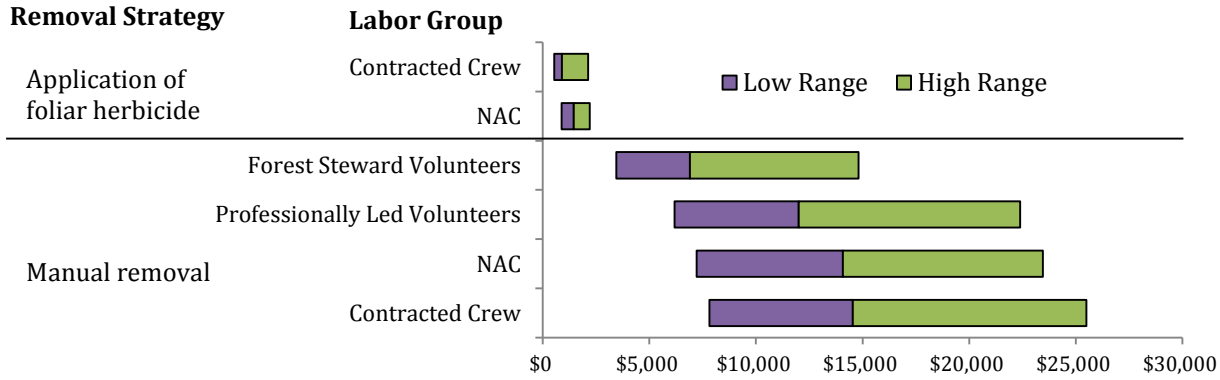
While the comparative costs per hour of various labor types are important to developing restoration strategies, we cannot assume that an hour of volunteer work is equivalent to an hour of professional work. Seattle Parks & Recreation staff have therefore evaluated many years worth of field work logs to develop a range of expected times that it would take each group to complete common restoration tasks. When multiplied by the estimated per hour cost of each labor type, this provides insight into the comparative cost efficiency of each group completing a particular task.

For each task, we have included a sometimes large range of values because the conditions between each site and work event can be highly variable. The species involved, the slope of the site, the techniques employed, the extent of invasion, or the experience level of a volunteer or professional are other factors that may affect the time to task completion. [3] While this is a quantitative analysis of the time and estimated cost it takes to complete a certain task, quality of work can vary between and among each of these labor groups.

Phase I - Invasive Removal

As can be seen below, volunteer work provides a noticeable savings per acre on the primary removal of invasive species. **Forest Steward volunteers, in particular, can be expected to clear an acre for roughly half of the estimated cost to GSP as the staff or contracted crews**. This calculation changes, however, once one compares the cost of removal with herbicide. The application of herbicide by professionals reduced the expected cost of clearing an acre at least threefold from the next best alternative (Forest Steward volunteers) and roughly sevenfold in comparison to manual removal by professionals.

Estimated Cost per Acre of Primary Invasive Removal to GSP*



*Expected (median) cost lies at intersection of low range and high range
Source: 2011 – 2014 Green Seattle Partnership work logs and Seattle Parks and Recreation expenditure database.

From a cost efficiency standpoint, herbicides should be used whenever possible to expand the number of acres that can be restored. However, the use of herbicides is not appropriate in many sites. Areas including or near to sensitive wetlands, those in which regular use by park visitors, particularly children, cannot reasonably be restricted, and those that contain a mixture of higher value native plants may fall into this category. Although it is difficult to parse from the work logs, use of mechanized equipment (which is also restricted to professionals) would also conceivably reduce the cost of removal in certain cases.

[3] It is also worth noting that sites selected for work by contractors are more likely to have those attributes that would extend the tasks. This selection bias likely overstates some of the savings gained by volunteer work, though it is estimate by how much.

Phase II - Planting

Forest Steward volunteers provide the greatest value from a cost standpoint when it comes to planting**.** As seen below, the expected cost of their labor to install a plant is less than half of that of a professionally led volunteer, the next best value. As in invasive removal, **both volunteer types are less expensive than having professionals conduct the work**. This relationship appears to hold across the various types of planting stocks: bare root, live stake, and plugs.

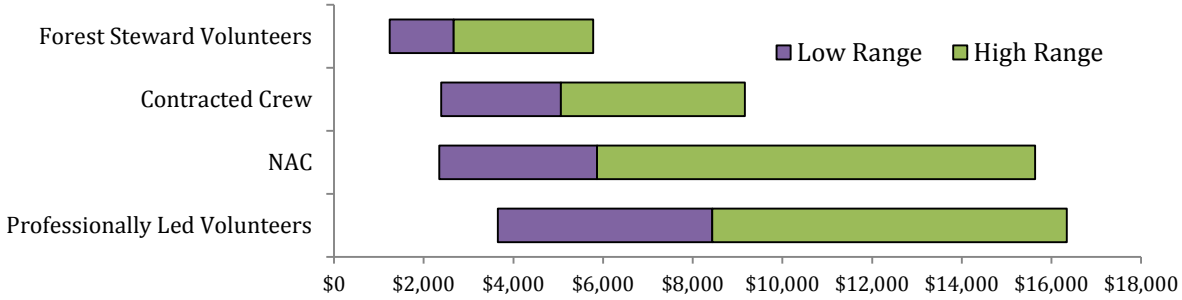
Estimated Cost of Labor to Install one Potted Plant to GSP*

*Expected (median) cost lies at intersection of low range and high range.
Estimated costs above do not include cost of plant material.
Source: 2011 – 2014 Green Seattle Partnership work logs and Seattle Parks and Recreation expenditure database.

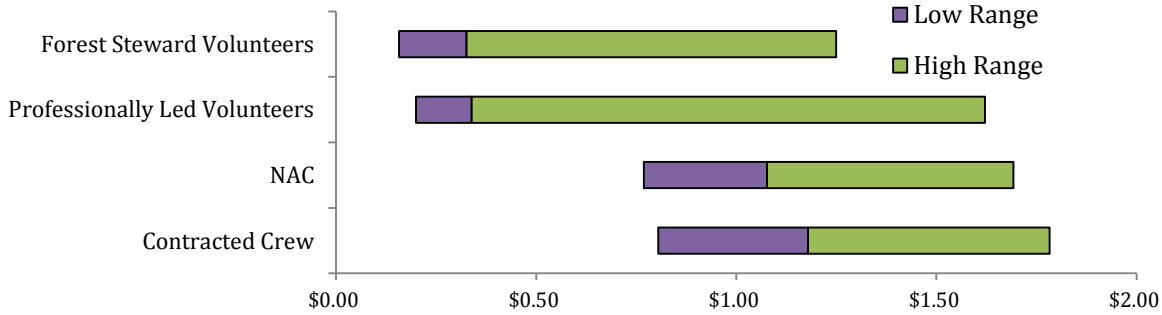
Phase III - Weeding and Watering

Weeding bucks the trend seen in the previous phases insomuch as professionally led volunteers are expected to be the most expensive option. One reason for this may be less familiarity with native versus invasive plants, or possibly that they're sometimes assigned to sites that have regressed. **In either case, Forest**

Estimated Cost per Acre of Weeding to GSP*



Estimated Cost per Plant Watered to GSP*



*Expected (median) cost lies at intersection of low range and high range.
Source: 2011 – 2014 Green Seattle Partnership work logs and Seattle Parks and Recreation expenditure database.

Steward volunteers are expected to be the most cost efficient option for weeding, though their advantage is not as pronounced with weeding as primary invasive removal or planting.

Volunteers, both Forest Steward led and professionally led alike, provide value when it comes to watering plants, coming in at about 30% of the expected cost per plant as professional crews. However, this value seems to exist primarily in the low and median ranges. This implies that as the obstacles to water some areas increase, the benefit of using volunteers to water them decrease. This makes sense in light of technologies (such as water trucks) available to professional crews.

Summary

Through the strategic use of volunteer, professional staff, and contracted crew labor, GSP can work to maximize the cost efficiency of restoration work in the field. This analysis is meant to inform such planning as well as identify areas in which training, tools, or other resources can be brought to improve cost efficiency. While this does not include all tasks conducted or recorded in the field, it does include some of the most common. Conclusions are described below with recommendations in bold.

The combination of work log and expenditure data examined above indicates that Forest Stewards and their volunteers are by far the most cost-efficient restoration labor group**.** The only exception to this rule seems to be when herbicide an option for invasive removal. Professionally led volunteers are often the second-best option, with the notable exception of weeding. Despite the comparative cost effectiveness of Forest Steward led volunteers when compared to professionally led volunteers, Forest Stewards act more autonomously, and cannot be scaled up as quickly and easily as professionally led volunteers. **As much as cost effectiveness is a priority for the program, so should Forest Steward recruitment.**

From this efficiency perspective, it appears that **the value volunteers bring in comparison to professional crews is strongest when planting, watering easily accessible plants, or conducting manual invasive removal (where mechanized tools or herbicide are not appropriate**). When one considers the educational, outreach, and recreational value of including volunteers in restoration work, partnering with volunteers becomes ever more attractive.

Not all tasks are appropriate for volunteers**. Where herbicide can be used safely effectively by professional crews for invasive removal, it appears to be highly cost efficient**. For watering, the savings gained from using volunteers appear to decline as areas become less accessible or other obstacles extend watering time. In addition to these factors, volunteers are simply not permitted to work on slopes with a greater than 40% grade, almost a third of the total system. It should also be noted that the professional crews are often brought in to tackle more difficult tasks, a bias in the data that it is difficult to correct for, but certainly puts them at a disadvantage in this analysis. The NAC and private crews tend to be relatively comparable in cost effectiveness, trading off slight advantages depending on task. Because of their lower per hour cost, it is conceivable that **more consistent training and reduced turnover in the NAC could lead to them surpassing contracted crew in cost efficiency.**