Pacific Northwest

Native Plant Habitat Garden Manual

A How-To Workbook for Schools

Exposing students and teachers to new gardening approaches based on natural cycles...

A step-by-step guide for creating a native plant garden on your school site

- Project Planning
- Designing with NW Ecology
- Site Preparation
- Planting
- Maintenance
- Using the Garden with Students

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Starflower Foundation

Starflower Foundation helped create native plant habitat gardens across Seattle. This manual is one of many resources now available on the Washington Native Plant Society website www.wnps.org.
Native Plant Habitat Garden Manual

Our perception of a public school site has changed...to a rich outdoor classroom supporting all aspects of the curriculum. Natural environments on school sites provide a wealth of multi-disciplinary educational opportunities...—Nancy S. Gramick, Maryland State Superintendent of Schools, in Conserving and Enhancing the Natural Environment (a guide for planning, design, construction and maintenance on new and existing school sites (1999) Baltimore, MD, MD State Dept of Ed)

What is a native plant garden?
A native plant garden is an oasis of learning on your school site. Such an oasis features plants common before European settlement, arranged in a mini-ecosystem garden that provides habitat for wildlife. Paths, seating areas, wildlife viewing areas, monitoring stations and interpretive signage make it welcoming. Using the ingenuity and energy of the school community, a native plant garden can become a focus for education across the disciplines. By following the guidelines presented here, you can provide your students with a profound educational experience.

What is the purpose of this manual?
To create a thriving native plant garden you’ll need to employ three skills you use everyday in your teaching: 1) Planning a complicated project, 2) Successfully working with people, and, 3) Locating the resources you need. This manual provides tips and content in each of these three areas to assure your native plant garden reaches its full potential.

This manual also provides:
- an introduction to basic Pacific Northwest native plant ecology
- links to student activities utilizing the native plant garden
- maintenance schedules
- tools
- case studies of successful native plant gardens

What does a native plant garden look like?
Native plant gardens come in all shapes and sizes. Since an important educational purpose of the native plant garden is exposing students and teachers to new gardening approaches based on natural cycles, your native plant garden should be in harmony with the ecology of your site. It might replicate a piece of meadow or forest, or provide a wetland or thicket as refuge areas for wildlife. Throughout this manual you’ll have a chance to see some of the native plant gardens created by other teachers and classes. The last section of this manual presents a number of case studies.

Click on the image to the left to take a brief photo tour of the Hawthorne Elementary School Habitat Garden, which features a variety of plant communities, paths, and habitat features.

Keys to Success
- Create a clear, well-articulated statement of the purpose of the project
- Involve your maintenance and grounds staff early in the project
- Receive approval in principle of the preliminary concept and site location before any detailed design takes place
- Obtain substantial commitment by the school principal and staff
- Cultivate a shared ownership of the project through extensive and frequent consultation with all affected stakeholders
Planning Overview
Let’s get started on the road to creating a thriving native plant garden by employing your planning skills. You’ll need to:

1. Begin by setting goals and objectives - ask the questions, “What do I want to do?” and “How will I know I have done it?”.
2. Then, think about who should be involved - ask the questions, “What kinds of permission will I need? From the principal? The school district?” and “Who has the skills needed?”.
3. Once everyone is on-board with your vision, ask the questions, “How do I create a plan?” and “What are my timelines for implementation?” This is also a good time to ask about future maintenance and enhancement plans - “What long-term plans do I need to make?”.
4. Now that your planning is complete, you can create a budget and ask the question, “Who can help me make this happen?”.

You’ll find helpful suggestions for each of these steps in the information that follows.

Setting goals and objectives

Learning grounds should have accessible and inaccessible areas; places for passive and active play; elements that are risky and others that are repetitive and secure; hard and soft surfaces; and natural and built elements - S. Stine (1997) Landscapes for learning: Creating outdoor environments for children and youth. New York: John Wiley & Sons.

The native plant garden is meant to mimic the natural features and functions of the historic ecosystem. Think of the native plant garden as a habitat that provides a home for interesting plants, along with food, water, refuge and nesting sites for wildlife. Hedges, dense plantings, wood planks, and shallow pools can provide all of these elements.

Things to consider...
The basic components of an ecosystem, including soil type, rainfall and runoff, plant combinations, and insect, bird, and other animal species, will guide your native plant garden planning. Strive to replicate the native natural environment; here’s where the advice of a local naturalist or habitat biologist can be invaluable. While replicating the natural environment by selecting plant combinations that naturally occur in the landscape is the underlying principle, sometimes choices need to be made. For instance, in your particular site it may be preferable to create bird habitat with hedges, linear plantings and berry-producing plants rather than creating habitat preferred by small mammals. While obtaining plants is discussed more fully later, it’s worth mentioning here that harvesting native plants from the wild for your garden is not appropriate. The only exception to his rule is obtaining plants in “salvage” or “rescue” operations from land slated for development.

Further key considerations include:
- careful project placement
- promoting connections to other natural areas
- encouraging natural seeding and succession of the native plant garden ecosystem by reducing disturbances
- selective weeding of invasive or aggressive species only
- adding new plantings over time

Educational Rationale
- Natural areas are integral to learning
- “In the field” experience adds to a child’s environmental understanding
- Habitat areas increase students’ knowledge of their bioregion - the unique combination of ecological and social characteristics we call “home” - locally and globally

Environmental Rationale
- Native plants are especially adapted to our local environment
- All plants and animals are dependent on other species and their habitat for survival
- The unique web of interconnected relationships among plants, animals and the non-living environment is called an “ecosystem”
- Native plant gardens can help revitalize or maintain the connections within the local ecosystem, especially if they are linked to a wider habitat enhancement strategy
Thinking about your local habitat
Each site you might choose for a native plant garden will have a particular set of environmental conditions, including exposure to sun and rain, slope, and soil type. These factors help dictate your choice of native plants and your garden design. The following table, from *School Ground Greening—A policy and planning guidebook* by Evergreen (Canada), provides a variety of project types and outlines their characteristics and benefits. Use it to help you plan the focus of your native plant habitat garden.

*A native plant meadow at Roxhill Park*

<table>
<thead>
<tr>
<th>Habitat Restoration and Naturalization Projects</th>
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<tr>
<td><strong>Type of Project</strong></td>
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<tr>
<td>Meadows/Prairies</td>
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<td>Forests</td>
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<td>Refuge Areas</td>
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<td>Nesting Areas</td>
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As the native plant garden is becoming established look to the future and keep the following maintenance recommenda-
tions in mind:

- mulch with a 6” layer of wood chips or similar organic material to reduce weed growth
- plan to water during the dry season for the first one to two years until plants are established
- replace plants that do not survive on their own after the initial watering period
- accept that native plant gardens may be less “tidy” than non-native plantings. (This is where interpretive signage created by your students can help to communicate the purpose of the garden and develop a “native plant aesthetic”)

Once your native plant garden is established, little work is required to maintain its health other than litter clean-ups and occasionally additional plants to increase diversity.

Who should be involved?

Teamwork is the Key
Put together a list of the people who can help you make a native plant garden happen. Here are some of the people who could be on your team:

- School Principal
- Students
- Teachers
- Parents
- School District representative
- Maintenance staff
- School Librarian
- Master Gardener
- Wildlife Biologist
- Neighbors

Planning Tips – divide and conquer
Planning and planting a native plant garden is lots of fun but it’s a big job and one best accomplished by small groups with specific tasks. Once you’ve identified your team, divide them into groups with tasks such as the following:

1. Site Inventory – inventory the site and make a list of what’s present
2. Site Mapping – map the site
3. Good Neighbor Group – make sure the school neighbors know about the native plant garden project
4. Fundraising – coordinate raising money for the project
5. Plant Acquisition – find out where to buy or salvage plants
6. Native Plant – determine which plants will survive best in the habitat found at the site and where to place them
7. Tools – determine what kinds of tools are already present, as well as what will be needed and where to get them
8. Photography – take pictures of the site to preserve a record of the activities and plantings
9. Publicity – contact local newspapers, radio and television stations, and other media
10. Maintenance – assure that native plant garden is watered during the first two years (especially during the summer), weeded and kept clean by helping students, teachers, and parents
11. Signs – decide the number, content, style, size and cost of signs and whether they may be made by students or others involved with the project

Planting day at Roxhill Park
Developing a Timeline

Creating a timeline for your native plant garden project is a good idea. Developing your garden to its fullest potential will be an on-going process so your timeline may cover more than one year. The planning and permission gathering stages may take several months so ideally these should begin early in the school year. In general, most native plants do best if planted from October to March – your Native Plant group will help determine the specific needs of the plants chosen for your garden. Use the Garden Maintenance Activities lists for Fall, Winter, and Spring, which begin on page 25, to help you create your plan. These lists also provide a resource for developing your future maintenance and enhancement plans – another reason to create a multi-year timeline! Once the plan is developed, create a calendar to post in your classroom so that everyone on your team can refer to it. You’ll find the calendar to be a useful tool to involve other teachers and classrooms. Completion of your timeline is a good point to reaffirm the substantial commitment by the school principal and staff - it’s important to cultivate a shared ownership of the project through extensive consultation with all affected stakeholders.

Creating a budget and finding resources

Your project budget will flow directly from your plan and timeline. You will likely need money to buy plants, tools, and other materials. Some things may be donated to your project but before you can ask for donations, you must know what you need. Your budget may be thought of as a “shopping list” and might look like this:

<table>
<thead>
<tr>
<th>Items to Consider</th>
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<td>Billy Bob’s Nursery</td>
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<td>10/15</td>
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Finding resources to support your native plant garden is a simple expansion of the skills you’ve been using to gather resources for your classroom. You’ve probably used some of the tried and true methods such as bake sales, car washes, and walkathons to raise money for other projects or field trips. A native plant garden project presents specific fundraising opportunities from “Adopt-a-Tree” programs where supporters donate money for specific garden elements to engraved paving stones to grants. Click here for a list of potential funding sources. Remember that a clear, well-described proposal is key to helping potential supporters see your vision and that it is your vision and enthusiasm that will prompt their support.
Pacific Northwest Ecology

Native plant gardens are unique...
Unlike vegetable gardens, native plant gardens strive to duplicate the natural ecosystem present before European settlement – its plants are arranged in a mini-ecosystem garden that provides habitat for wildlife.

Since your native plant garden mimics the native ecosystem, the short review of the larger native ecosystem presented below may be helpful to you as background for your planning.

The cycle of renewal in the Westside lowland forest ecosystem

We live in the Westside Lowland Forest ecosystem, which extends from the Pacific Ocean on the Olympic Peninsula, to the Cascade mountain range and covers the Puget Sound region. This is a complex ecosystem made up of plants, animals, bacteria, fungi, rocks and soil that make up a “grand symbiosis-a self perpetuating, mutually advantageous system of life… life and death are inseparable and indeed interdependent” (Arthur R. Kruckeberg).

Green plants form the basis of life on land and in water, from microscopic algae to the great trees of our forest. They provide the shelter and primary food for animals and microbes, which depend on them either directly or indirectly. Herbivores depend directly on plants for sustenance while all carnivores, in turn, indirectly depend on plants. These relationships are known but not fully understood; we are still learning about the complexity of this web of life - about which animal feeds on which animal, which feeds on which plant, which depends on certain fungi, nutrients and habitat to survive.

Native plant gardens
are:
• Project-based learning
• An opportunity to connect students to nature
• Models for sustainable environmental practices
• Critical habitat for wildlife and people
• Drought resistant, low resource use
• Real-world examples of ecology / web of life
• Positive solutions that empower students and community

Native plant gardens
are not:
• One year projects – native plant gardens take 3-5 years to establish and require ongoing enhancements and management
• Formal landscape designs
• Rat and pest habitat

As we work towards restoring our ecosystem through projects such as native plant gardens, we are in many ways working on faith that by restoring plant communities we are creating the foundation necessary for the prospering of the native animals and microbes that are part of the web of life of our land.
The process of death and decay is fundamental to this web of life. Plants grow by capturing the sun's energy along with carbon dioxide from the air and nutrients and water from the soil. When plants (and the animals that eat them) die, they become raw materials for the decay process. Organisms called decomposers recycle the vast amount of plant and animal material that returns to the forest floor; microorganisms, fungi, insects, worms, mites, and other creatures convert the carbon from dead plants into energy for their own growth, releasing carbon dioxide into the air in the process. Similarly, they recycle the nutrients from the decaying plants into their own bodies and eventually back into the soil. Other plants and microorganisms use the carbon and nutrients released by the composting process, and the earth's biological cycle of growth and decay begins again. The diagram, “Decaying log biomass becomes living forest”, shows both forest succession (the change in the forest over time) and the decay of forest logs. Click here for lessons to teach about the Cycle of Renewal.

Fungi, which we see in the fruiting form of mushrooms and shelf-fungus, play a special role. Their subterranean filaments form a vital connection with the roots of trees and other green plants. This root-to-fungus, or “mycorrhizal”, connection benefits both organisms.

Forestry and landscape practices often interfere with these complex natural processes. Successful restoration allows for decay and promotes healthy decomposer populations. To accomplish this requires a shift in thinking about garden management strategies and landscape aesthetic norms.

For more on the Cycle of Renewal, click on the above image of the newly planted garden at the Environmental and Adventure School.
Pacific Northwest Native Plant Cycles

Plants of the Pacific Northwest have adapted to weather conditions unique to the northwest. Nearly 90% of our rainfall in the Seattle area falls between October and May, while the summer months of June through September are nearly drought conditions. This means that our native plants have adapted to very wet soil for the bulk of the year, and to the extremely dry conditions of our summer months. Compare these conditions to other parts of temperate North America where average monthly rainfall is nearly equal throughout the year. Adaptation to summer drought makes our native plants ideal for planting in our landscapes.

While some plants go dormant during summer, an adaptation to low summer rainfall, most of our plants go dormant in fall. Our habitat garden plants in fall have endured the drought of summer. Dormancy may include leaf drop and early fall coloring. Also, by fall most plants have fully completed their fruiting and seeding cycles.

Perennial native plants that are in healthy dormancy adequate food supplies for winter survival. Although these plants may appear to be ‘dead’ they are likely to emerge in spring as strong vigorous plants.

The ideal time of year to plant native plants begins in October and ends in February. This allows newly transplanted plants time to establish root systems and prepare to survive the low rainfall of summer. It is possible to plant later but such plants will likely need to be watered during the summer months if they are to survive.

To learn more about Pacific Northwest plant cycles, read ‘Climate and Weather’ in The Natural History of the Puget Sound Country by Arthur R. Kruckeberg.

Above: Map of average annual precipitation in inches. Rainfall in the vicinity of Seattle averages 30-40 inches, San Juan Islands less than 30", and the Olympic Rain Forest 100- 120".

Adapted from The Natural History of Puget Sound Country- Kruckeberg

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</table>

Annual progression of precipitation for Seattle WA, and St. Johns Newfoundland, showing that other similar temperate areas receive their rainfall evenly distributed over the year. Rainfall is rounded off to the nearest whole number.

Adapted from The Natural History of Puget Sound Country- Kruckeberg

Annual cycles of temperature and precipitation joined in a single graph. Drought periods are visibly distinguished by high temperatures and low rainfall.

Adapted from The Natural History of Puget Sound Country- Kruckeberg
**Project planning and design**

*Site assessment*

Once your team is formed and your proposal developed and embraced, you’re ready to formalize your plan and design. A good place to begin is by assessing the site you’ve chosen. Start with an inventory of everything that currently exists on the site where you will plant your native plant garden. One good way to note what you find is on a large map so this is a good time for the Site Inventory and Site Mapping groups to take the lead. Here are some of the items to include in your inventory:

**Plants** – trees, shrubs, herbs (both native and non-native plants). This information will help you decide which plants to keep as part of your garden and which to remove. See Quick & Easy Activity 5-6 QE Plant Assessment for a strategy you might employ.

**Animals** – look for large and small animals and animal signs (e.g., nests). Birds, insects, and spiders are likely to be seen while mammals may only be inferred from signs. For more information about animal signs, see Quick & Easy Activity: 4-3 QE Wildlife Sign Walk.

**Buildings** – include the location of nearby buildings and note any doors or windows with a view of the native plant garden.

**Sidewalks, driveways, paths** – be especially careful to note the paths students take as they move about the school (you may want to spend some time watching students during recess or lunch). If possible, avoid siting your native plant garden in heavily trafficked areas.

**Water sources** – water is important to animals and will be needed to water plants during the first one or two years as they become established.

**Soil type** – information about soil type will let you choose the best plants for your soil. You can get help from the Washington State University Cooperative Extension Master Gardener program or you assess the soil yourself by following the procedures outlined in Quick & Easy activities: 5-7 QE Soils Assessment I and 5-8 QE Soils Assessment II.

**Other landscape features** – be sure to include any standing water, rock outcrops, slopes, etc.

Take time to observe your site under different weather and light conditions. Note differences you see and think about how what you observe may influence your choice of plants (For example, if your site is always in the shadows, you’ll want to avoid sun-loving plants). Also explore the history of your site before the school was built – are there any historical photos? written histories?

A few words about the map are in order. Your final map should be large enough to post in your classroom or in a central location in the school so everyone can see it. This map shows what your site is like now – it’s the “before” map. You can note changes on your map as you make them, use tracing paper to make an overlay of the changes, or create an “after” map based on what you’ve done. Be sure to make your maps to scale, indicate North on each map, and take pictures of your site before, during, and after your efforts.
Developing your planting map

Use the information gathered in your site assessment as the starting point for your plan. Think small, beautiful and manageable for the first phase – remember this is a long-term project. Your Native Plant group can coordinate these activities. On a piece of tracing paper placed over your site map, layout plantings and hardscape (paths, etc.) Here’s one approach to creating your plan:

- Since the location of hardscape features dictates your planting areas, now is the time to add any additional paths, rocks, or other features to your site map. Place and draw the features to scale on your overlay.

- While help from a Master Gardener or a landscape designer at this stage is most helpful, you can create the design yourself. Begin by perusing native plant books such as *Plants of the Pacific Northwest Coast* by Pojar and Mackinnon (1994) and by looking at the plant community lists found beginning on page 13. The attached files may also be helpful in determining the plants for your site:
  - Fall in the Habitat Garden
  - Winter in the Habitat Garden
  - Spring in the Habitat Garden

- Next, make a preliminary list containing the plants that appeal to you. Include the name of each plant, the size to which it grows, and the conditions it prefers (e.g., wet soils, dry and rocky, etc.). Now, eliminate those plants that require conditions not found at your site.

- Make templates for the plants remaining on your list by drawing proportional circles using the scale of your map. (This sounds more confusing than it is. Here’s an example: If the scale on your map is 1/2” = 1’ and the plant grows to four feet in diameter, then your circle will be 1/2’/foot x 4’ or 2’ in diameter). Write the plant name on the circle and the height to which it grows.

- Use the circles to create a planting map. If your site is bordered by a fence or wall, you may want to place the circles representing the tallest plants nearest those features. Circles representing smaller plants would be closer to walkways. Remember that plants are found in layers in the forest and that you can add lower-growing, more shade-tolerant plants under taller plants.

Click on the thumbnail map below to see a sample planting map. Notice that the individual circles for multiple plants are merged and the edges softened since plants seldom grow in perfect circles. While this makes a nicer appearance, a planting map using only scale circles may be just as useful.

As your planting map is being developed, the Plant Acquisition group can begin to determine the availability and cost of the plants chosen for your site. Cost and/or lack of availability may mean substitutions will be necessary. Once your planting map is complete, you can finalize your plant list and more accurately determine the costs of your plants. At this point, convene a meeting with the major stakeholders in the project to share your plan and strengthen their support. Again, planting map review by an experienced landscape designer or Master Gardener is very helpful at this point. After your planting map is shared and approved, you’re ready to order plants and to begin the physical work.
Securing your native plants
Locating plants for your native plant habitat garden can take several forms from “salvaging” or “rescuing” plants from land slated for development to purchasing plants from native plant nurseries to propagating plants yourself.

Salvaging Native Plants
While harvesting plants from the wild is not appropriate, salvaging plants is a great way to preserve existing plants and stock your garden at the same time. Plants from within a 50 mile radius will be more likely to recreate the ecosystem that thrived at your site before European settlement.

Since the availability of salvage plants is constantly changing, visit the home page for King County Native Plant Salvage Program. There you’ll also find Native Plant Salvage Details: Plant Recycling for Restoration Projects which provides a comprehensive guide to salvaging native plants.

Purchasing Plants
Salvaging native plants is not always possible and not all the plants you’re looking for may be available as salvage plants. Purchasing plants can solve these problems. One great source is a Washington Native Plant Society plant sale! Check out their local chapters plant sales page for the latest information on upcoming sales.

The King County Conservation District holds an annual Bareroot Plant Sale from late winter to early spring. (206) 764-3410 ext. 5. Cascade Biomes. also holds an annual fall plant sale. (206) 322-0528.

Many retail nurseries now offer native plants raised from locally propagated stock. However, some may sell plants raised out of state or misname a hybrid as a true native. The best option is to ask where the plant came from and how was it originally obtained to prevent buying improperly salvaged plants or ones that will not survive in your local soil. The sidebar on this page provides a listing of recommended nurseries. King County DNR posts a list of native plant sources as well.

As you go through the ordering process, you may have to make some substitutions; some plants you’ve listed in your plan may not be available when you need them or at all. Be flexible and look for a plant with a similar growth form and ecological preferences. To help you organize your ordering, click here for a sample Plant Order Form.

Growing Your Own Plants
While salvaging or purchasing native plants is lots quicker, growing your own native plants can be a valuable learning tool, as well as adding something special to your garden.

Raising plants from seeds is introduced in the Quick & Easy Activity: Growing Native Seeds in which students propagate native plant seeds using techniques that replicate natural seasonal dispersal of the seed. As they grow, the seedlings can be used for the Plant Growth Monitoring activity. Once established, they can be transferred to your native plant habitat garden. Growing Plants from Seeds provides specific seed germination tips for a variety of native plants.

Another method to add plants to the garden that you can use successfully with students is hardwood cuttings. Propagation from cuttings involves removing certain parts of a living plant and putting them in a growing medium so they form roots. Cuttings are a good way to obtain new plants, and often produce useable plants more quickly than seeds. See Native Plant Propagation for complete directions.
**Plant Community Lists**

The plant community lists found as text bars on this and the next page can be helpful in determining the plants for your site. Be sure to observe the existing plants on your site and in your local area for help in identifying your plant community. Plants with a star (*) are good key indicators for determining which type of plant community you may have—they are the most common plants found in these communities. These lists are not complete. Add to these lists with further research. Also, some plants can live in several different communities.

**Forest Community**

**Trees**
- *Big leaf maple*
- *Douglas fir*
- Red alder
- Western hemlock
- Western red cedar
- *Vine maple*
- *Hazelnut*
- *Bitter cherry*
- *Pacific dogwood*
- Pacific yew
- Cascara

**Shrubs**
- Oceanspray
- Tall Oregon grape
- Dull Oregon grape
- Red flowering currant
- Red huckleberry
- Salal
- Snowberry
- Salmonberry
- Indian plum
- Thimbleberry
- Devil's club
- Serviceberry
- Blueberry species

**Groundcovers**
- False lily of the valley
- False Solomon’s seal
- *Foamflower*
- *Pacific waterleaf*
- Trillium
- Vanilla leaf
- Wild ginger
- Dull Oregon grape
- Youth-on-age
- Wood strawberry
- Violets
- Inside-out flower
- Starflower
- Meadowrue

**Ferns**
- Licorice fern
- Sword fern
- Wood fern
- Deer fern
- Oak fern

**Vines**
- Orange trumpet
- Honeysuckle
- Dewberry

**Site preparation**

Before you can plant, you’ll need to prepare the site. Here are some of the steps you’ll want to take.

- Clean the site of debris – remove any non-living material from your site and dispose of it properly

- Remove weeds and kill grass – it’s important. On small areas of a few thousand square feet or less, smothering weeds on the area is simple, effective, and requires no chemicals or special equipment. Smothering involves covering the soil surface with black plastic, old rugs, pieces of old plywood, or a thick layer of newspapers covered with mulch, such as wood chips, leaves or grass clippings. Ideally, this should be left in place for a full growing season in order to kill the plants underneath, though lawns can usually be killed in two months using smothering. If your schedule doesn’t permit such lengthy waiting, mulch heavily (6 inches or more deep) and be prepared to remove unwanted plants that sprout alongside the plants you add to your garden.

- Install watering system – Pacific Northwest native plants evolved to thrive in our rain conditions. This means they should be able to survive in a garden only watered by the rain. However, the plants you add to your garden will need some time to get used to their new surroundings. You will need to deep-water them regularly to get them established – this is especially true in the summer months during the first year or two after you’ve planted them. (You’ll also need to corral a crew of summer volunteers who can water your garden.) Now is the time to think about access to water. Will you need to install a sprinkler? Purchase hoses? Once a watering system is in place, encourage good water stewardship – water early in the morning or in the evening. Deep watering encourages root growth and helps new plants become established.

- Add other improvements as time and funding permit. See *Habitat Features for Native Plant Habitat Restoration* and *Pathways* (pages 15-18) that follow the community plant lists on the next page for suggested improvements.

**Forest community understory**
## Native Plant Community Lists

### Freshwater Wetland Community

*Emergent water plants (must be in water)*
- Cattail
- Duckweed
- Pondweed
- Wapato
- Water smartweed
- Yellow pond lily
- Hardstem bulrush or tule
- Water parsley

*Shoreline/marsh plants (in and out of water)*
- Small fruit bulrush
- Douglas spirea
- Spikerush
- Soft rush
- Rushes (many)
- Slough sedge
- Fox sedge
- Sedges (many)
- Swamp Lantern
- Water plantain
- Sweet gale
- White water buttercup
- Northern manna grass
- Pacific willow

### Riparian Community

**Trees**
- *Black cottonwood*
- Western red cedar
- *Willow species*
- *Sitka spruce*
- *Oregon ash*
- Red alder
- Vine maple

**Shrubs**
- Devil's club
- Indian plum
- *Pacific ninebark*
- Black hawthorn
- Pacific crabapple
- Red elderberry
- Red osier dogwood
- Salmonberry
- Currants
- Twinberry
- Goat's beard
- Nootka rose
- Cluster rose

**Groundcovers**
- Bleeding heart
- *Horsetail*
- Youth-on-age
- Salal
- Stinging nettle
- False lily-of-the-valley
- Wild ginger
- Wood strawberry
- Tufted hairgrass
- Western clover's foot

**Ferns**
- *Lady fern*
- *Maidenhair fern*
- Sword fern
- Deer fern

**Vines**
- Trumpet Honeysuckle
- Dewberry

### Rainshadow/Prairie Community

**Trees**
- *Pacific madrone*
- Douglas fir
- Douglas maple
- *Garry oak*
- Grand fir
- *Shore pine*
- *Incense cedar*

**Shrubs**
- Evergreen huckleberry
- *Hairy manzanita*
- Nootka rose
- Oceanspray
- Dull Oregon grape
- Red flowering currant

**Ferns**
- Sword fern
- Deer fern

**Groundcovers**
- Kinnikinnik
- Starflower
- Twinflower
- Wood strawberry

**Prairies**
(can occur in other communities)
- Blue camas
- Death camas
- Nodding onion
- Red fescue
- Wild strawberry
- Yarrow
- Tiger lily
- Chocolate lily
- Tufted hairgrass
Habitat may be defined as the place where an organism naturally lives or grows. Plants and animals depend on a specific habitat for their survival. Habitat requirements for all wildlife include: food, shelter, water and space. While developing habitat restoration projects it is important to include these habitat components in the planting plans, some of which might take years to achieve naturally, or preserve existing naturally occurring habitat features.

Introducing and preserving certain features such as nurse logs, stumps and snags provides food and shelter for hundreds of species of wildlife, and a habitat niche for many species of vegetation, in particular ferns, groundcover species, and seedlings of many conifers. Decaying logs and snags hold an enormous amount of water which becomes available to other plants and animals. The process of decay also creates heat which can raise the internal temperature of a large snag to 85 degrees providing a cozy winter home for hibernating wildlife and dormant plant species, as well as an ideal nursery for young animals and plants. In addition, nurse logs, stumps and snags provide decaying matter that is critical for the health of a newly restored site.

Arranging rocks and branches into piles or screens provides important habitat for wildlife by offering protection from predators, as well as by providing microclimates required by certain species of wildlife and vegetation. Rock piles stabilize temperatures and are important homes for snakes, frogs, lizards, and chipmunks. Log piles near water provide specific habitat for salamanders and young frogs. Snags and stumps are home to chickadees, woodpeckers, raccoons, fishers, bears and many other species. The size and height of these snags will determine which animals use them; for example, a black capped chickadee requires a nesting cavity 4-8 feet above the ground, while a pileated woodpecker prefers to create nesting cavities and roosts in a snag 45 feet above the ground. Song sparrows build their nests in brush piles up to 3 feet off the ground, while winter wrens make their homes in low stumps or roots of upturned trees. Bats make their roosts under the loose bark of snags and hibernate in the decaying cores of tall snags.

Including habitat features adds enormous wildlife value to habitat garden projects, while creating wonderful educational opportunities for all project participants.

### Nurse Logs and Stumps

1A- **Nurse logs**: Provide logs or allow fallen trees to remain in the garden. They provide habitat for decomposers and eventually serve as ‘nurseries’ for seedlings, moss, fungus and other organisms. Any native tree can serve as a nurse log though decomposition rates vary between species. Partially burying and drilling holes in logs speeds up decomposition and potential seed germination.

1B- **Cavities in nurse logs**: New logs can be modified artificially to create immediate habitat for wildlife such as salamanders, birds and insects. Here’s how: Use a chainsaw to cut an angled ‘lid’ along one end of the log as shown in 1B. Next create a cavity in the log, and finally drill or cut an access hole. Leave some wood chips or add forest duff to the cavity to speed up the decay process. Replace the lid and periodically monitor the wildlife use of this cavity. (Concept derived from a lecture by Tim Smith, U.S. Forest Service– wildlife habitat expert.)

1C- **Nurse stumps**: Create a ‘nurse stump’ by modifying an existing stump or an introduced stump (these can be found on logged or roadside cut sites, or may be available from tree cutting companies). Here’s how: Use an axe, adze, mattock and/or chainsaw to create a cavity roughly one foot deep and 6”-12” wide. Add several large handfuls, or more, of decaying wood from an existing nurse stump or log (to introduce microbes to speed up natural decay). Add humus-rich soil to the hole and plant with 4” containers of typical nurse stump plants such as red huckleberry, salal, spiny wood fern, western hemlock and western red cedar.
**Brambles, Brush and Rock Piles**

**2A- Brush Pile:** Create an important wildlife habitat by creating a ‘brush pile’ from excess branches (leave branches naturally in place when possible). Here’s how: Before you begin the pile, you can create permanent cavities and crevices by carefully placing rock and ceramic pipes on the ground. Place branches over the rocks and pipes, or simply on the ground if you’re not creating additional cavities, beginning the pile with larger-sized branches and logs. Layer loosely with smaller and smaller dimension branches. Add more branches as they become available. The pile provides important habitat for birds, amphibians, and insect life and will eventually decompose. Add interpretive signage and begin monitoring activities to observe the function of this artificially created habitat.

**2B- Rock Pile:** Rocks and rock piles provide very important habitat for snakes, lizards, frogs, salamanders and small mammals such as chipmunks. Place in sunny locations against hills or in a slight depression if possible. Here’s how: Provide a base layer of sand, then mound rocks, bricks, and/or ceramic pipe to create cavities for wildlife to inhabit. This is a good way to use those rocks of all sizes that you encounter during site preparation and planting. An additional top-layer of brush can encourage a variety of wildlife species and provide additional protection. Note: Rocks are good habitat for garter snakes that are native to the Northwest and love to eat our non-native slugs. Garter snakes should be encouraged in our gardens as part of a healthy ecosystem.

**2C- Bramble Trellis:** Birds and flying insects, as they move through the garden, love to hide and feed in bramble trellises. Creating a bramble trellis can also provide screening, protective shade for new plants, and support for climbing plants such as orange trumpet honeysuckle. The trellis can also add an attractive landscape feature. Here’s how: Construct a trellis frame from red cedar or other long-lasting wood, and fastened with wire (floral, copper, etc) and nails. Weave long flexible branches into trellis frame (branches are available from roadside clearing, development sites, landscape prunings, etc). Fasten branches as needed with wire or string. Place against fences or support with metal stakes, copper plumbing pipe, or metal fence posts as shown in drawing 2C. (Concept from Heidi Bohan- habitat garden designer.)

**Snags**

**3A- Create a snag:** In certain situations it may be necessary to remove a tall tree because of it’s interference with electrical wires, building safety, etc. Rather than remove the entire tree it is possible to turn it into a snag. Here’s how: Cut the upper part of the tree, as needed, leaving as much of the lower trunk as possible. To give a more natural appearance, cut the upper trunk end at a rough angle. Cut the remaining upper branches to within a foot or so of the trunk which will begin a natural process of decomposition.

**3B- Introduced snags:** In the absence of existing natural snags it is possible to introduce snags to a garden. Here’s how: Dig a hole slightly larger in diameter than the log and to a depth of up to a third of the log’s length. Place the log upright in the hole and reinforce with rocks or fasten to a supporting pole (such as a copper plumbing pipe). Since the level of decomposition in a snag influences the type of wildlife which will use it, one can speed up decay and wildlife use by drilling holes at a 10% downward angle, and cutting upward crevices using a chainsaw (bats are known to inhabit these crevices). Monitor these logs to watch the natural process of decay.

**3C- Create artificial cavities and access holes in snags:** Many mammals (bats, squirrels, bears, raccoons, etc.) and birds (owls, flickers, woodpeckers, etc.) require cavities for shelter and to serve as nests to raise their young. A species often has specific requirements for height and size of openings to these cavities. By providing these specific habitat features it is possible to create important habitat for specific wildlife species. Here’s how: Use chainsaws, axes, mattocks, or other appropriate tools to create cavities at various heights. Cover the cavity with plywood or boards and drill appropriate-sized access holes. Eventually, the snag will naturally decompose.
Pathways

Pathways invite people into the habitat garden and create the opportunity for exploration. Pathways offer a timeless pleasure and an ancient allure that reminds us of discovery, the unseen around the corner, or the final destination, all while adding beauty and function to a garden.

Pathways can be narrow and winding, or wide and direct. They can be a hard surface or a soft trail. A narrow winding path can remind us of wildlife trails while leading to secret places to sit and experience the garden. A wide and direct path allows many people to enjoy the garden, and provides easy access for tools and materials.

Large gardens can have many types of paths and trails, from wide to narrow, soft to hard surface, straight to winding, and can be made of a variety of different materials from hazelnut shells to asphalt.

A smaller display garden can utilize a footpath of stepping-stones or a “dry riverbed” of small river rock to invite people to explore and experience the garden rather than simply observe.

Basic Pathway Design Principles

- Wide, straight trails encourage users to move quickly down the trail.
- Winding trails create a sense of discovery, and anticipation. Allow for unexpected openings and interesting garden features.
- A trail at least 36” wide allows the public to pass in either direction.
- Access trails for tools and equipment should be 30” to 36” wide and fairly straight.
- Narrow trails, 6”- 24” wide, invite users to slow down and observe.
- Narrow trails should widen to 30-36” periodically to allow for passing of individuals.
- In large gardens, or ones with a single entrance/exit, provide a location for wheelchair turn-arounds that allows a minimum 36” radius.
- Stepping-stones and rounds can provide access for weeding and plant studies, and protect plants from damage while remaining unobtrusive.
- Adding seating such as logs, rocks and benches along the way encourages deeper appreciation of the garden and wildlife. Keep large rocks 6’ apart for safety.

Two paths through the same forest. While the destination may remain the same, the design of a pathway can influence the manner in which one experiences the journey.
### Suggested Pathway Materials for Pacific Northwest Habitat Gardens

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<thead>
<tr>
<th>Type</th>
<th>Pro</th>
<th>Con</th>
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<tbody>
<tr>
<td>Cedar play chips or Cedar bark chips</td>
<td>Natural looking, readily available, moderate pricing, easy to install and very long lasting. High in tannins so will reduce weeds, they are attractive, and good for wide or narrow trails.</td>
<td>May not hold on slopes, may impede wheels, can be tracked outside of garden.</td>
</tr>
<tr>
<td>Wood chips</td>
<td>Readily available, affordable (sometimes free), easy to install, conforms easily to surfaces, natural looking, muffles sounds while walking, decomposes, temporary, good for wide or narrow trails.</td>
<td>Will decompose quickly sometimes in one season, can become soggy and slippery, needs to be refreshed, weeds can invade, will not hold on slopes, can be tracked outside of garden.</td>
</tr>
<tr>
<td>Crushed rock (5/8” crushed best)</td>
<td>Readily available, moderate price, conforms to path, good where drainage is a problem, quickly compacts to excellent surface for wheelchairs and other wheels, long lasting.</td>
<td>Neutral appearance, heavy to spread initially, usually requires a large load for delivery, can be tracked outside garden (especially at first), weeds can invade.</td>
</tr>
<tr>
<td>Natural stone slabs (such as slate)</td>
<td>Available at rockeries, attractive and natural, good for small meandering trails, garden access areas, and side trails, can be placed among groundcovers or meadow plants for maintenance access or plant studies. (Note: broken slate or granite tiles may be available for no cost.)</td>
<td>May be costly, not a good surface for wheels, not good for main trails unless professionally installed for smooth surface, poor installation may be dangerous for tripping, may be slippery when wet or frosty.</td>
</tr>
<tr>
<td>River rock (3/4” or less)</td>
<td>Readily available, affordable, interesting sounds, makes an attractive “dry riverbed” for side trails and access areas for garden, border with larger rock to add architectural element to garden, long lasting.</td>
<td>Heavy to deliver and install, weeds may invade, hard to move, not good for wheeled equipment, not suitable for wide main access trails.</td>
</tr>
<tr>
<td>Boardwalk (Various construction techniques)</td>
<td>Attractive, excellent for wetland areas, good community project (with skilled supervision), creates all-season seating area, good surface for wheels, can be used in short lengths to ‘bridge’ wet areas.</td>
<td>Expensive and labor intensive, requires higher skill level for installation, requires long term maintenance, may be slippery, may need replacement every 10-20 years depending on materials used.</td>
</tr>
<tr>
<td>Stepping Stones or Wood Rounds</td>
<td>Attractive, affordable, creates narrow trails for small gardens or as side trails, long lasting, suppresses weeds, easily moved or modified, can be imbedded in other trail materials, can be an art project activity.</td>
<td>Not a good surface for wheels, not good for wide main access trails, may be slippery depending on construction and installation, can be cracked with heavy use.</td>
</tr>
<tr>
<td>Concrete and Asphalt</td>
<td>Long lasting, virtually no maintenance, easy to clean, does not track outside of garden, allows for heavy use and equipment, can be decorated with edging or inlays.</td>
<td>Unnatural looking, expensive to purchase and install, difficult to replace or remove, damage and cracking is costly to replace.</td>
</tr>
</tbody>
</table>

To learn more:
- **Complete Guide to Trail Building and Maintenance** - Carl Demrow, David Salisbury
- **Making Paths & Walkways** - Paige Blomgren
- **Washington Trails Association** - www.wta.org
Changes in the Habitat Garden Over Time

Your Native Plant Habitat Garden is different from a vegetable garden where plants grow for a season or two and are then replanted. The plants you are planting typically grow for many years, sometimes very many years! Planning for planting needs to take these changes into account as you strive to duplicate a native ecosystem.

By way of background, the development of an ecosystem over time is called ecological succession. There are three important things to know about succession:

- It is an orderly process of community development and is reasonably predictable.
- The changes in the community result from changes in the physical environment brought about by the community itself (think about how the growth of shrubs and trees prevents sun-loving herbs from growing).
- It culminates in a stabilized ecosystem that is self-maintained for long periods of time.

Ecological succession is a fascinating subject and an area of lots of scientific research. Click here for a slightly more detailed definition of the three important things to know about succession.

Since sometimes a picture is worth a thousand words, the following drawings may help you visualize the process.

**Drawing 1** shows a disturbed habitat with the type of new growth typically seen within a few years of a major disturbance, such as construction, fire or logging. This new growth might be generated from seeds that are present in the soil (referred to as a ‘seed bank’), or from seeds that arrive by wind, water, or animals. Alternatively, this new growth could be the result of your restoration planting. A natural system recovering from a disturbance has many herbaceous perennials, deciduous shrubs and trees, and slower growing evergreen shrubs and trees.
**Drawing 2** shows an early succession forest, about 40 years old, with the forest beginning to form layers. It is possible to distinguish evergreen conifers growing up under the canopy of deciduous trees. If evergreen trees are not present in a restoration site it is important to make sure to add them as you plant to help aid the natural succession.

**Drawing 3** shows a mid-succession forest, about 60-100 years old, with a mix of mature deciduous trees, and a strong population of young evergreen conifers. Douglas fir is a fast-growing conifer that forms the mid-succession canopy along with bigleaf maple and red alder. Slower growing conifers such as red cedar and Western hemlock grow in the shade of these faster growing trees. The groundcover layer has become established. Sun-loving herbaceous plants are disappearing as their habitat changes.
Layering your planting

Since you may not wish to wait a hundred years to see the fruits of your labor, layering is an important “trick” to speed things up. Layering in this case means planting a variety of groundcover plants, shrubs, and trees. This might be a good time to look at your planting map with layering in mind. Your planting map has created a “bird’s-eye view” of your proposed native plant habitat garden. It may look something like the image to the right. This is helpful but doesn’t give you a clear indication of which plants are groundcover, which are shrubs, and which are trees—information that is important in accelerating the successional process.

Just as you had to “look down” at your proposed garden to draw your bird’s-eye view planting map, you can look “sideways” and draw a planting map that shows the layering that will be provided by the plants you’ve chosen for your garden. Use the technique found on the next page to help you construct your “side view”.

**Drawing 4** shows a mid-succession forest at about 150-200 years of age. Older trees have become snags, or have fallen to earth to become nurse-logs. The mature evergreen trees have shaded out the deciduous, sun-loving shrubs and trees, except along the edge of forest, which now has a greater diversity.
Use your ‘birds-eye’ view to draw the side view of the vegetation in your habitat garden plan.

Side-view of a plan

Bird’s-eye view of a plan

For classroom lessons on mapping layers and a handy form for evaluating the layers in your plan, visit the Q&E activity, *Plant Assessment*. 
Planting time
Fall and winter is the best time to plant native plants. This is especially true for trees and shrubs. Planting can occur through March without requiring watering; after March, more supplemental watering is required in order to establish a vigorous root system. Following these planting instructions for native plant habitat gardens adapted from directions by Linda Chalker-Scott from the Center for Urban Horticulture at the University of Washington, will maximize your success.

Caring for Plant Material Prior to Planting
- Keep roots cool and moist.
- Heel-in off-season material to prevent freeze damage. To heel-in, use wood chips or soil and bury the plant containers in the wood chips or soil at least as high as the rim of the pot.
- On site, protect plants from excess light and heat, drying out, or other hazards.

Positioning the Plants
- Set the plants in their pots according to your planting map.
- Rearrange the plants as necessary. General guidelines for plant spacing are 10-15 feet apart for trees, 5-10 feet apart for shrubs, and 1-3 feet apart for groundcovers.
- Remember that planting shrubs under the tree canopy and groundcover under the shrubs provides a layered habitat that will attract birds and other wildlife.

Planting Hole Preparation
- Dig a hole no deeper than the root mass, but at least twice as wide. Keep the soil from the hole in a pile off to the side so you can use it to re-fill the hole.
- Build a soil mound in the middle of the hole to help spread the roots evenly.
- Remove roots, weeds, large rocks, and other debris from the planting hole
- Do not add gravel, fertilizers, organic matter, or other amendments to the planting hole.
- Do not loosen or otherwise disturb the soil at the bottom of the hole.

Plant Installation
- If the plant is in a pot, make sure it is well watered. Loosen the plant from the pot by squeezing or gently tapping it.
- Remove all foreign materials – burlap, plastic, tags, etc.
- Gently shake extra potting soil from plant roots.
- Orient the plant so the top of the soil is at or slightly above the soil level in the hole.
- Place the plant atop the soil mound and spread the roots out evenly.
- Backfill with the native soil. (Plants selected should be able to adapt to soil conditions on the site.)
- Water the plant well to help settle the soil. If holes appear, fill with native soil.
- Make sure the plant is standing straight.
- If desired, build a slight soil berm around the planting hole to increase water retention.

Click here to view a student checklist and drawing to use during planting events.
After Care

- Add a thick layer of well-drained organic mulch atop the root zone, but not within 1-2 inches of plant trunks. See the box below for details about mulching.

**Mulching the Habitat Garden**

**What is mulching?** Mulching is the deliberate addition of a layer of humus around plants. Humus is organic matter in the form of compost, bark, chips, leaves or other decomposing natural material and replicates the natural process of decomposition in a plant community. The mulch layer is like a blanket over the soil that over time decomposes to become part of the organic portion of soil.

**Reasons to mulch:** Mulch is a natural weed suppressant, helps to hold in moisture and stabilizes soil temperatures. It is best to mulch after planting in the rainy season, or in the fall in an established garden. In the native plant habitat garden, it is important to leave native plant leaf and plant litter where it falls on the ground around the plants. Once the native plant habitat garden is well established, it should not need additional mulch; the leaf litter and plant litter naturally mulch the garden.

**Mulching materials:** Many materials work well and range from cardboard to compost. Different factors influence which materials to use. For maximum weed suppression cardboard with a layer of wood chips is recommended. For general garden use a thick layer (4-6") of wood chips, shredded bark or Cedar Grove compost is highly recommended. Note: Do not use “SteerCo’ or other mulches containing manure or similar nutrient-rich ingredients. Native plants do not need these extra nutrients and can, in fact, be harmed by them.

**Installing mulch:** Mulch should be installed in fall or after planting new plants. It is important to remove weeds before installing mulch. If using cardboard make sure the soil is moist, as it will take a while for rainfall to begin penetrating cardboard. All mulch should be kept about 2” away from the stem or trunk of plants to prevent stem rot. Generally mulch should be installed at a depth of 4-6”. Herbaceous (non-woody) native plants that may be dormant in fall and winter should not be covered with more than 2” of mulch or it may prevent their emersion in the spring.

---

**Mulch Suppliers**

- **Action Tree Service**
  - (Woodchips for Free)
  - 1802 12th
  - Seattle, WA 98122
  - Phone: 206-324-7535

- **Ground Up**
  - (Compost, Bark, Soil for a Fee)
  - Giovanni Anichini
  - Phone: 206-498-8835

- **Pacific Topsoil**
  - (Compost, Bark, Soil for a Fee)
  - Bothell, WA
  - (425) 337-2700

- **Alternative Tree Care**
  - (Woodchips for Free)
  - Phone: 206-789-1585

- **Sayers Fuel**
  - (Compost, Bark, Soil for a Fee)
  - 3809 Rainier Avenue South
  - Seattle, WA
  - Phone: 206-723-0564

- **Cedar Grove Compost**
  - (Compost, Bark, Soil for a Fee)
  - Maple Valley, WA
  - (425)763-2700

**Weed Barrier Suppliers**

- **NW Landscape Supply**
  - 1-800-303-9325

- **Landmaster Landscape Fabric**
  - Available at many hardware stores
More after care...

- Stake tall trees only to prevent them from falling over. Stakes should be loose and low (bottom 1/3 of plant) and removed after one growing season.
- On your planting map, mark or record what and where you actually planted.
- Water new transplants during the first 1-2 dry seasons to help them establish. Use deep watering techniques. (Note: if planting occurs from Oct.-Feb. and plant sizes are one gallon or smaller and plantings are well mulched, watering during the first 1-2 dry seasons may not be necessary).
- Maintain a mulch layer ≈ 3-4 inches thick.
- Keep the entire garden, especially the root zones, free of turf, exotic grasses, and other weeds to reduce resource competition.
- Use the seasonal maintenance checklists below as a guide.
- Keep records to help determine what worked and what didn’t to help plan the next plantings.
- Compost your weeds (except for noxious weeds) and clippings but let fallen leaves become a part of your mulch.
- Check your native plant garden often for weeds, over- or under-watering, insect or other problems, and to enjoy your planting successes.

Fall Maintenance Activities

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<th>September</th>
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<tr>
<td>Work Parties</td>
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Time estimates

- **Weeding:** 0-4 hours per month, depending on season, maturity and diversity of plants.
- **Planting:** Variable, depending on plant sizes and quantities.
- **Mulching:** 4 hours, one time per year for new plantings during first and second year.
- **Watering:** 2 hours, twice per month for new plantings during first and second year. Note: If planting occurs from Oct.-Feb. and plant sizes are one gallon, 4” pot or smaller, and plantings are well mulched, watering during the first and second year may not be necessary.
- **Work Party:** 4 hours, plus prep and clean up.

Garden Activities

- Summer watering if needed (first and second years only)
- General garden cleanup
- Weeding and weed suppression
- Pruning and grooming for trails and access areas
- Mulching and degradable weed barrier
- Maintenance of hardscape and wildlife features
- Begin planning for future enhancements
- Fall education activities
- Seed collection for propagation activities

*Black cottonwoods turn golden against the evergreens.*
Winter Maintenance Activities

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Time estimates

Weeding: 0-4 hours per month, depending on season, maturity and diversity of plants.
Planting: Variable, depending on plant sizes and quantities.
Mulching: 4 hours, one time per year for new plantings during first and second year.
Watering: Not needed during winter months
Work Party: 4 hours, plus prep and clean up.

Garden Activities

- Addition of habitat and hardscape features
- Planting for enhancements
- Weeding, mulching and installing weed fabric
- Pruning and grooming for trails and access areas
- Hardwood and root cutting propagation activities
- Winter education activities
- Set up work parties for above activities

*Work parties can be 'Family Days', 'Saturday Garden Day' or other planned public events with specific activities for people to participate in the garden.

Osoberry or Indian plum, (Oemleria cerasiformis), is the first native shrub to flower in the Westside lowland forest.

Spring Maintenance Activities

<table>
<thead>
<tr>
<th></th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeding</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mulching</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Watering</td>
<td></td>
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<td></td>
<td>X</td>
</tr>
<tr>
<td>Work Parties</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Time estimates

Weeding: 2-6 hours per month, depending on season, maturity and diversity of plants.
Planting: Variable, depending on plant sizes and quantities.
Mulching: 4 hours, one time per year for new plantings during first and second year.
Watering: Not needed during spring months, with the exception of late plantings.
Work Party: 4 hours, plus prep and clean up.
Spring Garden Activities

- Set up maintenance action plan for year
- Addition of habitat and hardscape features
- Weeding and installing weed suppression materials (such as edging, wood chips, degradable weed cloth, etc.)
- Mulch for summer
- Spring education activities
- Set up watering system and plan for summer (if needed)
- Set up work parties for above activities
  *Work parties can be ‘Family Days’, ‘Saturday Garden Day’ or other planned public events with specific activities for people to participate in the garden.

About weeds

While weeds are often defined as “a plant out of place”, weeds in the native plant habitat garden are out of place and time; they are plants that would not have been found in this area before the arrival of Europeans. Preventing the growth of weeds and removing weeds that grow in your garden are important tasks. Many habitat gardeners claim that, when weeding, the best way to make sure you are removing a weed and not a valuable plant is to pull on it. If it comes out of the ground easily, it is a valuable plant. Although humorous, the statement underscores the sometimes tricky nature of weeding. To help, Starflower Foundation has developed Habitat Restoration WEED ID Cards for the Pacific Northwest. The cards are intended for use on native plant habitat restoration sites in the Seattle urban area and are helpful in identifying plants to be removed during weeding stewardship activities. The set of cards includes the most common and important weeds and can be accessed free at www.wnps.org/education/resources/index.html

Each card includes the following information:
- Color images of the plant in young and mature stages, its form and flowering structures, and key identifying field characteristics
- Management strategies—how to remove the plant
- General information about the plant type, its life cycle and size
- Common name and scientific name
- Flower color and color code for quick searching
- Form including shape and configuration
- Native or non-native look-alikes

*A portion of a Weed ID card. Click here to see the full card

Click here to learn some weed botany basics
Schoolyard Habitat Composting
Since native plant leaf and plant litter are left to decompose on the ground around the plant, traditional compost piles are not really needed. However, while native plant habitat gardens are largely models of self-composting, you may wish to construct a compost bin or pile to take care of any weeds that appear or pruning debris that you create. The following introduction to schoolyard habitat composting is adapted from “Backyard Composting”.

The science of composting and the cycle of growth and decay
Composting carries out part of the earth's biological cycle of growth and decay. Plants grow by capturing the sun's energy along with carbon dioxide from the air and nutrients and water from the soil. When plants (and the animals that eat them) die, they become raw materials for the composting or decay process. Microorganisms, fungi, insects, worms, mites, and other creatures convert the carbon from dead plants into energy for their own growth, releasing carbon dioxide into the air. Similarly, they recycle the nutrients from the decaying plants into their own bodies and eventually back into the soil. Other plants and microorganisms use the carbon and nutrients released by the composting process, and the cycle begins again.

The material that remains from the decay process is similar to soil organic matter. It holds water and nutrients in the soil, and makes the soil more porous and easier to dig.

Building the pile
Step 1: Collect enough material to make a pile at least 1 cubic yard in volume (an open pile 5 feet wide at the base by 3 feet high holds about a cubic yard). You need roughly two parts bulking agent to one part energy material. Chop, shred, mow, or smash coarse materials so they will break down faster.
Step 2: Start the pile by adding energy material and bulking agent, and mixing with a pitchfork.
Step 3: Squeeze a handful of the mixed material to check its moisture level. If you can barely squeeze out a drop of water, the moisture level is ideal. If the pile is too dry, add water, and check the moisture again. If it is too wet, mix in some drier material.
Step 4: Continue adding energy material and bulking agent, mixing, and checking moisture until the pile is built.

Turning the pile
Use a pitchfork to turn the pile weekly, and add water when needed. Turning gets air into the center of the pile and speeds the biological decay. Turning also mixes material from the outside of the pile into the hot center. Cover the pile during rainy periods so it will not get too wet.

Curing phase
After initial mixing, a regularly turned pile usually stays hot (120°F to 150°F) for several weeks to a month. The pile will shrink to about half its original volume during the hot phase. The pile then needs to sit another for 4 to 8 weeks to cure. Temperatures during curing are 80°F to 110°F. The compost is ready to use when at least 8 weeks have passed since initial mixing, the pile no longer heats when turned, and the material looks dark and crumbly. Curing affects the availability of nitrogen and the microbial activity of the compost. Uncured compost may harm some plants. This is most likely when compost is used in potting soil or to start seeds. Curing is less critical when small amounts of compost are worked into soil.

Using the compost in the schoolyard garden
The compost pile is an excellent ‘laboratory’ for studying decomposers while doing decomposer/soils activities with students. Cured compost is best used as mulch around established plants. Most native plant gardens do not need compost as soil amendments. Watch for the presence of weed seed that may be present in the compost and manage as needed.

Click on the Stewardship Gardening logo to view the original, more extensive, version of Schoolyard Composting
Capitalizing on the educational opportunities

Starflower Habitat Education Activities and Resources provide a wide variety of information you can use to turn your native plant habitat garden into a successful teaching and learning center. Hands-on activities for teachers and students, native plant identification cards, weed identification cards, and informational posters, all briefly described below, are available on the Washington Native Plant Society Habitat Education Activities and Resources page.

All the materials listed were developed by the Starflower Foundation whose mission was to assist with the creation, rehabilitation and stewardship of Pacific Northwest native plant communities.

Quick & Easy Habitat Education Activities
Science-based activities for grades K-5 and middle school focus on our Pacific Northwest native ecosystems, stress hands-on learning, and accommodate many different learning styles.

Native Plant ID Cards
111 cards provide a quick reference for novice botanists. Each features helpful images and text designed to assist with long-term stewardship of native plant landscapes.

Weed ID Cards
51 cards assist in identifying plants to be removed during weeding management stewardship activities on native plant habitat restoration sites, especially in the Seattle urban area.

Posters of the Month
53 posters serve as a handy tool to engage neighbors and visitors in on-going native plant restoration projects.

Additional resources developed by Starflower Foundation include an array of educational materials, project case studies, and an image herbarium. All contain Western Washington native plant information and images for use in education, restoration and landscaping projects. As mutually agreed upon with Starflower Foundation, Washington Native Plant Society has made Starflower's learning and education materials available on its website. 

You might also find these activity guides helpful:

- **Schoolyard Habitats- National Wildlife Federation** (2001) (Steps and techniques for restoring habitat on school grounds)
- **Project WILD- K-12 Activity Guide** by Council for Environmental Education
- **City Kids and City Critters! Activities for Urban Explorers** by Roberts & Huelbig (Learning Triangle Press 1996)
- **Trees are Terrific (Ranger Rick's NatureScope)** by Judy Braus, editor (McGraw-Hill 1998). (Teacher resource & activity guide)

Thinking about sharing your native plant habitat garden knowledge and experiences with other teachers? 

Click here to see an assortment of training agendas

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**Starflower Foundation**


**Ann Lennartz**

1951-2006
Books and other resources
From books to bareroot suppliers, the following list provides helpful information. Books marked with an asterisk are excellent aids

**Suggested Books**

*A Manual of Native Plant Communities for Urban Areas of the Pacific Northwest* by Charles M. Anderson, ASLA
Cascade Biomes, Inc.
PO Box 22419, Seattle, WA 98122-0419
Phone: 206-322-0528 Email: biomes@earthlink.net

*Lanscaping for Wildlife* by Russell Link (University Press) (How to design and create wildlife habitats with lots of drawings.)
Web: http://www.wdfw.wa.gov/wlm/landscap.htm

*Plants of the Pacific Northwest Coast* by Pajar & Mackinnon (Lone Pine 1994). (Excellent reference for field ID of native plants and their ethnobotany uses)


**Birds of Seattle and Puget Sound** by Chris C. Fisher (Lone Pine 1996). (Illustrated field guide)

**Familiar Birds of the Northwest** by Harry B. Nehls (Illustrated field guide)

**Landscape Design for Wildlife, Urban Wildlife Series**, Washington Department of Fish and Wildlife
16018 Mill Creek Boulevard (How to guide for creating, maintaining a habitat garden)
Mill Creek, WA 98102-1296
Phone: 425-775-1311
Fax: 425-338-1066
Web: http://www.wdfw.wa.gov/reg/region4.htm

**Propagation of Pacific Northwest Native Plants** by Rose, Chachulksi and Haase (Oregon State University Press 1998)

**The Natural History of Puget Sound Country**, also by Arthur R. Kruckeberg, provides ecological background information for teachers, older students

**National Wildlife Federation**
NWF offers publications on how to do habitat restoration.
Web: http://www.nwf.org/education/

**Plants & Animals of the Pacific Northwest** by Eugene N. Kozloff (University of Washington Press 1976). (Illustrated guide)

**Education Supplies**

Catalogs:
**Acorn Naturalists: Resources for the Trail and Classroom**
17821 East 17th Street, #103
PO Box 2423
Tustin, CA 92781-2423
Phone: 800-422-8886 (M-F, 7am-5pm PST)
Fax: 800-452-2802
Web: www.acornnaturalists.com

**Local Retailers:**
**Science, Art & More**
6417 Roosevelt Way NE
Seattle, Washington 98115
Phone: 206-524-3795
Note: Science, Art & More will donate a small percentage of your purchases towards the school of your choice

**Resources for Garden-Based Education from Gardens for Growing People**
PO Box 630
Point Reyes Station, CA 94956
Phone/Fax: 415-663-9433
Education Organizations- Classes, Workshops, Curriculum

Environmental Education Association of Washington
P.O. Box 4122
Bellingham, WA 98227
Email: eeaw@eeaw.org
Web: www.eeaw.org

North Cascades Institute:
Connecting People, Nature & Community
Through Education
810 State Route 20
Sedro-Woolley, WA 98284-1239
Phone: 360-856-5700 ext. 209
Fax: 360-856-1934
Email: nci@ncascades.org
Web: www.ncascades.org

People for Puget Sound
911 Western Avenue, Suite 580
Seattle, WA 98104
(206) 382-7007
Education Coordinator, Stephanie Raymond
Email: sraymond@pugetsound.org
Web: http://www.pugetsound.org/education/resources.html

Sampling of Presentation Themes:
• **Watershed Web:** Discusses the links between species in the Puget Sound ecosystem, from orcas to fir trees.
• **What is Puget Sound?** Covers the formation of the Puget Sound watershed, common habitat types found around Puget Sound, and a "who's who" of Puget Sound flora and fauna.

Islandwood
4450 Blakely Avenue Northeast
Bainbridge Island, WA 98110
Phone: 206-855-4300 Email: info@islandwood.org
Web: http://www.islandwood.org/

Seattle Audubon Society
8050 35th Ave. NE
Seattle, WA 98115
(206) 523-4483 Fax (206) 528-7779
Web: http://www.seattleaudubon.org/

Education Kits, Field Trips

The Burke Museum of Natural History and Culture - Traveling Study Collections
Education Division
Box 353010
University of Washington
Seattle, WA 98195-3010
Phone: 206-543-5591 Email: burked@u.washington.edu
Web: www.burkemuseum.org
(Ask for Pacific Northwest Cultures Collection)

Master Gardener Program
WSU Cooperative Extension in King County
Department of Natural Resources and Parks
919 SW Grady Way, Suite 120
Renton, WA 98055-2980
Phone: 206-205-3100 Fax: 206-296-0952
Web: http://king.wsu.edu/gardening/mastergardener.htm
(Education Kit Themes from compost to plant ID)

Washington Native Plant Society
7400 Sand Point Way NE
Seattle, WA 98115
Phone: 206-527-3210 or 1-888-288-8022 Email: wnps@wnps.org
Web: http://www.wnps.org/
(Northwest Native Plant Education Kit (for teachers) and Slide Show Library (Ethnobotany of Western Washington, Common Native Plants, Gardening for Wildlife, etc.))

Washington Park Arboretum
University of Washington
Box 358010
Seattle, WA 98195-8010
Phone: 206-543-8800 Email: wpa@u.washington.edu
Web: http://depts.washington.edu/wpa/
(Field trips for school groups including 'Native Plants & People’ and other botany programs. Also, Self Guided Explorer Packs for ages K-8.)
Native Plant Habitat Restoration Resources

Restoration Organizations

City of Seattle, Office of Sustainability & Environment (Urban Forest Management)
Key Tower, 700-5th Avenue, #2748
Seattle, WA 98104
Phone: 206-615-0817
Fax: (206) 684-3013
Email: Julie.Tobin@ci.seattle.wa.us
Web: http://www.cityofseattle.net/environment/

Washington Native Plant Society
7400 Sand Point Way NE
Seattle, WA 98115
Phone: 206-527-3210 or 1-888-288-8022
E-mail: wnps@wnps.org
Web: http://www.wnps.org/

Society for Ecological Restoration Northwest Chapter
Center for Urban Horticulture
Box 354115
Seattle, WA 98195-4115
Phone: 206-547-9641
Fax: 206-685-2692
Email: info@sernw.org
Web: http://216.119.67.178/

Sampling of Restoration Projects

Colman Park
1800 Lake Washington Boulevard
Seattle, WA

Dearborn Park
2820 S. Orcas
Seattle, WA 98108
(Student Plot restoration (adjoining Dearborn Park School, student plot restorations))

Genesee Park
4316 S Genesee St
Seattle, WA 98116
Phone: 206-684-4075 Web:
http://www.cityofseattle.net/parks/parkspaces/genesee.htm

Hawthorne Elementary School
4100 39th Avenue S.
Seattle, WA 98118
(Habitat Garden (at NW corner of school next to teacher parking))

Madrona Woods is located between
800 and 900 Lake Washington Boulevard, west to 38th Avenue
Seattle, WA 98122
Web: http://woods.madrona.org/

Pritchard Beach
5500 South Grattan Street
Seattle, WA 98118
Web: http://www.scn.org/neighbors/pritchardpark/

Roxhill Park
29th Avenue SW and SW Barton Street
Seattle, WA 98126
Web: http://www.scn.org/neighbors/westwood/roxhill/
Native Plant Suppliers

Plants and Seeds
These wholesale suppliers of native plant seed and plant stock may have minimum orders as well as other requirements. All offer delivery service. Use after you have created a design and plant list.

Forest Flor Recovery
(360) 758-2778
PO Box 89
Lummi Island, WA 98262

Frosty Hollow
360- 579-2332
Box 53
Langley, WA 98260

Judd Creek Nursery
206-463-9641
PO Box 13378
Burton, WA 98013

Storm Lake Growers
360-794-4842
21809 89th St SE
Snohomish, WA 98290

Wabash Farms
360-825-7051
19390 SE 400th
Enumclaw, WA 98022

Annual Native Plant and Seed Sales Events
Washington Native Plant Society
7400 Sand Point Way NE
Seattle, WA 98115
Phone: 206-527-3210 or 1-888-288-8022
E-mail: wnps@wnps.org
Web: http://www.wnps.org/

Bare Root Stock Suppliers
Fourth Corner Nurseries
360-592-2250
www.4th-corner-nurseries.com

King County Conservation District
206-764-3410
935 Powell Ave SW
Renton, WA 98055
www.kingcd.org/

Mulch Suppliers
Action Tree Service (Woodchips for Free)
1802 12th
Seattle, WA 98122
Phone: 206-324-7535

Alternative Tree Care (Woodchips for Free)
Phone: 206-789-1585

Cedar Grove Compost (Compost, Bark, Soil for a Fee)
Maple Valley, WA
(425)763-2700

Ground Up (Compost, Bark, Soil for a Fee)
Giovanni Anichini
Phone: 206-498-8835

Pacific Topsoil (Compost, Bark, Soil for a Fee)
Bothell, WA
(425)337-2700

Sayers Fuel (Compost, Bark, Soil for a Fee)
3809 Rainier Avenue South
Seattle, WA
Phone: 206-723-0564

Weed Barrier Suppliers
NW Landscape Supply
1-800-303-9325
Landmaster Landscape Fabric
### Suggested Tool List For Native Plant Habitat Restorations

The following is a list of tools useful in habitat gardens and restoration projects. For most ongoing maintenance activities in the garden, the tools marked in **bold** are the bare minimum required. Other tools are specific to certain tasks such as propagation activities, new garden site preparation, easier handling of wood chips, etc. The descriptions will help you to decide which tools are most appropriate for your particular garden activities.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Quantity *</th>
<th>Prices* *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves in a bucket</td>
<td>Store a variety of gardening gloves (such as latex coated mud gloves, canvas, reinforced cotton, and leather) loosely in a plastic bucket, bin or box allowing students to easily find individual or pairs of gloves as needed. Encourage students to wear garden gloves during garden activities. Mud gloves are the most versatile and long-lasting garden gloves and work well in our wet northwest climate. Leather gloves are important for pulling blackberries or other thorny plants. Canvas and reinforced cotton gloves are good general use gloves and are the most affordable.</td>
<td>1 pair/ student</td>
<td>$1-$10/pair</td>
</tr>
<tr>
<td>Disposable latex or vinyl gloves</td>
<td>Disposable latex or vinyl gloves are very useful for propagation activities where dexterity is important such as working with seeds and seedlings, and handling cuttings. These can be purchased in bulk in most pharmacies, as well as in the paint and cleaning supply sections of hardware stores. While they are designed for one use, it is possible to reuse these several times for propagation activities. They also work well as emergency general garden gloves though they will wear out quickly. Some people may have a reaction to latex (skin redness or rash); see information included with gloves.</td>
<td>1 pair / student</td>
<td>$2.50/10 pack or $12-15/100/pk</td>
</tr>
<tr>
<td>Hand trowel</td>
<td>Plastic-handled or full plastic hand trowels work fine for the school garden. High-grade wood handle and/or metal trowels will last longer. Used for planting small plants (4&quot; containers, tubes, transplanted seedlings etc.), general weeding and helping to spread mulch.</td>
<td>12+</td>
<td>$1-$5 +</td>
</tr>
<tr>
<td>Shovel – round point</td>
<td>Long handle and/or short D handle, round point shovels for general garden use. These are used for preparing the site, planting large plants, spreading mulch and pathway materials and weeding in unplanted areas.</td>
<td>6-12</td>
<td>$5-15+</td>
</tr>
<tr>
<td>Spade – round point</td>
<td>Short D handle, round point for planting small to large plants, and for large weed removal. Can also be used for general garden use preparing the site, spreading mulch and pathway materials.</td>
<td>6</td>
<td>$15-25+</td>
</tr>
<tr>
<td>Hand pick (or hand mattock)</td>
<td>Short-handled planting pick (also called a hand mattock) with fiberglass or wood handle, and with small pick head (blade on one side and sharp pick on the other). A very useful tool for planting (especially in hard or rocky ground), weeding and preparing the site.</td>
<td>6-12</td>
<td>$8-15</td>
</tr>
</tbody>
</table>
### Suggested Tool List For Native Plant Habitat Restorations—continued

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutter mattock</td>
<td>36” wood or fiberglass handle, standard cutter mattock head (heavy blade on one side and cutting blade on the other). Used to prepare planting holes in hard clay, rocky or heavily rooted ground for large plants and for clearing pathways. This tool is necessary for preparing sites especially when removing non-native blackberries and ivy, or other heavy-rooted invasive plants. Note: Heavy and somewhat dangerous tool most appropriate for middle school students or adult use in the garden. All gardens should have access to at least one of these tools especially during site preparation phase.</td>
<td>1-4</td>
<td>$10-20</td>
</tr>
<tr>
<td>Garden rake</td>
<td>Metal bow or level-head rake, long wood handle. A garden rake is useful for spreading mulch or pathway material, grading soil during site prep phase, and handling large piles of weeds.</td>
<td>3+</td>
<td>$10-20</td>
</tr>
<tr>
<td>Pitchfork</td>
<td>Long, wood handle, metal fork with several curved prongs. Especially useful for handling bark/wood chip mulch and piles of weeds, and turning compost piles.</td>
<td>1-2</td>
<td>$12-20</td>
</tr>
<tr>
<td>Garden fork/digging fork</td>
<td>Short, wood D handle, metal flat blades. Very useful in the site preparation phase in readying the soil for planting. Can also double as the pitchfork used in handling bark/wood chip mulch.</td>
<td>1-2</td>
<td>$20-40</td>
</tr>
<tr>
<td>Post hole digger</td>
<td>Standard pass-through post hole digger with wood or fiberglass handles. Very useful for preparing holes for fence posts, trellises, placing snags, etc. Can also be used to dig planting holes in heavy, hard soils.</td>
<td>1</td>
<td>$12-20</td>
</tr>
<tr>
<td>Hand pruners/gardening shears</td>
<td>Bypass pruners (also called gardening shears) with metal blades and cushioned handles. Used to harvest seeds, create cuttings, prune plants as needed and cut branches or large weeds for speedier composting, and many other uses in the garden.</td>
<td>3-6</td>
<td>$8-15</td>
</tr>
<tr>
<td>Loppers</td>
<td>Bypass loppers with wood, fiberglass or metal handles. Used to prune large branches, and cut large plant materials into smaller pieces; especially helpful for gardens with large trees that need periodic pruning to maintain clearances, pathways, etc.</td>
<td>1-3</td>
<td>$5-18</td>
</tr>
<tr>
<td>Bucket</td>
<td>Plastic 5 gallon buckets (paint buckets, utility buckets), with handles. Very helpful for moving mulch, weeds, and for storing tools and other materials. Can also be used to supply water for plants after planting and for watering planting sites inaccessible by garden hose.</td>
<td>4-6</td>
<td>$5</td>
</tr>
<tr>
<td>Wheelbarrow</td>
<td>General-purpose 4-6 cubic foot wheelbarrow. An important tool for the garden, used to move mulch, weeds, plants, tools and other materials.</td>
<td>1-3</td>
<td>$35-50</td>
</tr>
</tbody>
</table>
Suggested Tool List For Native Plant Habitat Restorations—continued

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Quantities</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flagging tape</td>
<td>Colored PVC flagging tape in 50-100 yard rolls. Comes in a variety of colors, and may be imprinted with ‘caution’ or other text. Useful to identify native or non-native plants during weeding activities or site preparation (for example use pink for non-native, green for native), to mark off recently planted areas (e.g., string tape between sticks or metal stakes inserted in the ground to create a low fence), or to designate plots or boundaries.</td>
<td>1-6 (varied colors)</td>
<td>$2-8</td>
</tr>
<tr>
<td>Garden hose</td>
<td>General-purpose garden hose for gardens that have access to water faucets. Use after planting and during the summer, as needed, until plants become established.</td>
<td>As needed</td>
<td>Depends on length.</td>
</tr>
<tr>
<td>Tarp</td>
<td>Plastic tarps- several sizes. Tarps are extremely useful for collecting and moving weeds, covering mulch piles, protecting hard surfaces, providing dry seating for students, and rain cover if needed.</td>
<td>1-3</td>
<td>$1-10</td>
</tr>
<tr>
<td>Push broom</td>
<td>Wood or plastic handle, straw or plastic bristle broom head. Use for cleanup on sidewalks, parking lots, and entrances to classrooms.</td>
<td>1-2</td>
<td>$5-15</td>
</tr>
<tr>
<td>Door mat</td>
<td>Scraper mats, vinyl mesh, coco mat, or other heavy-duty mud removal mats. Place outside garden entrance and/or entrances to school hallways or classrooms to reduce dirt tracked into your school (maintenance staff will appreciate it!).</td>
<td>1-2</td>
<td>$5-20</td>
</tr>
</tbody>
</table>

Note:
- Quantities required will vary depending upon the number of students and the type and structure of garden activity. Generally, students will be working in teams or rotations as multiple activities take place in the garden, each with different tool requirements. As your particular needs are determined, you can adjust tool quantities.

- Prices listed are low-end estimates. Check large hardware stores and sale catalogs for your best prices. Look for quantity discounts, sales, and economy priced tools. Always ask for a school discount or donations. For school garden use by younger students, most economy-grade tools will last for many years if properly stored and handled. However, premium-grade tools, which employ superior materials and construction techniques, will last much longer.
A helpful checklist
The Arizona Master Gardeners have compiled a checklist for schools initiating garden projects. Although designed for desert climes, the list is quoted below as a useful tool for tracking your progress with your native plant habitat garden. For additional information please see Success with School Gardens by Linda A. Guy, Cathy Cromwell, and Lucy K. Bradley (1996 Arizona Master Gardeners, Inc.).

Native Plant Garden Management
- Develop the Native Plant Garden Proposal
- Discuss program objectives
- Identify potential site
- Identify leaders and participants
- Outline program requirements (activities, training, tools, supplies)
- Prepare a budget
- Identify potential donors for skilled labor and materials

Form a Native Plant Garden Committee
- Include faculty, parents, administrators, and students
- Include members with a variety of skills, not just native plant/ecology knowledge
- Develop a vision of what the native plant garden and its related educational program will be in 5 years
- Establish program goals and a budget for the year
- Decide who participates and how
- Ensure that native plant garden operational needs (initial watering, weeding, mulching, class scheduling, tool and system repair) are met
- Create an annual program to provide focus for class activities, fundraising and special events
- Establish rules of native plant garden “etiquette” and behavior management
- Enlist and train classroom volunteers
- Write grants and conduct fund raising
- Secure native plants, tools and supplies

Cultivate Administration and Community Support
- Make the native plant garden a showcase; keep it neat, attractive, and interesting
- Know the native plant garden program and discuss it with enthusiasm
- Keep your administrator and sponsors well-informed
- Invite district personnel and local media to native plant garden events
- Include the maintenance staff
- Credit sponsors in school publications and use the publications as promotional tools
- Know your organization’s tax status for donors
- Provide awards or recognition for your volunteers

Native Plant Garden Start-up and Maintenance
Select a site that has:
- Partial to full sunlight (prefer morning to mid-afternoon)
- Good drainage (Test by digging a hole and filling it with water. After it drains, refill. It should drain at least one inch per hour)
- Level ground
- Healthy, workable soil (Review history of site to identify any potential contaminants. Conduct soil test if necessary. Lots of weeds or grass is a sign of at least adequate soil.)
- Easy access to water
- Easy access to classrooms
- A highly visible location to showcase program and minimize potential for vandalism. However, avoid sites that have been used previously as high-traffic areas
- Sufficient in size to include, or close enough to, an area for group discussion and work
Native Plant Garden Start-up and Maintenance—continued

Select a site that has:

- Long-term potential as the garden site (Review future plans for school grounds to ensure at least a three-year commitment to garden location)
- Potential for expansion as the project grows
- Existing schoolyard fencing around perimeter

*Click here for Stewardship Management Action Plan forms*

Design and Develop the Site

- Think small, beautiful and manageable for the first phase
- Clean the site of debris
- Remove weeds and kill grass
- Design final garden on paper
- Layout plantings and hardscape (paths, etc.)
- Prepare soil
- Install watering system
- Add other improvements (fencing, compost gin/heap, tool shed) as time and funding permit

Planting Time

- Check planting calendar information to learn what to plant when
- Use taller plants for shade and natural trellises
- Group plants with similar water or light needs
- Mark or record what and where you planted
- Mulch to minimize evaporation and weeds
- Use deep watering techniques during dry season of years one and two
- Check your native plant garden often for weeds, over- or under watering, insect or other problems, and to enjoy your planting successes
- Keep records to help determine what worked and what didn’t to help plan the next plantings
- Compost your weeds (except for noxious weeds), clippings
- Relax and enjoy. Gardening is therapeutic!

Weathering the Summer

- Restore mulch to six-inch thickness
- Schedule staff, parent or student volunteers to water (during years one and two), weed, and care for the native plant garden
- Have summer school, recreation program, maintenance staff, or other volunteers adopt the native plant garden