

Developing a viable, healthy network of green spaces, sustained by community involvement

Habitat Steward Field Guide

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Dear Habitat Steward:

We welcome you to the Green Tacoma Partnership (GTP). The GTP Habitat Stewards are innovative, dedicated and motivated individuals from our community working to ensure the health and sustainability of our urban forest through community-based restoration. Thank you for joining the team! Work is already underway to restore more than 1,943 acres of land by 2036. There are 94 restoration sites within the GTP and the majority of these sites are owned and managed by the City of Tacoma or Metro Parks Tacoma. There are also other key partners including the Port of Tacoma, Citizens for a Healthy Bay, Tahoma Audubon, Forterra, Tacoma Community College and University of Puget Sound. Our goal is to have at least one Habitat Steward at each site!

This endeavour results in numerous benefits to the community as well to the environment. Habitat Stewards and community volunteers like you play an integral role in the success of this effort. Without volunteers our goal would not be achievable. To date, the work of many dedicated volunteers has been substantial, and we hope that through this Habitat Steward Program, we can assist you in making your efforts even more successful.

While the thought of tackling the many challenges associated with habitat restoration may seem daunting at times, we also hope that it will be rewarding and even fun. Remember you are making a difference! Also, you will have support from the many entities engaged in this activity, from Metro Parks Tacoma (CHIP-in!), the City of Tacoma, Forterra and even fellow Habitat Stewards. You are not alone and each year our team is growing.

This Habitat Steward Field Guide contains the basic information that you will need to start and implement site restoration plans as well as a system for tracking your progress. Remember tracking your restoration efforts will be critical to help demonstrate to political leaders and fellow citizens that the money spent on urban habitat restoration efforts is effective, efficient and ultimately successful. As a Habitat Steward you will have opportunities to expand your knowledge and skills by attending specialized trainings sessions. In addition, Habitat Stewards at each site are eligible to receive tools, materials, plants and crew assistance for your restoration projects through GTP and Metro Parks CHIP-in.

Thank you again for taking the lead to restore, maintain and steward our urban forests and habitats. Your commitment makes our amazing city an even better and healthier place to live.We look forward to the many great years of cooperation and success!

Sincerely,

The Green Tacoma Partnership





About the Green Tacoma Partnership

Formed in 2005, the Green Tacoma Partnership (GTP) is a public-private venture between the City of Tacoma, Metro Parks Tacoma, Forterra, other public landowners, residents, and numerous non-profits. The protection, maintenance and enhancement of these natural areas in Tacoma are supported by an aware and engaged community who work together to support the protection, maintenance, and enhancement of green spaces in Tacoma for current and future generations.

Why GTP?

Green Space, whether associated with active parks, passive gathering areas or even non-publicly accessible spaces provide numerous benefits to the City of Tacoma and its residents. These areas filter pollutants from the air and water, mitigate climate change, prevent urban flooding and provide homes for our wildlife. Collectively, these benefits are known as ecosystem services and lead to a healthier urban environment.

In addition to these ecosystem benefits, parks and green spaces help to define our neighborhoods and provide opportunities for people to interact with and connect with nature. Our natural areas, parks and green spaces provide the foundation for vibrant neighborhoods and a high quality of life.

However, our green spaces are under siege, invasive plants choke out native plants and seedlings that would typically regenerate the natural habitat of Tacoma's green spaces, creating monocultures of unhealthy habitat. Without intervention we are at risk of losing the quality habitat our city needs. If we do not act to care for and maintain our green spaces within 20 years, 70 percent of our green spaces could be ecological wastelands. GTP is committed to ensure this does not happen.

Our Goals

• Increase the amount of land in active restoration through Metro Parks, City of Tacoma, and volunteer efforts.

• Establish financial and volunteer resources to provide long-term maintenance and ensure the sustainability of green spaces.

• Galvanize an informed, involved and active community around restoration and stewardship by providing free continuing education, training, and networking opportunities.

Habitat Steward Program

The most important element of success is a concerned and committed community. The Green Tacoma Partnership is a result of enlightened leadership and community demand to provide resources and support to the restoration and enhancement of our forested urban green spaces. Habitat Stewards serve as the foundation of the GTP by building a community of stewardship around these public green spaces and to safeguard their future.

GTP provides stewardship trainings developed to harness the energy and excitement of the community. The Habitat Steward Program offers community-based restoration groups assistance and staff support so that volunteers can confidently achieve their restoration goals. By supporting and enhancing the capabilities of volunteer groups, GTP provides an opportunity to establish a foundation for the long-term stewardship and health of our City's green spaces.

Benefits of GTP Support (as resources allow)

- · Free voluntary restoration trainings throughout the year
- · Support in assessing sites and developing Site Management Plans
- · Volunteer networking between groups working with GTP
- Staff help to recruit volunteers and accomplish your site goals
- · Access to plants and materials
- Access to tools
- Contracted crew labor where needed
- Watering and maintenance assistance
- · Better monitoring of progress made on your project

Habitat Steward Duties

As a Habitat Steward, you are responsible to carry out the following duties and/or delegate them within your team:

- Attend Habitat Steward orientation
- · Serve as key contact person with GTP staff
- Coordinate with GTP staff to develop a site plan and annual goals.
- · Have at least four restoration events annually in your green space
- Post GTP event notices and if feasible create Facebook posts or flyers.
- Communicate! Submit resource requests, work logs and sign-in sheets to document restoration activities and progress.
- · Attend at least one free training event annually.
- · Celebrate often, meet new people and have fun.



THE FOUR-PHASE APPROACH

GTP uses a 4-phase restoration approach. While each site will likely need to go through all four phases of restoration, some areas with low levels of invasive plants may start in phase 2 or even 4 in some cases. On the other hand, sites that are heavily inundated with invasive plants may be in phase 2 for an extended period of time. The phase of restoration generally corresponds to the level of effort and length of time each site is in a particular phase. Tracking the phase of each site will aid in monitoring, annual planning and site specific management strategies.



PHASE I: Invasive Plant Removal- This phase focuses on removal of invasive plants. Invasive plants are removed according to Best Management Practices (BMP's) and various mulching techniques are used to minimize soil erosion and new weed growth. Areas with high levels of invasive coverage may take more than one year to complete initial removal.



PHASE 2: Secondary Invasive Removal and Plant Installation- This phase requires follow-up invasive removal, preparation of the site for planting and the installation of native trees, shrubs and ground cover as identified in the site management plan.



PHASE 3: Plant Establishment and Invasive Control- This phase continues to control invasive plants through weeding and mulching, but is primarily concerned with plant care. Plants are mulched, weeded, watered and replaced as needed. This plant establishment phase usually lasts a minimum of three years.

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PHASE 4: Monitoring and Maintenance- This is the final phase, but also one that is ongoing and involves long-term stewardship and maintenance of the site.Volunteers and professional crews will visit the site every 3 years, looking for new invasive plants populations, social impacts and other ecosystem health indicators, both positive and negative. On some sites a formal monitoring plan and protocol will be created to inform adaptive management decisions across GTP sites.

Phase	Tasks	Avg. Labor Investment
1	Invasive removal & mulching	700 hours/acre
2	Secondary invasive removal and fall planting	100 hours/acre
3	Invasive removal, watering, and mulching	40 hours/year for up to three years
4	Stewardship and maintenance	12 hours/acre annually

GTP Structure and Land Ownership

GTP is a true partnership. As such many entities are engaged in restoring our green spaces back to health. There are two main divisions of GTP based on land ownership: Metro Parks Tacoma (MPT) and the City of Tacoma (COT). These two entities are responsible for ensuring the management and long-term care for the majority of acres within the GTP umbrella.

Metro Parks Tacoma (MPT) and City of Tacoma (COT)

MPT owns approximately 1,800 acres of land that will be restored and managed within the city's park system. MPT manages the restoration efforts on these lands through their volunteer and successful CHIP-in program. CHIP-in is highly recognized and provides many services and benefits to parks throughout the city. Within the natural areas program of CHIP-in is the Habitat Steward Program that is associated with GTP.

COT owns 496 acres of land that will be managed and restored within the Environmental Services Department for surface water quality benefits. Some of these lands are located on steep slopes and have limited access, however, some of the land is volunteer friendly and Habitat Stewards will be recruited and take the lead on restoration efforts.

Other Partners

Other major partners include Citizens for Healthy Bay, Tacoma Community College, University of Puget Sound and the Port of Tacoma. Each of these partners are usually restoring individual sites that they own or are contracted to restore for a GTP partner entity.

Collectively, we are all working toward the creation of a healthy system of green spaces that provide the wealth of ecosystem benefits that ensures Tacoma maintains its high quality of life.



Forterra Metro Parks Tacoma City of Tacoma Citizens for a Healthy Bay Habitat Otewards Tacaoma Community College Volunteers Community Groups

Tools for Success

In order to effectively plan restoration activities, you need to have a clear goal for what you want your site to become over time. There are several tools that help GTP staff establish goals and prioitize sites for long-term successful restoration of critical green spaces.

The 20 Year Plan

A 20-year plan is the main element of any Green City. It provides a roadmap for the Partnership and helps to establish all the elements needed for a successful program. The 20-year plan provides the vision and goals, a cost estimate, the creation of the Habitat Steward program, a capacity assessment and details about site conditions.

In 2011, the City of Tacoma developed a 20-year plan for all sites to be included in the partnership. The original 2011 20-year plan included 1,881 acres of land to be actively restored under the GTP banner.

In 2016, the City of Tacoma conducted a partial update to the 20-year plan as well as added new lands to the GTP goals. This 20-year plan included 496 acres. One of the critical elements of the update was to identify steep slopes areas and to add the goals of water quality and stormwater management explicitly to the Partnership.

As it stands currently, there are approximaltey 1,943 acres of land to be included within the GTP. This only includes lands than will be enrolled in restoration and does not include landscaped areas or water.



Habitat Triage Analysis

The tree-iage assessment helps to understand key habitat conditions and categories. It is described as a matrix with the x-axis (horizontal) illustrating the invasive species threat level and the y-axis (vertical) illustrating the current native tree coverage. As you move from left to right on the x-axis there is an increasing amount of invasive plants found on the site. The tree-iage matrix categories help to prioritize restoration intervention at a particular site. GTP, in general, prioritizes sites with high native tree composition and low invasive cover to minimize invasive threats from spreading. The tree-iage assessment forms the foundation of the 20-year plan.



Tree-iage Categories

- **High-value areas** Tacoma's highest-quality forests and prairies are dominated by mature trees, including more than 50 percent native conifers, Pacific madrone, Garry oak and/or naturalized wetlands.
 - **Medium-value areas** have greater than 25 percent native tree cover, but less than 50 percent of the canopy cover is evergreen.
 - **Low-value areas** may be forested or naturally open, but exhibit fewer than 25 percent native plant species.

GTP Tree-iage Statistics



In addition to the land categorized above there are 156 acres that do not have a tree-iage classification. This is a result of initial inventorying of land conducted before the tree-iage classification system was put into place.

The majority of the land falls within tree-iage category one, 555 acres. However almost all of this land is located at Point Defiance Park and may present an outlier situation. The second highest category is tree-iage category 5, medium invasive cover and medium habitat quality with 341 acres. As expected there are a lot of sites with high invasive cover and many sites that will require extensive native planting as well.

How do the lands at your site compare to the overall Tree-iage categories?

Habitat Management Units (HMU's)

To facilitate restoration each site is broken into a series of HMU's that allow Habitat Stewards and staff to better understand the conditions of the site and to prioritize and plan restoration activities. HMU's vary in size, but try to designate an area that has similar habitat conditions. A map of HMU's for each site is available and should be used to facilitate annual site planning, as well as a reference for submitting tracking information and setting up events.

GTP Restoration Inventory

Each year, as part of the annual planning process a rapid assessment of habitat conditions is performed on each site that had restoration activities the prior year. This assessment includes information on plant composition, as well as regenerating trees and overstory trees. This data is used for annual work planning as well as the Phase 4 verification by GTP staff.

Phase Mapping

Based on the annual inventory above each HMU is placed into a phase I-4. By tracking the phase of restoration GTP is able to stay on top of resource allocations and make any adjustments necessary to ensure successful implementation of the plan. A phase map is also a good visual indicator for Habitat Stewards to track progress and see the light at the end of the tunnel. Each Habitat Steward will receive an updated phase map as part of their annual planning process and you can watch your site change colors!

Forest Monitoring Teams

While the Inventory provides a rapid assessment of current conditions, the Monitoring Program provides important details on how restoration areas are changing over time. Monitoring plots are 1/10-acre in size and they are currently four monitoring sites for the GTP. The Forest Monitoring Team program and data collection protocol was developed in 2010 by several partners, currently there is no funding to return to monitoring sites, but an effort is being developed to help Habitat Stewards conduct monitoring at their site if interested. The original goal is to monitor sites on a five year rotating basis.

Work Logs (CEDAR)

Part of how work is planned and prioritized is capturing what has happened so far using the online work log and event portal called CEDAR. Having information on what work has been done where tells what follow up is needed, and can help to understand how much volunteer and crew time has been used in a given area. This makes it possible to refine techniques and resource commitments over the course of the program. Keeping up with work logs is a key component of getting sites to phase 4!

Each Habitat Steward is required to submit event request through CEDAR and to follow up each event with the submittal of a work log. CEDAR then can create annual reports for the entire GTP or for each individual park. These annual reports are critical to ensure the long-term political and financial support needed to sustain the program.

Critical Areas

Many sites within the GTP contain critical areas as identified by the City of Tacoma Municipal Code (TMC 13.11). Critical areas include wetlands, wetland buffers, streams, regulated ditches, FEMA floodplains, marine waters, steep slopes, geologic hazards and priority habitat. In general, the removal of Ivy, refuse or maintenance of existing landscaped areas is allowed without permitting as long as significant impacts do not occur and the landscaped area is not increased.

The following activities can occur within critical areas and/or their associated buffers without additional City staff review or approvals, provided reasonable methods are used to avoid and minimize impacts, native vegetation is protected and the use or improvement is not expanded:

- Maintenance of existing trails, access ways, stairways, parking lots and landscaping
- Ivy removal, provided ground disturbance is minimal and does not cause erosion
- Regulated Class A and Class B Noxious Weed removal
- · Hand removal of refuse and debris
- Critical area buffer restoration is allowed within relatively flat locations of up to 1,000 sq ft. (less than 15% slopes) – including non-native vegetation removal and/or native vegetation planting.

With additional City Staff review and approval, the following activities may be allowed within critical areas or their associated buffers:

- · Construction of low impact pedestrian trails within a critical area buffer
- Voluntary Enhancement beyond that which is outright allowed, including critical areas, on sites larger than 1,000 sq. ft. and on slopes greater than 15%.

If you need additional assistance to determine if your project requires critical areas review, approvals or permits from the City, please coordinate with your GTP contact to have the proposal reviewed by all agencies with jurisdiction. The City Planning and Development Services Department can be reached directly at (253) 591-5030.

Habitat Steward Restoration Success

The remainder of this field guide walks Habitat Stewards through the four key elements to successful restoration: preparation, site planning, work parties and on-the-ground restoration Best Management Practices.

Preparation

Every successful undertaking begins with preparation. As a Habitat Steward there are many resources available to you as you plan for and carry out restoration at your site. Always know that you can contact GTP staff with questions and seek advice. The largest element of preparation is to ensure that you actually want to become a Habitat Steward and take on the exciting challenge of habitat restoration. Below are a few other preparatory steps.

I. Visit existing GTP sites and get to know other Habitat Stewards. See how they run volunteer work parties and ask questions. The best preparation is knowledge transfer from an existing Habitat Steward.

2. Attend GTP Habitat Steward Orientation. Orientations are usually held once a year in the winter or spring. However, if there is enough demand additional orientations can be scheduled. Contact GTP staff if you have not attended an orientation yet.

3. Read and review your Field Guide, ask guestions and create a checklist.

4. Work with GTP staff to select your work site, visit the site and determine areas that you may want to start and areas that you would like professional crew help (e.g., steep slopes or heavily invaded areas.

5. Talk to your GTP contact to get connected with other volunteers or groups. Discuss your ideas with neighbors and friends. Consider creating a Facebook page or a Friends

As you get more work parties under your belt and word spreads new volunteers are sure to join. Re-member restoration is hard work and is not for everyone. Persistence and frequent friendly cor-sations will help bring volunteer take the time to greet people as they walk by and answer their questions.



Site Planning

The ultimate goal of the GTP is to get all acres of land into active restoration or phase 4. To accomplish this, there are 5 basic steps that occur on an annual basis.

1. Schedule a site visit with GTP staff. Staff will help you create a site plan that will guide your work and identify specific goals for each project year. Some parks already have a detailed Landscape Management Plan, in which case staff will help interpret that plan. Staff will clarify what work can be done by volunteers, and identify that must be left for professional crews such as slopes and herbicide work.

Site visits will cover the following topics:

- The history of any prior restoration work at your site.
- Information about how to set a timeline for volunteer work parties.
- An estimate of an appropriately sized area to begin restoration project.
- A review of site maps in order to evaluate the best area of focus for volunteer work.
- Information about how to set site goals and choose a restoration strategy using the Best Management Practices (BMPs) that apply to the site

2. Look at your initial tree-iage map (20 year plan), phase map and HMU maps. This information will be part of your introductory packet. You can view the initial tree-iage value, delineated wetlands (if available), slope conditions target ecosystems and many other physical elements of your site.

3. Explore your site to understand the ecological conditions. Consider the plant species that are present, soil type, sun exposure, water features or wet conditions, signs of wildlife.

4. Work with GTP staff to create an annual work plan. Use the maps provided to sketch areas where you plan on working, including invasive removal and new native plantings. Identify hot spots that will require help from a professional crew and try to establish a timeframe for all work within your desired work party schedule. Get an idea of how many volunteers would be ideal, but also have a Plan B in case initiate volunteer levels are low.

If you are a returning Habitat Steward your annual work plan process will start with a site inventory and review of work completed the previous year. You will also update the phase of restoration map and discuss any challenges that need to be addressed.

5.After your work plan is complete try to establish a calender of events. Some major events like Green Tacoma Day will be determined by the entire Partnership, but you should have some idea of when you will host work parties and tie those to areas of restoration identified on your annual work plan.

Work Party

Each group receiving GTP support must commit to holding at least four work parties per year. GTP staff can help each group recruit enough volunteers to meet this goal. Volunteers can help with all four phases of restoration – from initial invasive removal to watering and maintaining plants. Hosting a great work party is not complicated and after a few of them you will be an expert.

Ten Essentials

With all volunteer events, ten essential items help create a successful event.

- 1. Have a clear goal and area that you will work in (visit site ahead of time, maybe even designate areas that you will be working in, take before photos)
- 2. First-aid kit, cell phone, and info about nearest hospital
- 3. Tools and materials (plants, cardboard, mulch, etc.)
- 4. Signage at sign-in table or park entrance and a clear understanding of where people should meet (a canopy if heavy rain is expected)
- 5. Volunteer sign-in sheet and extra youth waiver forms, clipboard, and pens for signing
- 6. Water and food (coffee, tea, snacks, etc.)
- 7. Garbage bags, for trash and as-needed rain ponchos
- 8. General information about your group, your site plan, GTP brochures, the next work party dates, etc.
- 10. Volunteers, a great attitude and desire to have fun!



Running a Good Work Party

Welcome Table and Information

- Greet people as they show up
- Make sure they are signed in and all forms are filled out (e.g., youth waiver)
- Have information about upcoming events and general GTP / CHIP-in info

Managing the Sign-in Process

- Have a few clip boards and pens available
- Have a volunteer manage the table and the process
- Have tools spread out and ready to go
- Track numbers of volunteers and anticipate how many groups you will split folks into and where they will work.

Welcome

- Introduce yourself, why have you taken on this role, why are you excited!
- Make sure everyone has signed in, mention sign-in is also a photo waiver
- Locate bathrooms and other facilities
- Share names and introductions (only for small groups)

Background and Expectations

- Introduce GTP and why this effort is so important (if nothing is done only invasive plants in a few decades etc.)
- Introduce site and its history
- Where will we be working and what will folks be doing

Safety Talk

- Where is the Emergency Response Plan (ERP) and First Aid Kit?
- Review possible site hazards: glass, needles, hazard thorns and branches, steep slopes, etc.
- Ask, "Is anyone allergic to bee or wasp stings?"
- Demonstrate tool safety (proper carrying, use and storage for each)

Quality not Quantity

- Demonstrate tools use and any techniques (invasive removal or planting)
- Point out common plants on your site (natives vs. invasives)
- Compost on site or show where to store waste material
- Large woody debris and messy areas can be good for wildlife (not a cleanup)

Wrap-up.

- Reconvene 15 minutes before the end time (have volunteers gather tools)
- THANK everyone and plug your next event
- Recap the great work completed
- After folks leave, walk site, make sure all tools are collected, note what has been done and what still needs to be accomplished, take after photos
- Fill out your work log and enter work log into CEDAR as soon as possible

Working with Students

Students are enthusiastic volunteers and they can help you get some great work done. We recommend a ratio of 1:5 to 1:7, leaders to youth. When you work with students it is important to go over tool safety, explain why we need to restore our forests, and then have fun!

Students can help to remove invasive plants and mulch, but they need to have permission, most likely granted to the school by their parents. You still need to have a sign-in sheet for the event. You can have adults and/or teachers sign in on the sign-in sheets and have the teacher bring a class list to staple to it.

Hints for planting: Have students work in teams of two for planting. Have them identify their plant species with ID cards if available, name their plants, and make a mulch donut.

Hints for invasive removal: Have students compete to remove the largest blackberry root ball, create the largest compost pile, or pull the longest strand of ivy. Middle-school and high-school students can also help measure the area cleared to help with the work log.

If you need special tools for younger children, or have requests for extra hands for a youth event, please notify the GTP Project Manager four weeks in advance.

Resources for student activities and educational lessons can be found at the Starflower Foundation (www.wnps.org/education/resources/index.html).





REPORTING FORMS AND VOLUNTEER EVENTS

We need to know exactly how much wonderful work you are all accomplishing. This information allows GTP to recognize great achievements, monitor success, and track progress on your site and across the city. Reporting our citywide green space restoration achievements is absolutely crucial for gaining the necessary political and financial support for a successful program.

In an effort to simplify and streamline the documentation process, there are two basic times that you will need to fill out forms. The first is when you initially set up your volunteer event and the second is to document information after your event is completed. Both of these forms are filled out online within the CEDAR tracking system.

Creating a New Event

The information here should be a recap from your CEDAR training and is not meant to be comprehensive. Please contact your GTP representative if you need a CEDAR training, refresher or login.

When you initially create your event you will be providing information to GTP staff regarded the location, number of volunteers requested, tool needs and material needs for your work party. Once you create an event volunteers will be able to sign up online.

Remember to create your event as early as possible, 3 weeks in advance is ideal.

- I. Log into CEDAR (tacoma.cedar.greencitypartnerships.org)
- 2. Under "Events" click on create a new event
 - a. Your name should already be in the event organizer field
 - b. Proceed through this page and fill in all the details about your event
 - c. See the Appendix A for tips on how to create a tool list
 - d. See the BMP section of this Field Guide on how to estimate material needs

Remember to check the appropriate boxes if you DO NOT need tools or materials

- 3. You can attach a map or other information for volunteers to view
- 4. Once the form is complete hit "Submit Event"
- 5. Check back in a week or so to make sure your event has been approved. If it has not been approved check in your GTP staff contact.

Submitting Work Logs (Post Event)

Submitting your post event work log is one of the most critical pieces of information you can supply to the GTP effort.

For each event you host, be sure to submit a work log and volunteer sign-in sheet as soon as possible. If you are working independently, please record and submit hours regularly. Timely submission of work logs and volunteer sign-in sheets is important to tracking and reporting our monthly progress, and demonstrating this progress is key to attracting the financial, political, and volunteer support necessary to keep the program sustainable in the future.

- I.Work logs are submitted by logging into CEDAR
- 2. Navigate to your event and click on "need to submit a work log"
- 3. Complete the work log
 - a.Add volunteers and paid staff who did not pre-register
 - b. Identify the type of invasive species removed and square feet of first time removal
 - c. Identify native species planted by plant type and stock type
 - d. Record plant maintenance (watering, weeding and mulching)
 - e.Add any additional information you want staff to know about
- 4. Upload any documents
- 5. Submit work log

Volunteer events are great way to get work done in the forest, but it also serves an important opportunity to get people outside and connected to Tacoma's parks. Habitat Stewards can provide a fun and rewarding experience for resident's by being well organized, friendly, prepared, and appreciative.

GTP staff and paid crews are available to help lead larger events, as long as you provide us with enough advance notice. Please contact GTP staff to request volunteer-event support. If you cannot accommodate an interested volunteer group, please ask for assistance or direct them to an alternative GTP event listed on the website.

In addition to posting volunteer events on CEDAR, Habitat Stewards are encouraged to do additional outreach to recruit enough volunteers for a successful work party. GTP staff can help you with tips and strategies to get the word out about your event. Many Habitat Stewards have their own Facebook page and there is main GTP Facebook page if would like to post your event there.

Best Management Practices (BMPs)

The BMPs described in the 4-phase approach are a compilation of practices collected by both volunteers and restoration professional with a wide range of experience in forest restoration. BMPs are updated as new methods are tested and deemed successful.Your feedback on these methods is essential! Please don't hesitate to share your experience with us.

Integrated Pest Management (IPM)

The IPM decision making process is used to help develop strategies for reducing invasive plants. A full range of management options are considered based on weed biology, site conditions, as well as anticipated labor availability. This translates to Habitat Stewards in the form of recommendations by GTP staff as well as requirements in the BMPs. In some cases removing invasive plants using volunteers will work great, while other populations or species may require herbicide treatment by a professional crew. Often multiple methods over several years will be used. Using the IPM framework, GTP focuses on non-herbicide strategies whenever possible.

Habitat Stewards and volunteers are not allowed to do any herbicide application. All professional crew work is coordinated by GTP.

Volunteers have the best intentions to improve the health of natural areas in Tacoma, but sometimes restoration activities can be disruptive. Many of the habitats where GTP works, including wetlands, are ecologically important and sensitive, and as such City of Tacoma and Metro Parks Tacoma have a responsibility to comply with regulations. The following BMPs were developed by the City in collaboration with Metro Parks Tacoma and other members of GTP. Additionally, the BMPs are based on the cumulative experience of restoration professionals, volunteers, and stewards from all Green City Partnerships.

Phase 1: Invasive Plant Management



Not all non-native plants are invasive, and some plants that may not be causing local problems are listed as noxious weeds by the state or county. Washington State mandates that all landowners, including counties and state land agencies, control Class A and Class B noxious weeds on their properties (RCW 17.10).

The Pierce County Noxious Weed Control Board maintains a current list of invasive plants for which control is either recommended or required specific to Pierce County: http://piercecountyweedboard.wsu.edu/

Control Methods

Each invasive plant must be identified and its life cycle noted before control is attempted. Control methods for some of the invasive plants most common in Tacoma's green spaces are listed below. For control of other invasive plants, seek guidance from GTP staff or see the above link for Pierce County Noxious Weed Control Board.

In areas with dense infestations, no more than 1/4 of an acre of invasive plants should be removed within a 12-month period to avoid loss of habitat for some wildlife and to prevent soil erosion. Large weed removal areas create prime habitat for more weed intrusion, especially where the soil is disturbed.

Restrictions on Mechanical Methods

Volunteers are restricted from using power tools on all GTP restoration sites. Mowing, chainsaw work, and brush-cutting must be performed by appropriate City/Parks staff or contractors, unless permission is granted to trained individuals. Similarly, removal of weedy trees often requires treatment with herbicide or power tools, and will be addressed by licensed pesticide applicators via either contract restoration crews or public agency staff. Volunteers are not allowed to apply herbicides under any circumstances.

Weed Pulling and Cutting

Manual removal techniques can be very effective and may be applied to shrubs, vines, and herbaceous weeds.

In addition to the general guidelines for weed removal stated above, Habitat Stewards should consider the following when approaching the removal of weeds with tools:

Hand Tools

- Maintain safe distance of at least 10 feet between volunteers using tools.
- Work carefully to minimize soil disturbance.
- Avoid pulling or damaging non-target plants.
- Use tools of appropriate size for the job to avoid stress on both hands and tools.
- Cutting tools: Hand pruners for stems < 1", Loppers for stems 1-2", Handsaws for stems > 2".
- Root-removal tools: Hand-picks for herbaceous plants; large picks, shovels and Weed Wrenches[™] for shrub or tree roots and rhizomes.

Types of Control

Exclusion

Exclusion is the natural, long-term control for most invasive plants. In areas with little native vegetation, where plants have recently been removed, planting and/ or mulching helps develop this natural control. Establishing a healthy native plant community helps exclude invasive plants from a site by competing for light, water and nutrients. Mulching prevents light from reaching weed seeds in the soil, and if thick enough, can help control the re-growth of woody plants from roots.

Smothering

Similar to mulching, smothering restricts light reaching the soil but is used to kill plants that are already present by completely excluding light, and restricting air and water flow. The most common smothering method is sheet mulching, in which a double layer of uncoated cardboard is laid over the soil after removing the above-ground parts of any large invasive plants; the cardboard is then covered with mulch. In some cases, a very thick (12") layer of mulch may be used without cardboard. Do not use inorganic materials for smothering.

Creating Snag Habitat from Invasive Trees

In some cases, it may be desirable to kill a tree of an invasive type to prevent its further reproduction, and to leave the dead tree standing for its habitat value. Such work must first be reviewed and approved by the appropriate agency landowner staff. Trees may be killed by removing a strip of bark and cambium all the way around the trunk. Where this method may appear to be the result of (or encourage) vandalism, trees may be killed by certified agency landowner staff or their contractors injecting herbicide into the trunk.

Disposal Methods

Each invasive plant must be identified and its life cycle noted before removal is attempted. Invasive plants will in most cases be disposed of through local green waste recycling programs. Since reproductive parts of plants may survive some composting methods, keeping such parts out of green waste recycling programs is important to avoid contributing to a regional problem:

• Seed heads of noxious weeds, even if unripe, should be wrapped in sturdy plastic bags before cutting, then sealed and disposed of in a landfill immediately.

• All parts of invasive plants which are capable of re-sprouting from plant fragments should be removed from the site and disposed of in a landfill, or solarized under plastic on site (to reduce size), then later disposed of in a landfill.

Composting

Where green waste removal is impractical or cost prohibitive, stems of many plants, including blackberry canes and ivy vines, may be gathered into piles for on-site composting. To minimize the possibility of weed re-establishment, composting piles should have at least 2 layers of cardboard placed underneath them (I box folded flat = 2 layers) or a rack made from large branches. Use the following instructions and illustrations to build an on-site compost pile.

If you learn better by seeing, check out this video online:

http://greencitypartnerships.wordpress.com/2011/04/08/composting-on-site/

Building an On-site Composting Pile

Step I: Find an area free of native plants and remove all invasive plants and roots. It is very important that the area is cleared well before building your compost piles to minimize the chance for invasive weed growth from under the pile.

Step 2: Lay out a frame of branches that will define your compost area. The area of the pile should not be more than 40 square feet. If you are using cardboard, lay the cardboard down first and put the frame of branches on top of the cardboard edges.



Step 3: Fill in your frame with dead branches and sticks found on site. Place them in both directions to form a grid. This helps prevent the composting weeds from having direct contact with the soil.

Step 4: Put pulled weeds on top of the pile. Stack ivy in smaller bundles and contain all debris inside the frame. Do not make the pile higher than 3 feet tall.

Step 5: Check piles throughout the year and turn or maintain them as needed to ensure that the ivy or blackberry does not re-sprout.

Roots from non-listed invasive plants should be collected separately and placed on top of composting piles so they do not sprout or root in the soil.

Knotweed and other noxious weeds are capable of re-sprouting from plant fragments. All plant parts of knotweed, purple loosestrife, garlic mustard, and giant hogweed should be removed from the site in plastic garbage bags to be disposed of in a landfill. Reproductive parts, such as seed-heads, of purple loosestrife, garlic mustard and tansy ragwort should be clipped into plastic bags and disposed of in a landfill in a timely manner. CAUTION! Giant hogweed should only be handled when skin is fully covered and all Personal Protection Equipment, including safety glasses, is worn. The sap can cause severe burns. If you think you have giant hogweed on your site, please work with your GTP contact to develop a removal plan.

Disposal Considerations

• The City and Metro Parks Tacoma are generally able to provide green waste containers if planned in advance. Please coordinate with your GTP contact when you have a work party that will produce a large amount of invasive plant debris.

• Free disposal of weed waste in Tacoma or Pierce County's green waste recycling system is a viable and effective alternative if you have access to vehicles and drivers who can also get sufficiently close to your site's collection of removed invasive plant debris. Be sure your debris is placed on top of a tarp, and separated from non-plant debris, such as trash and recyclables.

• Where access to transport vehicles is difficult or impossible, stems of many plants may be gathered into piles and composted on-site, in out-of-trail-view corridors. This includes blackberry canes and Ivy vines.

• Invasive plants which have set seed such as purple loosestrife and tansy ragwort should have seed tops carefully cut, collected in plastic bags, and removed from the site.

• Noxious weeds that are capable of re-sprouting from plant fragments are often more effectively eradicated with herbicides than they are from mechanical removal. All plant parts of knotweed, purple loosestrife, garlic mustard, and giant hogweed should be removed from the site and disposed of in a landfill or hot composted in black plastic bags on site to reduce size, then later disposed of in a landfill. All flowering parts of any noxious weed should be clipped into plastic bags and disposed of in a landfill.

Weed-Specific Methods

Himalayan and Evergreen Blackberry (Rubus discolor and Rubus lacinata)

• Cut and grub root wads (this practice may need to be repeated for 2-3 growing seasons before planting). Be ready to cover bare soil areas where invasive plants have been removed with a minimum of six (6) inches of mulch to prevent the re-intrusion of alternate weed species that are always present in the soil.

OR

• Mow plants to keep them less than a foot tall. If the invasive cover is not too dense, this method can kill blackberry patches within 2-3 years. Remember that Habitat Stewards cannot operate power tools or machinery. Contact GTP staff if you have an area where you think mowing would be effective.

Blackberry Canes, above left – Use caution when cutting and carrying these stiff, prickly

canes. Long sleeves and leather gloves are a necessity. Locate a clearing beyond trail-view corridors and stack the canes to compost over time. It is helpful to leave about a foot of cane sticking out of the ground to remind you where to come back and dig out the root.



Blackberry Root Balls, above right – Blackberries have large clumps of root balls in the first 6-18 inches of soil. Below the balls the roots can grow up to three-feet deep. Roots should be dug out entirely and placed on top of a stack of canes.

• Canes and root wads that are removed can be disposed of in the following ways:



a) Send to a green waste recycling facility.

b) Clip the canes into small pieces on site and spread as a

mulch layer no deeper than one inch; only on sites where additional organic mulch can be provided.

c)Compost on site.



English Ivy (Hedera helix)

• Create tree "Life Rings" by cutting vines at shoulder height, then again near the base of the tree. Grub out roots to a radius of at least 5 feet away from the tree.

• Do not attempt to pull vines out of the tree; they will die and decompose on their own.

• Remove patches of ivy growing on the ground by clipping edges of swaths and rolling the mat into a log or ball.

•Take care to cut around, or gently lift

ivy mat over, existing native plants.

• CAUTION! During hot summer months, be cautious of nesting, stinging insects such as wasps and hornets. These insects seem to prefer nesting under ivy.

• Clear ivy at least 10 feet beyond proposed planting area to create an ivy-free buffer.

• Disposal options for ivy are limited because the plant roots so easily when in contact with the soil. Acceptable options:

a) Send to a green waste recycling facility.

b) Compost on site.

Knotweed (Polygonum spp.)

• Grubbing rarely works, and only for very small patches. All plant material must be removed from the soil, since the tiniest piece can generate a new clump. Knotweed must also be bagged and disposed of in a landfill – do not send any plant parts to green waste recycling.

• Manual removal of large patches is impractical and may exacerbate the problem by spreading plant bits.

• Chemical - stem injection is the most effective method of control, and must be performed only by certified agency landowner staff or contractors. Once dead,









knotweed may be recycled as green waste or composted on site.

Clematis or Old Man's Beard (Clematis vitalba)

• Cut vine at the base in early summer before seed production and grub out roots.

• Stems may be pulled in winter when brittle.

Field Bindweed/Morning Glory (Convolvulus arvensis)

• Hand pull at least 3 times per year (early growing season, midsummer, and late summer) for at least three growing seasons. Flag site and monitor.

• Chemical control may be most effective for larger infestations.

English Hawthorn (Crataegus monogyna)

- Cut to the ground repeatedly for at least 3 growing seasons.
- Mark stump and monitor.

Laurels and English Holly (Prunus spp. and Ilex aquifolium)

- Small, young plants may be hand-pulled or weed-wrenched.
- Cut laurel seed heads, place in plastic bag and dispose of in a landfill immediately.

• **DO NOT** cut down either species without removing the roots. This stimulates root growth and causes suckers which grow into many more trees, greatly multiplying the problem. Any tree that cannot be completely removed should be left for a professional crew.

• Trees can be girdled by stripping a small section of bark and cambium, which will kill the tree without encouraging it to sucker.

• Large plants require herbicide (to be performed only by City or Parks staff or contractors).

Scotch Broom (Cytisus scoparius)

• Hand-pull small plants and Weed Wrench[™] or excavate larger plants when soil is moist in spring. Another option is to cut plants in early summer, just as flowering begins; then cut again at least once in late summer. For large stands, sheet mulching and diligent monitoring may be necessary.









Phase 2: Planting and Installation



Many public properties have Resource Management Plans or other guidance documents that provide specific plant palettes to meet various management objectives. These documents are based on an inventory of existing and preferable plant species at each site, and are often developed with community involvement and agency environmental review.

Adhere to plant palettes and project scheduling as outlined in City or Metro Parks-specific documents. Where guidance is not available, work with the property owner and GTP staff to develop a plant palette. Sites overwhelmed by invasive plants will require more intensive planting and maintenance than those that already have some native canopy cover.



Selecting Planting Areas

Planting areas are distinct plant communities that require different restoration approaches. Sites overwhelmed by invasive plants will require more intensive planting and follow-up maintenance than those that already have established native plant cover. Divide the project site into the following three types of planting areas and sketch these areas onto a blank field page provided at the back of the field guide.

TYPE A: Establish Plant Community – These are areas of completely bare ground, likely due to clearing an invasive plant community.

TYPE B: Enhance Plant Community – Areas where there are some native plants, additional density and/or species diversity is required to meet canopy cover and habitat goals.

TYPE C: No Planting – Areas that are fully occupied by a diversity of native species that provide multiple layers of canopy cover OR otherwise currently meet management objectives.

Posting Planting Area

Delineating the planting areas defined above is helpful before measuring and identifying where to distribute plants when they are delivered. Visual clues in the forest will help you determine boundaries or "edges" between planting areas. Type "A" areas are the easiest to delineate with clear boundaries between bare or chip-mulched soil and the start of other plant communities - posting edges is not necessary in these areas. Where boundaries are less clear, define planting area boundaries by flagging edges at head height. Flagging is strictly for purposes of site measurement and locating areas on planting day. All flagging or stakes should be removed immediately after plants are installed and the site has been mapped.



Measuring Planting Area

Planting area estimates are required to determine plant quantities for orders. To estimate the size of an irregularly-shaped area, divide it into a series of squares or circles and add these elements together (see example below). If the entire area approximates a regular shape, then estimate the area of just the one large shape.

Area Formulas:

Square or Rectangle = Length x Width

Circle = $3.14 \times \text{Radius}^2$

For the example above: Planting Area A = $(30 \times 20) + (60 \times 40) + (20 \times 20) + (15 \times 15) = 3,625$ sq. ft.

Plant Stock Types

Stock refers to the packaging of plant material.

Container

The most familiar stock types used in restoration are container or bareroot trees and shrubs. Container stock is preferred for developed site plantings because these plants have well-developed root systems, the packaging protects plant roots during transport, and they can be staged for periods of time without special cold storage or watering instructions. In Western Washington, with our rainy winters and very dry summers, container plants are the best choice for fall and winter planting (October 15 – March 1) – this allows adequate time to develop new fibrous roots before the next growing season. Container stock comes in a variety of sizes. Trees and shrubs are purchased in gallon containers and herbaceous plants in 4" pots. Larger, more mature stock is expensive and has more difficulty adapting to variable site conditions. Smaller plant stock may outgrow larger stock over time.

Live Stakes, Plugs, and Bareroot Stock

Live stakes, plugs, and bareroot material are great to use for restoration plantings. These materials are lightweight and very inexpensive. However, their main disadvantage is storage. These stock types all have special watering requirements before installation. Bareroot and live stake materials must be kept in cold-storage prior to installation. Live stakes may be planted through fall and winter (October 15 – March 15).

How many plants do I need?

Spacing refers to the distance between installed plants. Spacing objectives are determined by management goals related to canopy cover and plant competition. Although it's not a guaranteed way to eliminate invasive growth, planting natives densely will consume site resources including water, nutrients and light, and limit resource availability for invasive species. Spacing will ultimately determine how many plants you need to order.

Type A and Type B planting areas have different spacing protocols. The general idea for both types of sites is to occupy as much of the site as possible without creating excessive competition between installed plants. Type A sites are fairly straightforward because you are working with a blank slate. Type B sites require evaluating the current plant density and approximating the number of additional plants you would need to fully occupy the site.

According to plant type and desired plant density, the following table indicates the spacing and the square footage that each plant will occupy based on the spacing (see caveat on herbaceous plants).

Formula for Calculating Plants Needed:

of Plants Needed = Planting Area ÷ Square Footage/Plant

of Plants Needed = 3,625 sq. ft. \div 36 sq. ft. / plant = 100 plants (densely spaced trees)

Plant and	Desired	Spacing	Divide Square
Stock Type	Plant Density		Footage by
Tres	Dense	10 feet o.c.*	100 sq. ft.
Average	12-15 feet o.c.	144-225 sq. ft.	
	Sparse	18 feet o.c.	324 sq. ft.
Shrubs	Dense	4 feet o.c.	l 6 sq. ft.
	Average	6 feet o.c.	36 sq. ft.
	Sparse	8 feet o.c.	64 sq. ft.
Live Stakes	Dense	l foot o.c.	l sq. ft.
	Average	2 feet o.c.	4 sq. ft.
	Sparse	3 feet o.c.	9 sq. ft.
Emergents plant in	Dense	clumps I ft. o.c.	l sq. ft.
clumps of 4, multiply	Average	clumps 2 ft. o.c.	4 sq. ft.
the final number x 4	Sparse	clumps 3 ft. o.c.	9 sq. ft.
Herbaceous/Ground	Dense	l foot o.c.	l sq. ft.
(over 4-inch pots in	Average	1.5 feet o.c.	2.25 sq. ft.
groups of 3	Sparse	2 feet o.c.	4 sq. ft.
Herbaceous/	Dense	2 feet o.c.	4 sq. ft.
Ground Cover	Average	3 feet o.c.	9 sq. ft.
I-gallon pot	Sparse	4 feet o.c.	16 sq. ft.

* o.c. = on center

Note: Herbaceous layer figures have been adjusted down from Sound Native Plants' suggestions to account for presence of trees and shrubs. For 4" pots, multiply final plant number by 3 as each group of 3 plants should receive 4 ft² of space. Sound Native Plants (2004)

If you desire to create a densely planted mixed conifer/deciduous canopy, you first need to determine the total number of trees needed. Then, figure out what percentage of your square footage you want each species to occupy. Let's assume we want 30% cedar, 50% maple, and 20% alder

Trees Needed = 3,625 sq. ft. \div 100 sq. ft. per tree = 36 trees Cedar Needed = 36 x 0.3 (30%) = 11 Maple Needed = 36 x 0.5 (50%) = 18 Alder Needed = 36 x 0.2 (20%) = 7 Follow the same steps for each plant layer to occupy the site fully. Don't be concerned about overloading each layer. Density protects the integrity of a project on two levels: 1) The site is fully occupied by natives, excluding invasive plant opportunities, and 2) it is a form of insurance for poor plant survival. Restoration plants are cheap relative to invasive species removal. It takes substantially less effort to thin a few excess native trees or shrubs than it does to clear ivy or blackberry from the same area. It is also extremely unlikely that you will obtain 100 percent survival.

If you are working on a Type B site, you will need to estimate the current site occupancy and adjust the quantity of plants needed. The simplest way to do this is to count stems and divide by site square footage. Don't worry about getting a perfect count, this process is an art and a science and there are no perfect answers.

As an example, see the following diagram. Let's assume Planting Area B is also 3,625 square feet.

The site is currently occupied by 2 cedars, 4 maple, and 4 alder. Assuming we



have the same density goal as our previous example, we can follow the same steps above, and then simply subtract the number of plants already occupying the site to match our management goal.

Cedar Needed = 11 - 2 = 9Maple Needed = 18 - 4 = 14Alder Needed = 7 - 4 = 3



Tree stem counts are simple, shrub counts are a little more complicated, and groundcover counts can be challenging. If you already have dense ground cover, or plants are in clumps too close to identify individuals, estimate a percent cover then work your way back to occupancy.

The following diagrams illustrate five levels of cover. Use these illustrations to help you estimate plants needed. If you have 70 percent native ground cover and your goal is 100 percent, you need to occupy 30 percent of your site with additional ground cover.



Ground Cover Plants Needed Dense = 3,625 sq. ft. \div 4 sq. ft. per plant = 906 plants

In order to account for current occupancy, multiply the number needed for full occupancy by the percent of bare ground on your site.

Bare Ground Percent = 100 - Current Percent Cover = 100 - 70 = 30 percent Ground Cover Plants Needed = 906 plants x 0.3 (30%) = 270 plants

This may seem like a lot of work, but if you are an experienced gardener or landscape technician, or have performed the above process many times, it gets much, much easier. An experienced reforestation specialist can walk to a site, estimate area and percent cover and calculate plants needed in less than an hour.

While you work your site, practice the following technique. Think of objects of known area. A car is approximately 25 sq. ft., an average bedroom is 100 sq. ft.,

and an average story of a medium-sized house is about 1,000 sq. ft. Estimate stem density and eyeball percent cover. After you practice a bit, run through the above steps and see how close your educated guess came to your measured results.

Over time your skills will improve dramatically and you will need significantly less time to develop planting plans. Remember that restoration is an art and a science - there are no perfect answers!

Obtaining Plants for your Restoration Site

With the plant selection, stock types, and spacing determined, plus planting areas delineated and measured, you are ready to combine these elements and put together a plant order. GTP staff can assist you in identifying potential sources of quality native plants.

Plant Salvage

Beyond purchasing container plants from local nurseries, you should be aware that Pierce, King, and Thurston Counties organize native plant salvage events. These provide an opportunity to rescue native plants from sites slated for development. And you'll get to take some free* plants for your own restoration site.

Pierce County

http://www.meetup.com/Native-Plant-Salvage-Alliance-Pierce-Co-WA/

King County

http://www.kingcounty.gov/environment/stewardship/volunteer/plant-salvageprogram.aspx

Thurston County

http://county.wsu.edu/thurston/nrs/nativeplants/Pages/default.aspx

*In exchange for your work!

Plant Propagation

Instead of purchasing plants, why not "create" your own? There are many different methods to propagate plants on your own and this is one of the easiest ways to drastically reduce the monetary costs of restoring your site.

See the appendix on Plant Propagation to learn about the ethics and techniques of how to propagate native plants.

Plant Installation

Plant Inspection

Signing a plant delivery order implies that you have received the stock and certify that it is acceptable. Visually inspect nursery stock on delivery. It is extremely difficult to communicate or negotiate regarding poor stock after the delivery truck has left. Plants also require special care, and the nursery is generally not responsible for the fate of plant stock after it has been received. Be prepared to provide water to plants that will not be quickly installed, and consider the safety of your plants if left unattended. Count and examine the health of all varieties of plants received. Pull some plants from containers to examine the root system. Occasionally, plants are delivered in containers larger than required for root and plant needs. If you pull a 4"-pot size plant from a gallon container—and most of the soil immediately falls off—make a note and communicate this to both the delivery driver and the person who ordered the plants.

Plant Staging

Staging is the distribution of plants across a site in preparation for planting. Many volunteers and new crew members are not familiar with plant species or their appropriate ecological niches, so it is very important to have plants placed where they will be planted prior to the planting event. Small patch plantings of 50-100 plants may be placed by an individual in an hour. Larger, more elaborate, plantings can take several hours and the help of a crew to stage. Upon delivery, have the nursery driver and crew, if available, help you place plants in groups by species, preferably in clumps of 10 for easy distribution across the site. Plan adequate time in work plans for plant staging.

Plant Layout

In habitat areas, plants are selected and placed to meet interconnected needs of wildlife, aesthetics, slope stability, and recreation. The general aesthetic is naturalistic, defined by a randomly placed assemblage of multiple canopy layers. Species are selected to suit site-specific soils, aspect, and existing plant communities. Some management plans may call out specific planting styles based on a desired aesthetic which can require specific staging methods. This is unusual, and unless otherwise noted, either the Clump-Gap Mosaic or Forest Thicket are preferred.

Clump-Gap Mosaic

A "micro-site" is the specific location within a restoration project where one

to many plants will be installed. Plant palettes are selected to meet general site conditions; however, within each site, there is variability in soils, sunlight, and moisture availability. In order to address microsite issues, the Clump-Gap Mosaic planting pattern was developed. The basic pattern is that 3 to 5 plants of each species are "clumped" with several other groups of 3 to 5 plants of other associated plant species. Between these clumps are gaps where indi-



viduals of the different species are randomly placed with wider spacing. This layout ensures that each species will be distributed across the site, both in association with several different other groups of species--as well as alone. The clump-gap planting approach provides several unique niche opportunities for each species and lends a random and naturalistic aesthetic to the planting.

Forest Thicket

This style of planting is a high-density version of clump-gap, as above, without the

gaps. To achieve this objective, groundcovers and shrubs are staged at dense spacing in groups of 3-5, with individual tree species placed in between, also at dense spacing. Visually there will be less bare ground than the clump-gap style. This style of planting is particularly useful to address areas heavily invaded by pervasive weeds as it maximizes immediate site occupancy by native plants.



Now You're Ready to Plant

I. Preparing the Planting Location

• Clear away all large loose materials, such as leaves, rocks and branches, from the area where the planting hole will be dug. Clear an area twice as wide as the plant's foliage or root system and deep enough to completely accommodate the existing depth of the plant's roots.

• Where mulch has been applied to the soil surface, be sure that the plant is actually installed in soil, and not just in the mulch. This may require that the finished planting has something of a funnel of mulch around it, without the mulch touching the plants' main stem, and without burying its roots too deeply.

• Once the hole is appropriately prepared, spread out the plant's roots after the planting container has been removed and the soil media in which the plant was grown is loosened, if not removed entirely.

• Place the nearly bare-root plant into the hole; plant roots without crowding or bending the roots. See below for specific installation recommendations related to different types of plant stock.

2. Preparing the Plant

The plants for your project may either be in containers or they may have no soil around the roots (bareroot and salvaged plants).

For Potted Plants:

• Ensure the soil in the pot is moist, then tip the pot on its side and gently press on the pot to loosen the plant.

- Remove as much soil as possible from the roots, and spread the roots out.
- Before planting, prune back any badly bruised, broken, circling, kinked, or jagged roots to healthy plant tissue.



For Bareroot Plants:

• Keep the roots moist and cool until planting by storing them in moist sawdust or soil. In addition, bare root plants may be soaked in water for I-2 hours (never longer than 6 hours).

• Before planting, prune back any badly bruised, broken, circling, kinked, or jagged roots to healthy plant tissue.



3. Planting

• Dig the planting hole deep enough so the plant, when set in the hole, will have the top of the root crown flush with the soil surface (use a shovel as a level on larger trees and shrubs). Both deep and shallow holes will compromise a plant's ability to establish effectively. Planting too deep can cause the stem to rot and kill the plant, and planting too shallow can dry out the roots.

- Thoroughly clear existing roots from the hole.
- Pile soil in a cleared area next to the hole. Take plant roots and grass clumps out of the soil that will be used to backfill the hole.
- Roughen the sides of the hole if they appear smooth or slick.
- Make a small cone of soil in the bottom of the hole.
- Arrange the roots around the soil cone so they all point outward from the plant.

- Place the plant so that soil covers the roots, but doesn't cover the root crown the swelling area on the main stem before the roots start.
- Do not plant too deeply.
- Backfill using the native soil that was dug out of the hole (or a hole nearby if more soil is needed).
- Ensure that only soil goes back into the hole no large rocks, sticks, clumps of grass, or leaves.
- Small quantities of TAGRO potting soil can be mixed with native soil at planting time or applied as a top dressing after planting.
- Push soil into and around the roots in the hole without disturbing root arrangement. Cover the roots, but leave the entire stem exposed above soil.
- Push soil down firmly to remove air pockets. Avoid stepping on the planting hole. Compacting the soil too much can damage fragile root hairs.
- Construct a basin around the periphery of the planting hole to hold water and adjust the soil so that water drains away from the immediate trunk area.

4. Finishing Up

- When possible, water the plant immediately to settle the soil and eliminate any significant air pockets. Add more soil to any air holes that appear.
- Apply wood chip mulch to the top of the soil in a circle at least as wide as the roots, but not touching the stem. Two five gallon buckets of mulch in a four inch deep circle around each plant is appropriate.
- Adapted from WSU Cooperative Extension Bulletin MISC0337, Plant it Right: Restoration Planting Techniques.



Planting Live Stakes (Cuttings)

· A tool called a planting bar is often used to punch a hole into the soil for cuttings. In softer soils, cuttings can also be directly pushed or hammered in.

 Insert the cutting right side up. Cuttings are typically cut on an angle on the bottom and flat on the top. When held right way up, the buds will typically point upward.

• A general rule is to plant cuttings 18" deep, three nodes into the soil, or at least half the length of short cuttings. Deeper is fine, as long as a few buds are exposed at the top.

 Tamp the soil around the cutting to ensure that there are no air pockets along the stem. You can push the planting bar into the soil immediately around the stem and push in the soil toward the plant.



on bottom

When to Install Plants

Stock Type Container Bareroot Livestakes Plugs – Emergent Plants Seeds Salvage Plants

Planting Season October 15 – March I lanuary I – March I October 15 – March 15 October 15 – March 15 Dependent on species October 15 – February 28



Phase 3. Plant Establishment



Most plants require at least three years of establishment care to ensure plant survival. Although native plants have adapted to our very dry summer climate, newly transplanted plants experience transplant shock that can reduce growth and health. The following Three-Year Establishment Care Calendar can be used to guide establishment care activities. In general, sites are weeded in the early growing season, watered in summer and mulched in late summer.

Water is rarely available for on-site application to plantings. Plant installations should occur during the rainy winter months (October I – March I) to maximize plant survival in non-irrigated areas. If water can be made available, drip irrigation is least labor-intensive. Containers that can be filled periodically and slowly ooze water into the soil may be useful where needed; these can be serviced by water tanks on trucks or trailers, as can emergency water buckets during particularly hot weather.

	Three Year Establishment Care Calendar										
	Mon	th									
Action	J	F	M	Α	M	J	J	Α	S C) N	D
Year 1											
Mulching											
Weeding				•	•						
Watering						• •	••	• •	• •		
Year 2											
Mulching											
Weeding				•	•						
Watering						••	••	••	••		
Year 3											
Mulching											
Weeding					•						
Watering						••	• •	••	• •		

Three Year Establishment Care Calendar

Indicates period when action may be taken. Timing and frequency to be determined by site micro-climates, soil and weather conditions.

 Indicates periods when action is most favorable OR must be performed.

Soil Preparations Using Mulches

Mulching

Mulch is a general term to describe ground covering materials placed over the soil. Mulches serve to retain soil moisture and block growth of weeds; they also prevent soil erosion and can be used to moderate soil temperature. Several organic mulching materials are effective and available from local sources, including TAGRO; inorganic materials should not be used.

Wood Chips

Wood chip mulch is particularly useful for weed suppression, soil enrichment, and plant establishment, especially on sites with little or no available water. You should always apply mulch to cover bare soil after invasive plant removal to prevent erosion and enrich the soil to prepare for planting. You should also always apply mulch around new plantings as this will drastically improve plant survival. Larger chips and shredded wood is much more difficult to spread, but is as effective as arborist wood chips. Coordinate with your GTP contact to have wood chips delivered to your site.

Bark

Bark should not be used as mulch; it creates an impenetrable mat as it breaks down, resulting in dry and slightly toxic soils.

Sheet Mulching

Sheet mulching in conjunction with the use of wood chips is useful for sites that were severely infested with invasive plants. Place at least two layers of non-coated cardboard (I folded box = 2 layers) on the ground between all plants, making sure to leave no gaps. Follow-up with 6-12" of wood chip mulch on top of the cardboard throughout

the site. Deeper application of wood chips (up to 24 inches) can achieve the same effect as using sheet mulch without cardboard, but be sure that your plants have their roots in the soil and are not buried by the deep mulch.

Compost

Compost is nutrient-rich organic mulch with a finer texture than wood chips. Compost is more appropriate as a soil amendment than mulch in most cases. On extremely poor soils,



 $\frac{1}{2}$ " layer of compost may be spread before mulching; do not incorporate compost into individual planting holes – soils should be kept as consistent throughout the area as possible.

Determining Mulching Needs

Calculating Cubic Yards

To convert cubic feet to cubic yards, divide the number of cubic feet by 27 (the number of cubic feet in I yard):

cubic feet ÷ 27 cubic feet = # cubic yards

For example, if you have an area of 1,000 square feet, and you would like to put down 4 inches of mulch:

1,000 square feet \times 0.33 feet = 330 cubic feet 330 cubic feet \div 27 cubic feet = 12.2 cubic yards

Converting Square Feet into Acres

I Acre = 43,560 square feet OR I Acre = 208.75 ft. x 208.75 ft.

To convert square feet to acres, divide the square footage of your restoration site by 43,560.

For example: You have a restoration site that is 7,850 sq. ft. Acres = 7,850 sq. ft. = 0.18 acres 43,560 sq. ft.

Don't want to go through all the calculations? Use this handy chart (borrowed from Hilltop Service Inc.):

Square	Depth	Depth	Depth	Depth	Depth	Depth
Feet	3"	4"	5"	6"	7"	8"
100	1	1 1/4	1 1/2	2	2 1/4	2 1/2
150	1 1/2	2	2 1/2	2 3/4	3 1/4	3 3/4
200	2	2 1/2	3	3 3/4	4 1/2	5
250	2 1/2	3	4	4 3/4	5 1/2	6 1/4
300	2 3/4	3 3/4	4 3/4	5 1/2	6 1/2	7 1/2
350	3 1/4	4 1/2	5 1/2	6 1/2	7 3/4	8 3/4
400	3 3/4	5	6 1/4	7 1/2	8 3/4	10
450	4 1/4	5 3/4	7	8 1/2	9 3/4	11 1/4
500	4 3/4	6 1/4	7 3/4	9 1/4	10 3/4	12 1/2
600	5 3/4	7 1/2	9 1/4	11 3/4	13	15
700	6 1/2	8 3/4	11	13	15 1/4	17 1/4
800	7 1/2	10	12 1/2	15	17 1/2	20
900	8 1/2	11 1/4	14	16 3/4	19 1/2	22 1/4
1000	9 1/2	12 1/2	15 1/2	18 1/2	21 3/4	24 3/4
2000	18 1/2	24 3/4	31	37	43 1/4	49 1/2
3000	28	37	46 1/2	55 3/4	65	74
5000	46 1/2	61 3/4	77 1/4	92 3/4	108	123 1/2

Phase 4. Monitoring and Maintenance



After a restoration site has gone through invasive removal and planting, and the trees, shrubs, and ground cover are established, the work still isn't done! We believe that forests are never completely "restored" because continued monitoring and maintenance are needed to make sure that Tacoma's parks and green spaces remain free of invasive plants and filled with healthy native plants. You should plan to take an annual walk through your site to look for plant mortality, any invasive plants, or possible areas of human impact that require attention. You can report any work done on work logs under the maintenance section.



For a small investment of your time, by remembering to check up on your site you can ensure that it stays in great shape for years to come and that all your hard work doesn't go to waste!

If you're inclined to take a more scientific approach to monitoring, GTP staff have standardized monitoring protocols and can help you establish a monitoring plot in your restoration site. Just ask!



Appendix A: Tools and Planning

Creating a Tool List for Your Event

Habitat Stewards can borrow tools for a volunteer event from Metro Parks Tacoma, using the request tools section of CEDAR. When planning for your event, estimate about one to one-and-one-half hand tools per expected volunteer (not including buckets, wheelbarrows, tarps, etc). Volunteers can share or trade tools as needed, so you do not need all of the different tools per volunteer. Requested tools will be available for pick up by Habitat Stewards (or a member of your group) at MPT maintenance facility, or a delivery by MPT/GTP staff can be arranged.

Habitat Stewards who demonstrate a long-term commitment to a site and need tools on a regular basis may qualify for an on-site tool box and tools. Contact the GTP Project Manager for more information.

Please note that the preferred tool for a job varies among volunteers. The following suggestions are based on what tools are most readily available.

All Restoration Activities

- Gloves! Make sure you have enough for each volunteer.
- Garbage bags

Invasive Plant Removal

- Hand tillers and/or mini-mattocks (digging out small roots)
- Loppers (all-purpose cutting)
- Hand pruners (cutting smaller invasive plants)
- Folding hand saw (cutting ivy vines from trees)
- Digging shovels (digging out blackberry roots)
- Tarps (carrying piles of invasive plants)
- Hard rake (moving piles of invasive plants)
- Weed Wrench[™] (removing Scotch Broom and small invasive trees)

Mulching and Sheet Mulching

- Buckets (moving mulch or gravel)
- Pitchfork
- Wheelbarrow
- Utility knife (prepping cardboard)
- · Hard rake (spreading mulch)

Planting

- Digging shovels
- Hand trowels (for smaller four-inch plants)
- Rock bar or pick-mattocks (rocky or difficult digging)
- Utility knife (cutting cardboard or fabric)

Basic Trail Work

- Pick-mattocks (grubbing trails or big roots)
- Pulaski half ax, half adze (grubbing trails or big roots)
- Hard rake (spreading gravel)
- Hazel hoe (grubbing trails)
- Buckets/wheelbarrows (moving gravel)
- Digging shovel

Other Available Tools

- Broom (cleaning up paved surfaces)
- Leaf rake
- Litter picker-uppers

Example

20 volunteers for English ivy removal as well as some blackberries will need:

8 loppers
8 hand tillers
5 hand pruners
2 folding hand saws
3 shovels
2 tarps
20 sets of gloves
3 buckets (for carrying tools)



Tips for keeping track of your tools

- Count your tools before you start working!
- Keep tools in a central location at the work site when they are not in use.
- Collect and count tools when breaking for snacks or lunch.
- Assign one of your volunteers to sort and count tools at the end of the day before volunteers leave. If there are tools missing, have everyone go back and look together.

• Tie brightly colored flagging tape to small tools such as hand pruners and folding saws.

- Sweep through the site as people are working to look for abandoned tools.
- Make sure people don't forget to return their gloves neatly rolled together.



Appendix B: Soil Quality

Soil quality is an important consideration in restoration plantings, especially in urban habitats where there can be significant disturbance. As part of preparing your planting plan, spend some time digging in and getting familiar with what is going on below the ground's surface.

Soil texture is key to our understanding of the capacity of a soil to hold and supply water and nutrients to a plant. Texture refers to the distribution of different sized soil particles.

- Sand particles are the largest and make for well-aerated and well-drained soil that consequently has poor water and nutrient holding capacities.
- Clay particles are the smallest and have slow drainage and poor aeration, but high water and nutrient capacities.
- Silt particles fall between sand and clay in size, nutrients, and moisture conditions.
- Loam refers to a soil that has half as much clay as sand or silt, making for a wellstructured soil with ideal pore space and surface area to hold water and nutrients.

	Forms a weak rib- bon of less than 1 inch	Forms a ribbon 1-2 inches before breaking	Forms a ribbon 2 inches or longer before breaking
Feels gritty	Sandy Loam	Sandy Clay Loam	Sandy Clay
Feels equally grit- ty and smooth	Loam	Clay Loam	Clay
Feels very smooth	Silt Loam	Silky Clay Loam	Silky Clay

Field Analysis

Select a soil sample from the rooting zone (between four and eight inches deep). Place in the palm of your hand, add water, and knead until the soil is like moist putty. When you squeeze it, see if the soil remains in a ball; if not, add more water or soil to get the correct consistency. If your soil still <u>will not</u> remain in a ball it is **Sml**. Next, if your soil is not sand, place your ball of soil between thumb and forefinger. Push soil upwards into a ribbon shape with uniform depth of about 1/8". Let it break under its own weight.

Does the soil form a ribbon?

Yes: Use the chart on the next page to ID your soil.

No: Your soil is Loamy Sand.

Adapted from:Thien, S. J. 1979. "A Flow Diagram for Teaching Texture by Feel Analysis." Journal of Agronomic Education. 8: 54-55.)

The results of your soil-texture ribbon test will help determine your best options for plant installation and management practices. Consider the following:

- Knowing your soil texture will change your approach to moisture management during droughty summer months. Because sandy soils drain quickly, any supplemental irrigation should be applied more frequently at decreased amounts. Clay or clay loam soils may make irrigation unnecessary.
- Organic amendments such as mulch rings can improve the water-holding capacity of sandy soils by decreasing evaporation and improving soil structure as the mulch decomposes.
- Because soil amendments can be expensive and logistically impossible for many sites, often your best option is to plant the right species for the existing conditions. For sandy soils with no natural seeps, include plants that establish roots quickly and can tolerate drought. Slow-draining soils heavy in clay should be planted with species that can tolerate anaerobic conditions common in saturated soils.
- Clay soil can have adequate organic content, providing for a combination of good moisture-holding capacity and a structure that allows for drainage and aeration.
- At sites where plant establishment has proven to be difficult, you may consider sending a soil sample to a testing lab such as the University of Massachusetts Soil Laboratory (www.umass.edu/plsoils/soiltest).

(Adapted from: Harris, W. H., J.R. Clark, N.P. Matheny. 2004 Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines. New Jersey: Prentice Hall. Thien, S.J. 1979. "A Flow Diagram for Teaching Texture by Feel Analysis." Journal of Agronomic Education. 8: 54-55.)



Appendix C: Mulch Calculation

Calculating Cubic Yards

I cubic yard = 27 cubic feet. To convert cubic feet to cubic yards: number of cubic feet \div 27 cubic feet = number of cubic yards

Example: You have an area of 1,000 square feet and you want to cover it with four inches (0.33 feet) of mulch.

1,000 square feet \times 0.33 feet (depth of the mulch) = 330 cubic feet 330 cubic feet \div 27 cubic feet = 12.2 cubic yards

Cubic Yards Calculator

Square Feet	Depth 3 inches	Depth 4 inches	Depth 5 inches	Depth 6 inches	Depth 7 inches	Depth 8 inches	
100	Ι	I – ^I /4	I - ^I /2	2	2- /4	2- /2	
150	I - ^I /2	2	2- /2	2- 3/4	3- ¹ /4	3- 3/4	
200	2	2- /2	3	3- ³ /4	4- /2	5	
250	2- /2	3	4	4- 3/4	5- /2	6- ¹ /4	
300	2- ³ /4	3- ³ /4	4- 3/4	5- /2	6- /2	7- /2	
350	3- ^I /4	4- /2	5- /2	6- /2	7-3/4	8- ³ /4	
400	3- ³ /4	5	6- /4	7- /2	8- ³ /4	10	
450	4- /4	5- ³ /4	7	8- /2	9- ³ /4	- /4	

If you don't want to go through all the calculations above.

Appendix D: Target Habitat Types

KEY Target Forest Types

- 1. Douglas-fir-Pacific madrone/salal
- 2. Douglas-fir-Pacific madrone / oceanspray / hairy honeysuckle
- 3. Douglas-fir-Pacific madrone / evergreen huckleberry
- 4. Douglas-fir-salal / sword fern
- 5. Douglas-fir-western hemlock / salal dwarf Oregon grape
- 6. Douglas-fir-western hemlock / salal / sword fern
- 7. Douglas-fir-western hemlock / dwarf Oregon grape / sword fern
- 8. Western redcedar-western hemlock / devils club / sword fern
- 9. Oregon white oak-Douglas-fir / common snowberry / sword fern
- 10. Riparian and wetland

Appendix E: Additional Field References

Pacing

My pace =	ft.
10 ft. =	paces
50 ft. =	paces
100 ft. =	paces

Estimating square footage

Average parking space: 150 – 200 sq. ft. Olympic-sized swimming pool: 13,448 sq. ft. (82' × 164') One acre: 43,560 sq. ft. Football field: 57,600 sq. ft. (160' × 360') One hectare (10,000 sq. m.): 107,639 sq. ft.



Appendix F: Native Plant Chart and Common

NRCS CODE	COMMON NAME	BOTANICAL NAME	SOIL MOISTURE	LIGHT / SLOI	PE FOREST
TREES					
ACMA	Bigleaf maple	Acer macrophyllum	moist-dry	● ● l s	1, 3-9
PREM	Bitter cherry	Prunus emarginata	moist	•	2, 3, 4, 6
POBA	Black cottonwood	Populus balsamifera	wet-moist	• •	6, 10
CRDO	Black hawthorn	Crataegus douglasii	moist	•	9
RHPU	Cascara	Rhamnus purshiana	wet-dry	● ● l s	2, 4-9
PSME	Douglas fir	Pseudotsuga menziesii	moist-dry	• • s	1-9
QUGA	Garry oak	Quercus garryana	dry	•	2, 4, 7, 9
ABGR	Grand fir	Abies grandis	moist-dry	s	1, 2, 4-9
FRLA	Oregon ash	Fraxinus latifolia	wet-moist	•	9
ARME	Pacific madrone	Arbutus menziesii	dry	•	1-7, 9
BEPA	Paper birch	Betula papyifera	moist	•	7
SALU	Pacific willow	Salix lucida	wet-moist	• • s	10
ALRU	Red alder	Alnus rubra	moist	•	1, 3-9
SASC	Scouler's willow	Salix scouleriana	moist-dry	• • s	1-6, 10
PICO	Shore pine	Pinus contorta	moist-dry	<mark>-</mark> s	1, 2, 5
PISI	Sitka spruce	Picea sitchensis	moist	• •	8
CONU	Wstrn. flowering dogwood	Cornus nuttallii	moist	••	1, 4, 7, 9
TSHE	Western hemlock	Tsuga heterophylla	moist-dry	• • 1	1-9
THPL	Western red cedar	Thuja plicata	wet-moist	1	1-9
SHRUB	5				
ROGY	Baldhip Rose	Rosa gymnocarpa	moist-dry	1 🔴	1-9
COCO	Beaked hazelnut	Corylus cornuta	moist	•1	1-9
OPHO	Devil's club	Oplopanax horridus	moist	1	7.8

noui	building nose	nosa gynniocaipa	monst ary	1	
сосо	Beaked hazelnut	Corylus cornuta	moist	•1	1-9
OPHO	Devil's club	Oplopanax horridus	moist	1	7, 8
MANE	Dull Oregon grape	Mahonia nervosa	moist-dry	• 1	1-9
VAOV	Evergreen huckle- berry	Vaccinium ovatum	moist-dry	1 • 1	1-8
ARDI	Goat's beard	Aruncus dioicus	moist	•	
SPDO	Hardhack	Spiraea douglasii	moist-wet	1 ●	10
SAHO	Hooker's willow	Salix hookeriana	wet-moist	l 🗣 s	10

NRCS CODE	COMMON NAME	BOTANICAL NAME	SOIL MOISTURE	LIGHT / SLOPE FOREST	
SHRUB	s				
OECE	Indian plum	Oemlaria cerasiformis	moist-dry	•	2, 4, 6-9
PHLE	Mock-Orange	Philadelphus lewisii	moist-dry	1	1, 2, 4, 6,10
RONU	Nootka rose	Rosa nutkana	moist-dry	1	1-9
HODI	Oceanspray	Holodiscus discolor	moist-dry	l s	1-9
PHCA	Pacific ninebark	Physocarpus capitatus	wet-moist	1 ●	9, 10
RHMA	Pacific rhododen- dron	Rhododendron macro- phyllum	moist-dry	1 ●	2, 6, 7
SARA	Red elderberry	Sambucus racemosa	moist	1 ●	1, 4-8
VAPA	Red huckleberry	Vaccinium parvifolium	moist	1 • 1	1-9
COSE	Red osier dogwood	Cornus sericea	wet-moist	l s	10
RISA	Red-flowering cur- rant	Ribes sanguineum	dry	1	1, 2, 4, 6
RUSP	Salmonberry	Rubus spectabilis	wet-moist	1 ● s	1, 2, 4-8,10
AMAL	Serviceberry	Amelanchier alnifolia	moist-dry	1 ●	1-9
SOSI	Sitka mountain ash	Sorbus sitchensis	moist-dry	1 ●	
SASI	Sitka willow	Salix sitchensis	wet-moist	1 • s	10
SYAL	Snowberry	Symphoricarpos albus	moist-dry	l 🗣 s	3, 6-9
MAAQ	Tall Oregon grape	Mahonia aquifolium	moist- dry	1 ●	8
RUPA	Thimbleberry	Rubus parviflorus	dry	l s	1, 4-9
LOIN	Twinberry	Lonicera involucrata	wet-moist	1 ●	8
ACCI	Vine maple	Acer circinatum	wet-moist	• 1 s	1, 4-9
GROUN	IDCOVER/HERB				
PTAQ	Bracken fern	Pteridium aquilinum	wet-moist	• •	1-7, 9
BLS	Deer fern	Blechnum spicant	moist	•	6-8
TITR	Foamflower	Tiarella trifoliata	moist	•	6-8
TEGR	Fringecup	Tellima grandiflora	moist	••	8
ARUV ATFI	Kinnikinnick Lady fern	Arctostaphylos uva-ursi Athyrium filix-femina	dry wet-moist	• ▲	1-4, 9 1-9
POGL	Licorice fern	Polypodium glycyrrhiza	moist	•	1-9
ADPE	Maidenhair fern	Adiantum pedatum	moist	•	1-8
loci	Orange honey- suckle	Lonicera ciliosa	moist	• •	1-9
DIFO	Pac. bleeding heart	: Dicentra formosa	moist	•	1-8
TOME	Piggy-back plant	Tolmiea menziesii	moist	•	1-3, 5-8
TODI	Pacific poison-oak	Toxicodendron diversi- lobum	moist	•	4, 9
GASH	Salal	Gaultheria shallon	dry-moist		1-9
URDI	Stinging nettle	Urtica dioica moist		1 🌒	1-8

EMERGENTS					
SCAC	Hardstem bullrush	Scirpus acutus	wet	1 🌗	
CAOB	Slough sedge	Carex obnupta	wet] 🌒 🌑	1-8
SCMI	Small-fruited bull- rush	Scirpus microcarpus	wet	1 ●	
INVASI	VES				
ROPS	Black locust	Robinia pseudoacacia L.			
PRLA	Cherry laurel	Prunus laurocerasus			
HEHE	English ivy	Hedera helix			1-9
ILAQ	English holly	llex aquifolium			1-9
RULA	Evergreen black- berry	Rubus laciniatus			1-9
GERO	Herb-Robert	Geranium robertianum			1-8
COAR	Hedge/Field bind- weed	Convolvulus arvensis			
CLVI	Western clematis	Clematis vitalba			
RUDI	Himalayan black- berry	Rubus discolor			1-9
PLCU	Japanese knot- weed	Polygonum cuspidatum			
SODU	Nightshade	Solanum dulcamara			4-9
LYSA	Purple loosestrife	Lythrum salicaria			
PHAR	Reed-canary grass	Phalaris arundinacea			4, 10
CYSC	Scotch broom	Cytisus scoparius			1-4, 9
SPAL	Smooth cordgrass	Spartina alterniflora			10

BOTANICAL NAME

SOIL

MOISTURE

LIGHT / SLOPE FOREST

NRCS CODE

COMMON NAME

Soil	Soil Moisture	
Organic: Plant prefers	Soil preferred: Wet, Moist or Dry	
organic rich soil in humus and generally moist.	Light/Slope	
Mineral: Plant prefers sandy soil, generally well drained and drier.	 Full Sun - Mostly Sun 	
Blank: No preference, or unknown	Suitable for steep slopes	

Appendix G: Monitoring Protocols for Exotic Pests

Exotic forest pests threaten our native forest ecosystems. The Asian longhorned beetle (ALB) has already invaded several states in the eastern US causing damage to native plant ecosystems, urban forests, agriculture, and home gardens. Early detection is the key to preventing the establishment of exotic forest pests in our area.

You can help by examining trees for ALB damage in neighborhood parks, forests, greenbelts, and even in your own backyard. When you examine the trees, please fill out the ALB Survey Data Form, reporting your observations is extremely important, even if you saw no signs of ALB. The survey process is quick, easy, and can be done while monitoring your site, working on site projects, hiking, or just enjoying recreational time outdoors.

The ALB Survey Data Form and other ALB information are located on the Green Seattle website (www.greenseattle.org/

forest-steward-resources). You can also request hardcopy forms by emailing Yolanda Inguanzo at Yolanda.I.Inguanzo@aphis.usda.gov.

Signs and Symptoms to Look For

Defoliation of trees (image below left) and dime-sized exit holes in the trunks of trees (image below right) are evidence of Asian long-horned beetle activity.

Asian Long-horned Beetle Survey Instructions

- Locate at least 10 host trees on your site.
- Examine each tree for signs of ALB infestation, especially beetles and dime-sized exit holes.
- If you observe beetles or evidence of ALB damage, please take digital pictures of the insect and damage to the trees if possible. If you can capture insects you think are ALB, place them in a jar and freeze them.
- Please completely fill out the ALB data form. Email the completed to form to Yolanda Inguanzo at Yolanda.l.Inguanzo@aphis.usda.gov or mail to: USDA-APHIS-PPQ, Attn: Yolanda Inguanzo 1550 Irving St. Suite 100, Tumwater.WA 98512

P lease review the ALB information available on these websites regarding signs and symptoms, hosts, and ALB biology.

Good information website from the University of Vermont: http://www.uvm.edu/albeetle/hosts.htm

Beetle busters website http://www.beetlebusters.info

Useful resources from Forestry Canada http://www.glfc.forestry.ca/VLF/invasives/alhbdetecguide_e.pdf







Appendix H: Plant Propagation

Why use live stakes and hardwood cuttings for native plant restoration?

Native plants have evolved for thousands of years and adapted to the soil, climate, and ecological conditions of the region. This means that they are well-suited to take on not only long bouts of wet weather with low light, but also the dry Pacific Northwest summers that challenge the survival of non-native plants. Because natives are so well adapted to these conditions, they require less care and maintenance than non-native plants – this saves us time and money in our restoration projects.

Native plants can be sourced in a variety of ways such as in pots, plugs, as bareroots, from seeds, or from cuttings. Each of these has advantages and disadvantages. One of the main advantages of using live stakes and hardwood cuttings for your restoration projects is that these materials are cheap, often just costing an investment of your time, easy to store and transport, and easy to plant.

When is the best time to take cuttings and plant live stakes?

The best time to collect plant material to live stake is from late fall through early spring. This is when plants in the Pacific Northwest are dormant. This is also the best time to plant live stakes because they need fairly wet soil when planted. This helps the stake establish new roots, and makes planting much easier than in hard, dry soil.

What things should I consider when collecting live stakes or hardwood cuttings?

The first thing to know is that not all native plants are will propagate well as stakes or from cuttings. Experimenting with live stakes and hardwood cuttings is okay, and we encourage you to share what works well with other Habitat Stewards and volunteers. Here are some "go-to" plants that we know do well as live stakes and hardwood cuttings.



Native plants that propagate well from live stakes*

Red-osier Dogwood (Cornus sericea) Black twinberry (Lonicera involucrata) Pacific ninebark (Physocarpus capitatus) Black cottonwood (Populus trichocarpa) Nootka rose (Rosa nutkana) Salmonberry (Rubus spectabilis) Willows (Salix spp.) Elderberries (Sambucus spp.) Spirea/Hardhack (Spiraea douglasii)

Native plants that propagate well from hardwood cuttings*

Red-osier Dogwood (Cornus sericea) Black twinberry (Lonicera involucrata) Pacific ninebark (Physocarpus capitatus) Black cottonwood (Populus trichocarpa) Salmonberry (Rubus spectabilis) Willows (Salix spp.) Elderberries (Sambucus spp.) Oceanspray (Holodiscus discolor) Orange honeysuckle (Lonicera ciliosa) Indian-plum (Oemleria cerasiformis) Mock-orange (Philadelphus lewisii) Red-flowering currant (Ribes sanguineum) Thimbleberry (Rubus parviflorus) Wild blackberry (Rubus ursinus) Spirea/Hardhack (Spiraea douglasii) Snowberry (Symphoricarpos albus) Western yew (Taxus brevifolia) Western redcedar (Thuja plicata)



The Ethics of Collecting Native Plant Materials*

Propagating native plants is a good thing, but we need to make sure we collect in a responsible way that ensures the continued health of our forests and green spaces. We don't want to improve the health of one native plant community only to cause harm to another by removing too much plant material. Here are a few quick pointers about how to collect native plant material responsibly.

• Get permission from the property owner before collecting plants from their land. This includes GTP project areas that are owned by Metro Parks or the City.

• Plants collected from public property are only to be used for restoration of other public property. While you may take cuttings from one park to plant at another park, you may not take cuttings from public property for personal use.

• Do not collect from a plant or group of plants that appear weak or unhealthy.

• Collect only as much as you will be able to use. Care properly for any material you collect – don't let it go to waste. Share extras with neighbors or friends.



• When collecting cuttings, do not take more than 10% of any plant.

• When collecting seeds, do not take more than 10% of a particular species' seeds in an area. Collect from as many different plants as possible. Always leave enough seed for each plant to regenerate and for wildlife that may depend on the seeds for food.

VOLUNTEERS

Use this space to collect the names and contact information of volunteers or community members you meet who might want to come back and volunteer at your site again. It is great to follow up with volunteers, thank them and invite them back.

Name	Email/Phone
NOTES	





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