

# StormWater Plant Materials

## A Resource Guide

Detailed information on  
appropriate plant materials  
for Best Management Practices



BoisePublicWorks



# ***Guidelines for Plant Selection, Establishment, and Maintenance for Storm Water Best Management Practices***

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## **PREFACE**

This resource guide serves as a tool for selecting plant materials for vegetated storm water Best Management Practices located in Boise City. The guidelines in this document can be used by landscape architects, architects, engineers, or other design professionals who are involved in storm water system design.

This resource guide does not include design of storm water BMPs. Design information can be found in the *City of Boise Storm Water Management Design Manual (available mid 2000)*. This resource guide should be used in conjunction with the *City of Boise Storm Water Management Design Manual* and the *Storm Water Operation and Maintenance Resource Guide*. This resource guide is an evolving document that will be updated as new information is available and as new plant materials are developed and tested.

The resource guide is divided into five sections. The first 4 sections describe the site components that are critical for successfully establishing plants in storm water systems. The last section details guidelines for specific storm water best management practices, specifically, ponds, biofiltration systems, and infiltration systems.

The appendices include climate information, biofiltration system cover type, plant lists, and regional plant vendors.





## **INTRODUCTION**

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For the past couple of years, the Boise Public Works Department has encouraged designers to incorporate vegetative storm water best management practices (BMPs) into the site design. These plant-based BMPs provide water quality treatment, are easy to maintain, and are aesthetically pleasing. In addition, vegetative BMPs can be used to meet both On-site Detention (ODI) and landscaping requirements. Designers will be required to submit a landscape plan if vegetative BMPs are included in the site design. See the *Boise Storm Water Management Design Manual* for more information on landscape plans and other requirements for specific BMPs.

Plants can purify the water by removing suspended solids (sediment) and a wide variety of nutrients and minerals such as nitrate, phosphorus, heavy metals, and fecal coliform bacteria. The plants also provide bank protection by reducing the wave energy before it hits the bank. By reducing the wave energy, the plants will cause the water to drop sediment around the base of the plants thereby cleaning the water by removing suspended solids. The above ground plant biomass provides sites for algae and other microorganisms to live and multiply. The root systems provide colony sites for microbes that breakdown nutrients into usable proteins and amino acids in addition to basic elements and nitrogen gas.

Selecting the proper plant materials for these BMPs is essential because many of these BMPs rely on the plants to perform important functions. Examples of these functions include filtering sediment and reducing erosion. If the wrong plants are selected, they may not tolerate site conditions and either become weak or die. Weakened or dead plants will need to be replaced so that the BMP will work properly. Continual plant replacement increases project costs and reduces BMP effectiveness. Similarly, other plants may require significant short-term and long-term maintenance. Consequently, the designer should choose plants wisely.

### ***Storm Water Best Management Practices***

Storm water BMPs can be temporary or permanent. Temporary BMPs are installed during construction to control erosion or stabilize or protect slopes. Examples of temporary BMPs are brush filters, geotextiles, and mats. Permanent BMPs are installed before, during, and after construction to not only control erosion, but also manage storm water and provide site aesthetics. Examples of permanent BMPs are extended detention ponds and biofiltration swales. The amount of space available on a site, operation and maintenance requirements, and aesthetics will affect the choice of a permanent BMP.



Designers can also incorporate storm water planning techniques into the site design during the site planning process. Minimizing directly connected impervious areas (DCIAs) and preserving existing vegetation onsite are examples of techniques that can be applied during the initial site planning phase.

Vegetative storm water BMPs provide a variety of uses, depending on your objective. BMPs such as biofiltration swales and grass buffer strips are primarily pretreatment systems that are used in conjunction with other storm water facilities for on-site disposal. Whereas, infiltration swales and ponds are systems that could be used alone or with some type of pretreatment. Detention ponds are designed exclusively for flood control and may be either wet or dry. Plant materials used in detention ponds are primarily for stabilization and aesthetics. Extended detention ponds are multifunctional, with a longer detention time in order to provide both water quality treatment and flood control. Table 1 shows the different uses of vegetative storm water BMPs.

**Table 1.  
Vegetative  
BMPs and their  
uses**

<b>Facility Type</b>	<b>Max. period of standing water</b>	<b>Comments</b>
Detention pond	24-48 hours	Water quantity control
Ext. detention pond	48-72 hours	Water quality control
Evaporation pond	Varies	Water quantity/quality control
Infiltration basin	48-72 hours	On-site disposal; Requires pretreatment
Infiltration swale	24 hours	On-site disposal; Requires pretreatment
Biofiltration swale	No standing water	Used for pretreatment only
Grass buffer strip	No standing water	Used for pretreatment only
Grass channel	Duration of storm	Used for conveyance only

Another type of vegetative BMP is bioretention. Bioretention is a method to manage storm water runoff using native plants and soil conditioning. Bioretention areas capture sheet flow from impervious surfaces. The captured water usually flows through a grass buffer strip and then is infiltrated into a filtration bed. Bioretention capitalizes on the biological abilities and physical attributes of specific plants and native grasses. Information on bioretention has not been provided at this time.



## **UNDERSTANDING YOUR SITE**

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Understanding the site's characteristics will help determine which plant materials and planting methods the designer should select. Selecting the appropriate plant materials and planting methods will improve plant establishment. This section will discuss the soil properties that are integral to successful plant establishment: soil characteristics, soil fertility, and topsoil.

### **Soils**

#### **Soil Characteristics**

Plant growth can be limited by certain soil characteristics. Species must be able to tolerate the soil's limitations in order to successfully establish on a site. Soil limitations can include the following:

- fine or coarse textures
- impermeable soil layers
- extended periods of wetness or high ground water
- salinity or alkalinity
- acidity
- shallow depth
- toxicity
- severe nutrient imbalance

The designer should consider other soil characteristics that may or may not be a limitation to the plant. For example, the soil's water-holding capacity affects the composition of natural vegetation and selection of species. In addition, slope, stoniness are also important in each plant's ability to adapt within the climatic range.

#### **Soil Fertility**

Disturbed areas can be extremely deficient in available nitrogen and phosphorus. Consequently, unless topsoil is applied, spoil material can be nearly devoid of organic matter. To remedy this problem, annual applications of nitrogen fertilizer may be needed to sustain a plant community until the plants can establish their own nutrient cycle.

Often disturbed areas can also be phosphorus deficient because the pH is at or above 8.3 and abundant calcium carbonate keeps the phosphorus largely unavailable. Phosphate fertilizer increases the plant-available supply for only a few years. Applying topsoil to the site greatly increases the available phosphorus levels on disturbed areas.

A general guideline to increasing soil fertility is to apply fertilizer to the site. Apply a minimum of 30 pounds of nitrogen and 40 pounds of phosphate ( $P_2O_5$ ) per acre to disturbed areas. Subsequent soil tests will determine if fertilizer rates will need to be adjusted.



## Topsoil

All topsoil and soil-like material should be saved and redistributed on the reclaimed area. Direct placement of topsoil (moved and replaced) provides a source of viable native plant seeds and vegetative structures, which volunteer into the reclaimed plant community. If top soils are not available, subsoils should be amended with compost and other organic amendments that will ensure better soil tilth, improved infiltration characteristics, and to ensure improved soil biologic activity. Guidelines for selection of the best quality topsoil material for use in reclamation of disturbed land is shown in Table 2.

**Table 2.**  
**Proposed Guidelines**  
**for Rating the**  
**Suitability of Topsoil for**  
**Use as Cover-Soil**  
**Material**

<b>Factors affecting suitability of soil material</b>	<b>Good</b>	<b>Fair<sup>1/</sup></b>	<b>Poor<sup>2/</sup></b>
Textural class <sup>3/</sup>	vfsl, fsl, sl, l, sil	lfs, ls, cl, scl, sil	s, c, sc, sic
Moist consistence <sup>4/</sup>	vfr, fr	lo, fi	vfi, exfi
EC (mmhos/cm) <sup>5/</sup>	<4	4-8	>8
ESP <sup>6/</sup>	0-5	5-15	>15
pH	5.6-7.8	4.5-5.6; 7.8-8.4	<4.5, >8.4
Stoniness class <sup>7/</sup>	0	1	2-5
Available water (inches)	>10	5-10	<5
Rock fragments (%)	<15	15-35	>35
Saturation water (%)		25-80	<25, >80

<sup>1/</sup> Mitigation of adverse properties will increase reclamation potential.

<sup>2/</sup> Materials rated as poor may be suitable as topsoil only if adverse factor can be treated.

<sup>3/</sup> Textural classes: vfsl = very fine sandy loam; fsl = fine sandy loam; sl = sandy loam; l = loam; sil = silty; lfs = loamy fine sand; ls = loamy sand; cl = clay; s = sand; c = clay; sc = sandy clay; sic = silty clay.

<sup>4/</sup> vfr = very friable; fr = friable; lo = loose; fi = firm; vfi = very firm; exfi = extremely firm.

<sup>5/</sup> EC (mmhos/cm) = electrical conductivity in millimhos/centimeter.

<sup>6/</sup> ESP = exchangeable sodium percent.

<sup>7/</sup> Stoniness Class = percent of surface covered with stones, where: 0 = non-stony; 1 = .01% to .1%; 2-5 = >.1% to >75%.



## **PLANT MATERIAL SELECTION**

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Selecting plants requires more than understanding what soils you have on the site. It requires selecting the appropriate plants that will work for the BMP. Appendix C contains plant tables that list information on grass and grass-like plants, riparian trees and shrubs, and upland trees and shrubs that are suitable for vegetative storm water BMPs.

### **Species Selection**

As previously mentioned, vegetative storm water BMPs provide a variety of uses, depending on the storm water objective. To meet that objective, the designer must select the plants that will meet the system requirements of the BMP.

For example, detention ponds are designed to collect and temporarily hold surface and storm water runoff. They are specifically used for flood control. System components of a wet detention pond include using plant materials to stabilize pond slopes (for dust control) and to improve pond aesthetics. Therefore, if a designer wanted to construct a wet detention pond on the site, the combination of plants selected for the pond should meet the criteria of soil stabilization and pond aesthetics.

In addition, the designer should consider the environmental factors of a site to determine which plants are appropriate for the BMP. Expected precipitation, irrigation supply, site exposure, elevation, temperature, and soil type and properties all play a role in selecting the appropriate plants. If the designer chose plants that are good soil stabilizers, but do not tolerate acidic soils then the plants will have limited establishment and will not meet the system requirements of the BMP.

Also, the designer must consider the location of the BMP in relation to land use activities. For example, if a vegetated BMP is going to be located next to a roadway, the plants should have high salt tolerance in case excessive amounts of de-icing salts run off the pavement into the BMP.

Finally, the designer must consider the extreme conditions under which the plant must survive. For example, plants have a extremely difficult time establishing in the Intermountain West because of the severe conditions. Plants must withstand long periods of drought and low temperatures without snow cover. Some wetland plants, however, can tolerate a variety of growing conditions. These wetland plants are rushes and sedges. Rushes can withstand up to six months of drought without supplemental irrigation and up to two months of total inundation. Rushes have extensive root systems and when the plant becomes inundated with sediment, they continue to grow. Also, the larger root systems allows the plant to take up and transpire a larger volume of water.



Rushes are also used in constructed wetlands to remove heavy metals from mine tailings, nutrients from domestic wastewater, and petrochemicals from urban runoff. The extensive root system allows the plant to survive even when a portion of the plant has been damaged by pollutants.

Rushes require little maintenance. They have hollow-stemmed blades that produce less residue and because of the small plant size, do not require mowing. However, mowing will not harm the plant.

### **Other Considerations for Vegetative BMPs**

A designer should consider four planning-related issues when selecting plants for vegetative BMPs: use or function, plant characteristics, availability and cost, and long-term maintenance. Each consideration will be briefly discussed.

- **Use or Function**

In selecting plants, consider their desired function in the landscape. Is the plant needed as ground cover, soil stabilizer, water quality treatment, or a shade source. Will the plant be placed to frame a view, create focus, or provide an accent? Nearly every plant and plant location should be provided to serve some function in addition to any aesthetic appeal.

- **Plant Characteristics**

Plant characteristics should also be considered when selecting plants for vegetative BMPs. Consider how these plant characteristics can affect the landscape and the use of vegetative BMPs. For example, *Catalpa spp.* produce large seed pods in the autumn. As the tree matures, it produces more seed pods which, ultimately, fall off the tree and onto the ground. Designers should consider where they plant this type of tree in relation to a vegetative BMP so that seed pods (and other tree matter) do not land in the BMP and either increase maintenance costs (i.e. clogging system pipes) or reduce BMP treatment effectiveness.

In addition, the designer should determine how the plant will fit in the landscape today as well as years to come. Growth rate, color, seasonal interest, and texture all play a role in the characteristics of a plant and its relationship to the landscape and vegetative BMPs.

Refer to Section 2, *Understanding your site*, for information on the importance of matching plants to typical site characteristics.

- **Water availability**

Most storm water systems located in urban areas are located on sites where supplemental irrigation is provided. Supplemental irrigation allows for a wider diversity of plant materials. Supplemental irrigation also makes the season of seeding less critical than if the area had no additional irrigation.



- **Availability and Cost**

These two factors can ultimately determine if the plants you have selected will be used in the vegetative BMP. As a result, the designer may have to check different plant suppliers for best price and selection. Also, choosing native plants over exotic or ornamental plants increases the chance that the plants will perform better in Boise's climate than those species accustomed to more temperate zones.

Local suppliers should be contacted first, since local suppliers stock plants and seeds adapted to this area. Successful plantings are directly related to the source of the plant materials and the conditions under which they were propagated. Refer to Appendix D for a list of plant vendors.

- **Long Term Maintenance**

Like structural BMPs, vegetative BMPs require long term maintenance. As previously mentioned, the designer should determine how the plant will fit in the landscape today as well as in the future. Will the plant sustain growth in the same location for several years or will it aggressively take over the site? Does the plant, over time, produce large amounts of litter that form a mat over the soil reducing seedling growth? Will irrigation be required? If the designer has carefully considered the plant characteristics, then the plants will continue to serve their function and will not require substantial maintenance.





## **PLANT ESTABLISHMENT**

To ensure that plant establishment is successful, the designer should consider the following planting guidelines. The guidelines discuss the importance of proper seedbed preparation, seeding rates, seasons and methods of seeding, mulching, and herbicide use.

### ***Seedbed preparation***

Good seedbed preparation is essential in revegetating disturbed land, such as those found on construction sites. Often, this is the most important stage in revegetation because, in many cases, subsurface layers have been compacted during construction operations. Compaction hinders root penetration and water infiltration.

Good seedbed preparation scarifies and loosens the soil surface creating a favorable environment for seed planting and subsequent seedling emergence. Generally, the seedbed is properly prepared if a person walking across the area does not sink more than  $\frac{1}{8}$ " into the soil. Scrapers should be used to apply subsoil and topsoil over the construction site. These machines compact the soil as it is applied, therefore, the subsoil and topsoil must be treated for compaction. Ripping with a bulldozer with ripper tooth is the first step to good seedbed preparation. After ripping the subsoil, topsoil can be applied to the desired thickness. Usually the topsoil is shallow enough that ripping is unnecessary. Poorly prepared seedbeds require higher than normal seeding rates; however, increased seeding rates will not compensate for poor seedbed preparation.

### ***Seeding Rate***

Seeding rate computations are based on pure live seed (PLS) per square foot. Pure Live Seed (PLS), expressed in percent, designates the calculated quantity of viable seed to plant. The percent PLS of a lot of seed is obtained by multiplying the percent purity times the percent germination and dividing the product by 100. PLS is important in determining the amount of material needed for planting and in determining the quality of the seed to be purchased. It is the best way to determine the actual cost of the seed.

In most cases, individual plant materials are used to vegetate a storm water BMP. The BMP is generally small so the cost of using plants in comparison to direct seeding is not prohibitive. Seeding can be used when the area to be vegetated is large or plants are not available.

A seeding rate from 30 to 40 seeds per square foot is generally adequate. Seeding rates should provide adequate seed for a good stand and limit the reduction of future stands because of too much competition among seedlings. Increased seeding rates may increase initial plant densities, but there is usually an inverse relationship between initial high density and survivability the first year after the stand is established.



Seed mixes should include about 25 to 50 pure live seeds per square foot when drilled and 50 to 100 pure live seeds per square foot when broadcast. Dry areas need less seed and critical areas need more seed.

### ***Season of Seeding***

A late fall or dormant seeding just prior to winter is the most common seeding period in the Intermountain West. The timing of seeding is important on disturbed lands. Plant late enough in the fall (after November 1 in the Boise area) so seed does not germinate or emerge before winter weather sets in. The closer to winter the planting can be made, the more successful the seeding will usually be. Overwintering helps break seed dormancy in some species and cool season grasses germinate readily under the snow when temperatures are slightly above freezing. Seedlings are protected from rodents by the snowpack and emerge quickly with early spring moisture.

Most legumes and grasses are seeded in the spring to allow the seedling to become well established before being subjected to freezing temperatures. The designer should schedule spring plantings as early in the spring as possible to provide for optimum germination temperatures and to allow seedling to get a jump on the weeds. A few species, such as cider milkvetch and other legumes, require warmer soil temperatures and should not be planted until mid spring. Ideally, the site should be prepared the previous fall if a spring seeding is desired. Usually spring seedings are planted between periods of wet and dry weather (commonly in March to mid April in Boise area). If spring seedings are to be effective, they should be made prior to spring rains. There may be a problem of getting heavy equipment onto the site to prepare a seedbed in the spring following a wet winter that has saturated the soil profile. In addition, flows should be diverted away from the seedbed until the area is stabilized.

### ***Method of Seeding***

Direct seeding can be accomplished by any of the following methods: broadcast seeding, drill seeding, or hydroseeding. Each of these methods will be discussed in some detail.

#### **Broadcast seeding**

Broadcast seeding is recommended in small areas or in seedbeds that are relatively uniform and rough. Dry method - hand cyclone seeders, air guns, or blowers are good inexpensive means for broadcast seeding of grass and legume seeds. There should be an even distribution of light and heavy seeds over the area. When using the broadcast seeding method, the designer should double the seeding rates normally used for drilled planting.



One advantage of broadcast seeding is that all seed types can be contained in the seeding mixture. Using a seed mixture is recommended on highly-disturbed construction sites because it increases the chance that the plants will successfully establish and improve vegetation diversity.

Heavy, awned or fuzzy seed are suited for the broadcast seeding method because they can clog a drill, making seeding a tedious process.

One requirement for using the broadcast planting method is that the seed should be adequately covered by the soil following sowing. Using a heavy sheepsfoot roller is an acceptable method to cover seed. It compresses some seed to approximately 1" depth while others are only slightly covered.

#### **Drill seeding**

Drill seeding is most effective when only a few species are included in the mixture and larger sites are involved. Large and small seeded species can be placed in separate boxes and depth bands can be set to plant the seed at a specific depth. Seed spacing is also more controlled with a drill. Row widths of 6-14 inches produces good stand establishment. A sound practice, although not commonly used, is alternate row seeding. Seeding grass, legumes, and shrubs into alternate rows increases the survivability of the slower developing legumes and shrubs by reducing competition during the establishment year(s).

Sometimes a slope is too steep to use tillage equipment to prepare a seedbed. On some sites, ripping can be completed across the contour and then seeding with equipment is completed on the contour. When this is not possible and the slopes are accessible from a level area, Hydroseeding may be an acceptable planting technique.

#### **Hydroseeding**

Hydroseeding is commonly used for planting roadcuts and embankments. Ideally, the seed and fertilizer are applied first then the site is mulched with hydromulch. A small amount of green dye and hydromulch (100 - 200 lbs/ acre) is included in the seed and fertilizer slurry to provide a tracer for judging seed distribution. The wood fiber, straw, or paper mix is then placed into the water vat and is applied as a cover for seed in a second operation.

The hydroseeding method is recommended over the more common method of applying seed, fertilizer, and mulch in one operation because when seed is suspended in the mulch, the seed may not come in contact with the soil and poor stand establishment may result. The seed may dry out and die after germination unless the relative humidity is constantly high enough to maintain high moisture levels when the seed is suspended in the mulch.

Disadvantages of hydroseeding include: damage to some of the seed as it goes through the pump and operations require large crews, water tankers, supply trucks, adequate water supplies and relatively smooth, flat areas from which to operate the equipment.



To reduce damage to the seed, apply the seed and fertilizer from separate bins. Avoid mixing the seed and fertilizer for more than a few hours or seed germination may be adversely affected.

#### **Other seeding methods**

Most shrubs are difficult to establish using direct seeding methods. Transplanting bare rootstock or tubed plants improves establishment success. Bare rootstock or tubed plants are planted into previously dug holes. Plant bareroot stock and tubed plants about 1 inch lower than the soil surface, cover with soil and compact the soil firmly around the roots. Plants should be thoroughly watered following planting. Tree spades can be used to transplant larger dormant shrubs and small trees onto disturbed sites or roadcuts.

If a sod-forming plant species is desired for quick vegetative cover, a sprig digger or modified potato harvester can be used to gather vegetative sprigs. Plant sprigs using a manure spreader or a specially designed sprig planter. If a manure spreader is used, sprigs must be lightly disked into the soil so that the sprigs are in contact with moist soil at all times. Another alternative would be to place sod.

### **Mulching**

Mulching is the most common and widely used method of rapidly stabilizing soils on moderate to steep slopes. Mulching materials such as straw, hay, jute and other appropriate materials should also be used to protect the new seeding (especially late summer and fall seedings). Mulches increase water infiltration of water and provide a microclimate for establishment of vegetative cover.

Wood fiber, erosion control blankets, hay and straw are the most commonly used commercial mulches. Net or blanket type mulches include straw or other fibers secured with jute or polypropylene netting and wire staples. Net mulches can be utilized on either slopes or flat surfaces, provided the net is attached securely to the ground. Straw or native grass hay is perhaps the most commonly used mulch because it is available, inexpensive, and easy to apply, and gives reasonably good results.

Straw or hay must be crimped by disking into the soil surface from 2 to 3 inches deep to prevent the mulch from being blown from the site by high winds. Because of this incorporation requirement, it is not a viable technique on steep slopes unless a tackifier or polypropylene netting anchors the mulch.

Straw is generally more weed-free than grass hay, but good native grass hay can also provide a source of adapted seed. These mulches can be spread by hand or with mechanical blowers.

Straw mulch can be used on high, steep slopes along roads to help hold the seed and fertilizer in place. Organic tackifiers and netting can be used to hold the straw in place. Wind, water and gravity should be evaluated to determine the amount and method used to hold the mulch in place.



Anchor mulch 2 - 4 inches deep with no more than two passes of the anchoring equipment.

Mulching with straw, a minimum of 4,000 pounds per acre to a maximum of 6,000 pounds per acre of clean small grain straw is recommended. Additional nitrogen needs to be applied when mulching with organic materials because nitrogen will be tied up in the process of breaking down the mulch. The following amounts should be applied for straw:

<b>Mulch</b>	<b>Nitrogen</b>
4,000 pounds/acre	15 pounds/acre
5,000 pounds/acre	20 pounds/acre
6,000 pounds/acre	25 pounds/acre

## **Herbicides**

### **Restrictions and Limitations**

Herbicides are chemicals formulated to control broadleaf and grass weeds. All have limitations as to type and degree of control. Many have restrictions on their use. The label for each herbicide should be read thoroughly and mixing and application directions followed carefully.

The applicator must consider, when choosing a herbicide, its effectiveness in controlling specific weeds. Will it injure other plants? What effect will it have on beneficial organisms within the treated area? Will it have any ill effects on nontarget areas?

Label information indicates product restrictions and limitations when applied to certain plants and in various habitats. These restrictions and limitations should be understood before a herbicide is selected to control a certain weed(s) in a specific planting. The limitations will help determine which herbicide(s) to purchase.

### **Herbicides and the Environment**

Weed control practices and protecting the environment, requires time-consuming precautions. The designer must select herbicides that will kill the weeds without damaging other plants. They must restrict the drift to nearby sensitive vegetation. Succeeding plant damage from herbicidal residues in the soil must be avoided. When weeds are treated in or near irrigation ditches or streams, special precaution must be taken to avoid contamination of water and injury to fish or other beneficial forms of life. The use of herbicides in and around storm water systems should be restricted and avoided, when possible, because of the potential to contaminate surface and ground water.





## **SPECIFIC GUIDANCE FOR STORM WATER BMPS**

This section discusses specific guidance for vegetative BMPs. The BMPs included in this section are ponds, biofiltration systems, and infiltration systems.

### **Ponds**

#### **General information**

Storm water ponds are categorized into three groups: detention, extended detention, and retention. The guidelines below are primarily for ponds that exhibit hydrologic zones. These guidelines are to be used in conjunction with the *City of Boise Storm Water Management Design Manual*.

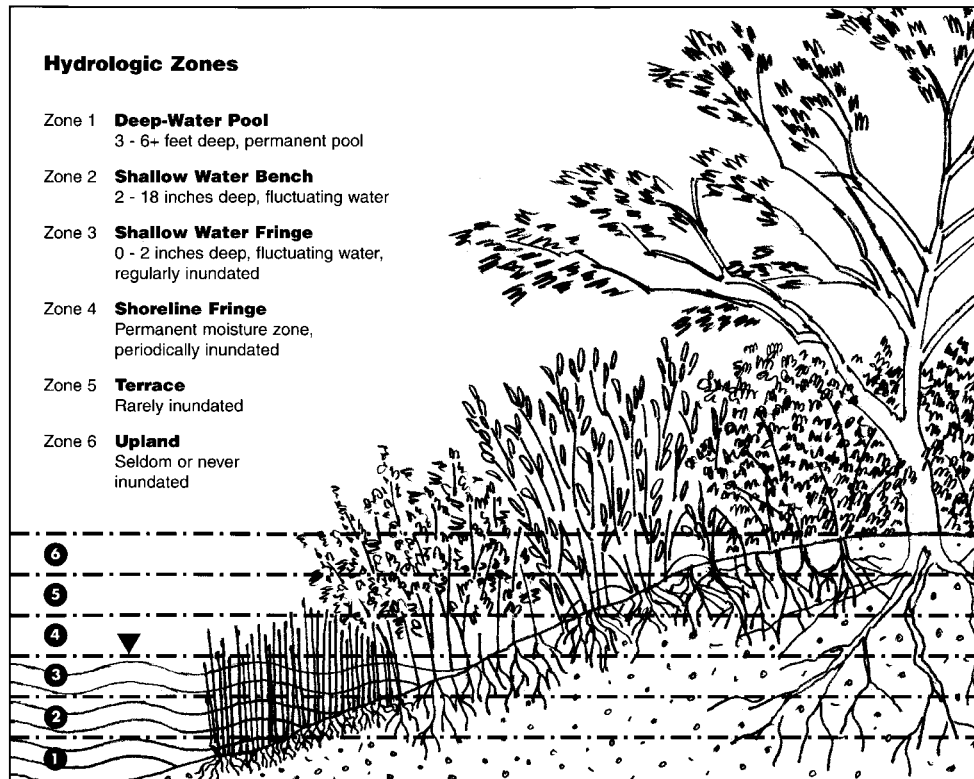
#### **Hydrologic zones**

Hydrologic zones are defined by the depth of the water and the period of standing water. Knowing what hydrologic zones are present in a BMP will help the designer determine where plants can be successfully planted based on the water levels that are expected with each BMP. Figure 1 shows the hydrologic zones. Establishing wetland plants in this zone can provide additional benefits. First, the plants contribute extensive wildlife and fish habitat to the wetland areas. Second, the plants provide resident sites for phytoplankton: a microscopic aquatic plant that significantly reduces nutrients in the water. Third, the plants can also soften the engineered contours of wetlands or ponds and conceal lower water levels caused by water drawdown. Establishing wetland plants in this zone can provide additional benefits. First, the plants contribute extensive wildlife and fish habitat to the wetland areas. Second, the plants provide resident sites for phytoplankton: a microscopic aquatic plant that significantly reduces nutrients in the water. Third, the plants can also soften the engineered contours of wetlands or ponds and conceal lower water levels caused by water drawdown. The hydrologic zones would include the following:

<b>Zone #</b>	<b>Zone Description</b>	<b>Hydrologic Conditions</b>
Zone 1	Deep-Water Pool	3 - 6+ feet deep, permanent pool
Zone 2	Shallow Water Bench	2 - 18 inches deep, fluctuating water
Zone 3	Shallow Water Fringe	0 - 2 inches deep, fluctuating water, Regularly inundated
Zone 4	Shoreline Fringe	Permanent moisture zone, Periodically inundated
Zone 5	Terrace	Rarely inundated
Zone 6	Upland	Seldom or never inundated



## Hydrologic zones



### *Zone 1: Deep Water Pool (3 – 6+ feet)*

Ponds and wetlands generally have deep pools that are a minimum of 3 feet deep. Emergent wetland vegetation generally will not grow in permanent water depths that are deeper than 3 feet. important for maintaining wetland plant populations, keeping plant vigor high, and allowing for the rapid spread of the plants after planting.

Many species can withstand deeper water for short periods of time. However, they will tend to die out in these water depths over time. Most plants that are found in water with these depths are called submergent species. Submergent species root in the pool bottom and extend their stems up toward the water surface. Occasionally, they will emerge out of the water. These plant species can provide excellent fish and aquatic invertebrate habitat. They can also provide water cleaning functions , such as removal of nitrates and phosphorous. Submergent plant materials are not readily available on the retail market at the present time. However, plant parts and seeds are mobile and will come in from other wetland areas; so, planting may not be necessary.

### *Zone 2: Shallow Water Bench (2 - 18 inches), fluctuating water*

Zone 2 is a bench that is added to wetlands and ponds specifically to allow plants to become established and grow. Emergent wetland plants grow in this zone and are generally limited to long term permanent water depths of less than 3 feet and more often, 18 inches and less. Species such as Hardstem bulrush can withstand water depths of 8 feet for short periods of time. However, they typically prefer water depths of 10 – 18 inches. Fluctuating water levels are



important for maintaining wetland plant populations, keeping plant vigor high, and allowing for the rapid spread of the plants after planting.

Establishing wetland plants in this zone can provide additional benefits. First, the plants contribute extensive wildlife and fish habitat to the wetland areas. Second, the plants provide resident sites for phytoplankton: a microscopic aquatic plant that significantly reduces nutrients in the water. Third, the plants can also soften the engineered contours of wetlands or ponds and conceal lower water levels caused by water drawdown.

*Zone 3: Shallow Water Fringe (0 - 2 inches), fluctuating water, regularly inundated*

Zone 3 is the fringe around the edge of the water in the wetland or pond area. This area is regularly inundated, but will dry out frequently as the water level fluctuates. Although fluctuating water levels makes it difficult to establish plants in this zone, it is critical to have good plant cover so that soil erosion and wave motion are reduced. Wetland plant plugs (as opposed to seed) should be used in this zone. The seed of wetland plants require light to germinate and cannot be covered by soil. If water is introduced into the systems prior to seed germination and rooting, the seed may float and form a ring of plants at water level. Designers should consider diverting water flow until the plants become established.

This zone will support wetland plants and water-tolerant shrubs such as willows, birch, dogwood, and other shrubs. The shrubs provide wildlife habitat and water quality improvement through shade, nutrient uptake and breakdown, and sediment deposition.

*Zone 4: Shoreline Fringe, permanent moisture zone, periodically inundated*

This zone extends about 1 to 4 feet horizontally (1 –2 feet vertically) above the normal pool level. It can be periodically inundated after significant storms or high water events. Water will typically move off of this zone fairly rapidly, so designers should consider this zone characteristic when evaluating design storm frequency. Plants in this zone typically like “wet feet” and do well under fluctuating water conditions. This zone is saturated for a majority of the growing season except when droughty conditions cause the water level in the wetland or pond to drop below normal levels for an extended period of time. Herbaceous plants should be planted to protect the ground from overland drainage flows moving into the wetland or pond.

*Zone 5: Terrace, infrequently inundated*

Zone 5 is normally dry but can be inundated by floodwaters that normally drop in one day or less. In general, zone 5 extends from the maximum 2-year water surface elevation to the 10 or 100 year maximum water surface elevation. Plants in this zone should be capable of withstanding occasional inundation and common drought conditions. Supplemental irrigation may be needed to maintain this zone during the hot summer months. The designer should



carefully select the herbaceous plants that will grow in this zone because it may be difficult to mow the area because of steep slopes. Woody plants may be used in this zone to discourage waterfowl use.

#### *Zone 6: Upland, seldom or never inundated*

This zone is usually above the 100-year water surface elevation and generally does not extend down into the design area. The variety of plants established in this zone can also be used for foothills revegetation and site stabilization. The plants should be selected on the soil conditions, water schedule potential, and function within the landscape. *The Tree Selection Guide for Streets and Landscapes Throughout Idaho* by Boise Parks and Recreation Department, Boise Urban Forestry is an excellent information source for this zone.

Appendix C contains plant tables that list information on grass and grass-like plants, riparian trees and shrubs, and upland trees and shrubs that are suitable for vegetative storm water BMPs.

#### **Establishment year**

Wetland plants can survive in anaerobic soils (soil without oxygen) because they have spongy plant tissue that acts like a straw to bring oxygen from the atmosphere to the root system. The establishment year is the most critical for young pond plants because they need to grow and develop the spongy plant tissue. A mature pond plant can withstand months of total inundation, but young plants will die under the same conditions. Refer to the plant tables in the Appendix C for more information on appropriate plant species for ponds.

Fluctuating water levels for at least the first year are extremely important to successfully establishing a wetland plant community. Fluctuating water levels allow the plants to spread more quickly than if the water level is kept constant. Water levels must be maintained at a maximum of 1-2 inches for the first two months. After that time, 1-2 inches can be added over the next few months. Fluctuating the water level from 2 inches of standing water down to saturated soils will allow the root system to spread and increase chances of plant survival.

#### **Plants**

When purchasing plants, always obtain plant plugs that are from a minimum of 12- 21 cubic inches. These plants have a much bigger root system and more developed spongy plant tissue. As a result, the plants will withstand wider variations in water depth than small plugs.



Pay particular attention to the wetland plant species when designing the landscape plan. Some species such as sedges and rushes can not survive in deep water (more than 1-2 inches). Hardstem bulrush can withstand water depths of up to 8 feet for short periods of time, but normal water levels are about 6-18 inches.

### ***Evaporation Ponds***

#### **Selection factors**

Evaporation ponds should be stabilized to with vegetation, rock, or other acceptable material to prevent erosion and provide dust control. If vegetation is chosen, use a deep-rooted grass that can withstand extreme water level changes (i.e. long periods of drought and total inundation).

Barrier shrubs, such as barberry, planted around the facility should be considered when there is a possibility that the public could damage the facility or hinder its function. Trees and shrubs should be planted high on the side slopes or above the design storm water line elevation. Plant trees and shrubs at least 15 feet away from the toe of the slope.

#### **Operation and Maintenance**

Grass should be mowed to maintain an average grass height between 3"-9", depending on site characteristics. Grass clippings should be removed and disposed of properly. Sediment deposition at the head should be removed if grass growth is being inhibited or if the sediment is blocking the entry of water. Annual sediment removal and spot reseeding should be anticipated.

### **Vegetative buffers**

Vegetative buffer strips are required around the pond perimeter. Buffer strips will reduce erosion and provide additional sediment and nutrient removal. Native plants should be used instead of introduced plants. Native plants require less maintenance and replacement than plants that are introduced to a region because they native plants have adapted to the climatic conditions. As a result, maintenance costs will be lower by using native plants than by using introduced plants.

#### **Operation and Maintenance**

As the plants become established in the pond, they will need to be inspected periodically to ensure they are thriving. Seeding failures are common during the establishment year, so it is critical that the pond is inspected regularly. Generally, if plants are uniformly distributed, with a minimum amount of weeds or undesirable vegetation, the seeding is establishing properly. Non-native plant species should be monitored carefully since they can quickly invade the area. Seasonal weather conditions will determine the frequency of subsequent inspections.



In addition, ponds will need to be maintained to work properly. Over time, problems such as compaction, overgrown vegetation, and weed infestations will occur and must be corrected. Also, the owner or operator will be required to identify how these problems will be corrected in an Operation and Maintenance (O&M) Plan. Consult the *Boise Storm Water System Operation and Maintenance Handbook* for more information on how to develop an O&M Plan and how to perform maintenance on these systems.

## **Biofiltration systems**

### **Definition**

Biofiltration systems include grass buffer strips and swales. Grass buffer strips are uniformly graded and densely vegetated areas of grass or grass-like plants. Swales are a natural or constructed channel that is shaped or graded to specified dimensions and established in suitable vegetation for the stable conveyance and treatment of runoff. Biofiltration systems rely on the use of vegetation to slow runoff velocities, filter sediment and other pollutants, and to improve or maintain water quality.

### **Design**

Flow must be evenly distributed across the entire strip to be the most effective. Once flow concentrates to form a channel, the filtering effectiveness is significantly reduced. Select grass or grass mixtures that have stiff upright stems (even after mowing) to promote filtering of sheet flows. Native woody plants may be desirable on channel back slopes and top of bank to improve screening, erosion control, wildlife habitat, space definition, and climate control. Avoid planting woody species in the filtration area. See Appendix B for plant characteristics of common cover types.

### **Selection factors**

The vegetation selected for a biofiltration swale must have characteristics which provide vegetal retardance of water or a Mannings "n" of between 0.20 and 0.24. For grass bufferstrips, the Mannings "n" must be 0.40. Mannings equation of open channel flow is used to obtain the width of a facility for a given flow, slope, and selected water depth.

Species should be selected on the basis of filtering abilities, inundation tolerance, and soil protection qualities. Local factors that will influence the plant selection are:

#### **Discharge to be handled**

In general, the greater the discharge the more root mass, ground cover, and stiffness of above ground vegetal lining required.



### **Gradient**

As gradient increases, channeling of the flow is more likely to occur. For this reason, bunchgrasses should not be used on slopes steeper than 5 percent. For slopes above 5 percent, only sod-forming covers should be used on the portion of channel where the main flow occurs.

### **Establishment**

Ease of establishment and time required to develop a protective cover are extremely important considerations in selecting species. Generally any type of temporary cover during establishment of permanent cover is better than no cover at all. Use of temporary cover plantings, and jute netting products should be considered. Suitability to user

If a sod cover is required, as determined by discharge and slope, but is objectionable to the user because of likely spreading, a combination of species may be selected. This type of planting may have, for example, Kentucky bluegrass on the bottom and partially up the sides of biofiltration system and a mix of sod wheatgrass, bunch wheatgrass, and alfalfa or forbs on the upper sides and top of bank.

### **Deposition**

Deposition may be controlled to some extent by the selection of vegetation. Low, shallow flows encounter very high retardance when flowing through dense sod covers such as Reed canarygrass. Dense sod covers keep the flows from channeling and result in low velocities conducive to deposition. Only when the vegetation bends and submerges will high, non-depositional velocities develop. Low growing sod species, bunchgrasses and open covers like alfalfa offer less resistance to shallow flows than dense sod-forming covers. Velocities are higher, owing primarily to development of channeled flow with less deposition. These covers, however, offer less erosion protection than dense sod covers and are limited to flatter slopes.

### **Operation and Maintenance**

As the plants become established in the biofiltration system, they will need to be inspected periodically to ensure they are thriving. Seeding failures are common during the establishment year, so it is critical that the system is inspected regularly. Generally, if plants are uniformly distributed, with a minimum amount of weeds or undesirable vegetation, the seeding is establishing properly. Seasonal weather conditions and land use activity will determine the frequency of subsequent inspections.

Biofiltration systems will need to be maintained to work properly. Over time, problems such as overgrown vegetation and weed infestations will occur and must be corrected. In addition, the owner or operator will be required to identify how these problems will be corrected in an Operation and Maintenance (O&M) Plan. Consult the *Boise Storm Water System Operation and Maintenance Handbook* for more information on how to develop an O&M Plan and how to perform maintenance on these systems.



## **Infiltration systems**

### **General information**

Infiltration systems that require incorporation of plant materials include infiltration basins and infiltration swales. An infiltration basin impounds water in a surface pond until it infiltrates the soil. Infiltration basins do not maintain a permanent pool between storm events and should drain within 48-72 hours after a design event. Infiltration swales are vegetated channels designed to retain, treat, and infiltrate storm water runoff.

### **Design**

The side slopes above infiltration basins and swales should be vegetated to prevent erosion. Additional grass or nonaggressive ground covers are appropriate. Other types of plant materials can also be used. If infiltration swales are to be constructed the following standards apply:

- Up to 15% of the total area of the swale designated for storm water infiltration may be covered with ground cover plants.
- Up to 10% of the total area of the swale designated for storm water infiltration may be elevated above the bottom of the swale to allow the planting of trees and shrubs.

If trees and shrubs will be used, plant them on the top perimeter of the side slopes. A spacing of at least 20' is appropriate for trees planted close to a swale.

### **Selection factors**

Infiltration basins should be stabilized to prevent erosion, minimize sediment transport and plugging, and provide dust control. Vegetating the basin with a deep-rooted grass will provide erosion control and promote infiltration. Infiltration swales must be grass-covered. Uniformly fine, close-growing, water-tolerant grasses should be used. If sod is chosen to vegetate the basin, select sod that has been grown in permeable soils. Sod grown in clay soils will not be effective because the clay soil can restrict water infiltration reducing the expected infiltration rate of the system. If sod grown in clay soils is the only sod available, ask the grower to wash off the soil from the sod to remove all clay material.

Barrier shrubs, such as barberry, planted around the facility should be considered when there is a possibility that the public could damage the facility or hinder its function. Trees and shrubs should be planted high on the side slopes or above the water line elevation for the design storm. Trees and shrubs should be planted at least 15 feet away from perforated pipes and 25 feet away from a riser structure.



### **Operation and maintenance**

Avoid using bark and mulch in infiltration facilities. These materials may impair infiltration of the system. Grass should be mowed to maintain an average grass height between 3"-9", depending on site characteristics. Grass clippings should be removed and disposed of properly. Sediment deposition at the head should be removed if grass growth is being inhibited or if the sediment is blocking the entry of water. Annual sediment removal and spot reseeding should be anticipated.

## **APPENDIX A:**

### ***Climate information for Ada County including isobar drawing and weather station data for the four stations in the area.***

The climate data in this section were specifically prepared for the City of Boise by the Natural Resources Conservation Service and includes data for all weather stations located within Ada County.

The Ada County PRISM Data map provided includes visual iso-precipitation information on average annual precipitation based on data collected from 1961 through 1990.

The weather station data provided for Boise Airport, Boise Lucky Peak Dam, Kuna 2 NNE, and Swan Falls Powerhouse gives data on temperature, precipitation, and growing season dates based on data collected from 1961 through 1990. The temperature information includes monthly average daily maximum, average daily minimum, and average data in degrees F. The precipitation information includes monthly average, 30 percent chance of less than and more than, average number of days with .1 or more, and average total snowfall data in inches. The Growing season dates information provides 50 and 70 percent chance probability of temperatures being higher than 24, 28, and 32 degrees F.

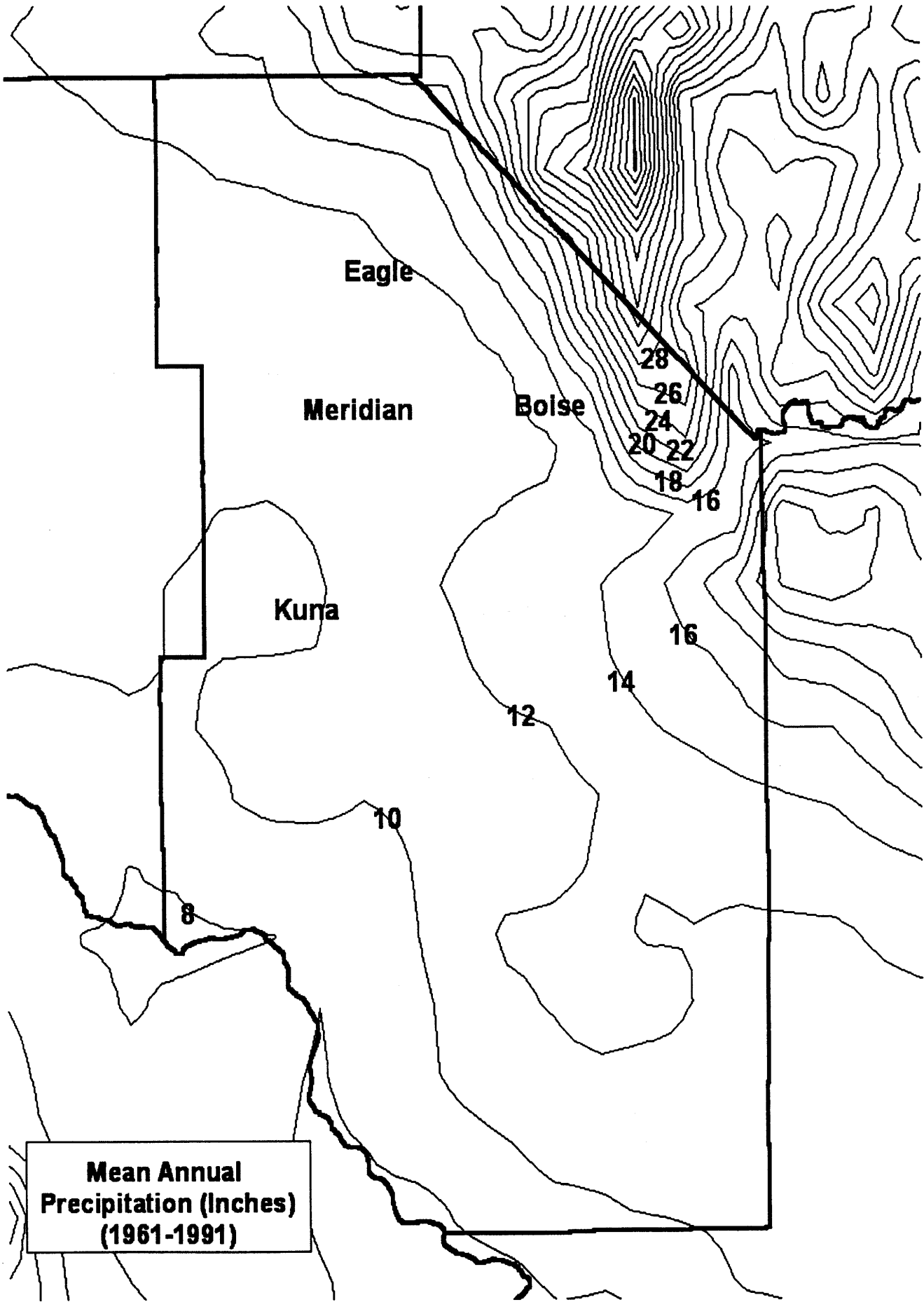
Ada County winters, though cold, are generally not too severe. In summer, days are hot and nights are relatively cool. Precipitation occurs primarily during winter and spring (70+ percent), except in mountainous areas, and is low in summer. The snowpack at high elevations supplies much of the water used for irrigation in the valley.

The lowest temperature recorded at Boise Airport was -23 degrees on December 10, 1972. The highest recorded temperature at Boise Airport was 111 degrees on July 19, 1960.

The average annual precipitation in the county ranges from about 30 inches at the highest elevations of the Boise Front to about 8 inches in a strip adjacent to the Snake River. The average precipitation in most of the area near Boise is between 10 and 14 inches. Near Boise, on average 11 days have at least 1 inch of snow on the ground, but the number of such days can vary greatly from year to year.

The average relative humidity in mid afternoon in spring is less than 40 percent; during the rest of the year, it is about 45 percent. Humidity is higher at night, and averages about 65 percent near dawn. The percentage of possible sunshine days is 83 in summer and 44 in winter.

Winds in most of the county are northwesterly with intermittent southeasterly winds in winter and spring. In the northern, eastern and central Boise area, southeasterly winds prevail because cold, heavy air masses drain down the Boise Front into the Boise River Canyon during cool periods.



**Mean Annual  
Precipitation (Inches)  
(1961-1991)**

Station : BOISE WSFO AIRPORT ID Number: 1022  
 Latitude: 4334 Longitude: 11613 Elevation: 2840 feet  
 County Name: Ada  
 Start yr. - 1961 End yr. - 1990

Month	Temperature (Degrees F.)				Precipitation (Inches)			
	avg		avg		30% chance will have		avg	avg
	daily max	daily min	avg	days	less than	more than	# of w/.1 or more	avg snow fall
January	36.4	21.6	29.0	1.45	0.91	1.75	4	6.3
February	44.2	27.5	35.9	1.07	0.65	1.30	3	2.8
March	52.9	31.9	42.4	1.29	0.78	1.56	4	1.4
April	61.4	36.8	49.1	1.24	0.75	1.50	3	1.0
May	71.0	43.9	57.5	1.08	0.53	1.32	2	0.2
June	80.9	52.1	66.5	0.81	0.34	0.98	2	0.0
July	90.2	57.7	74.0	0.35	0.11	0.45	1	0.0
August	88.1	56.8	72.5	0.43	0.14	0.56	1	0.0
September	77.0	48.2	62.6	0.80	0.38	1.04	2	0.0
October	64.6	39.0	51.8	0.75	0.51	1.01	2	0.1
November	48.7	31.1	39.9	1.48	0.98	1.77	5	2.7
December	37.7	22.5	30.1	1.36	0.69	1.66	4	6.9
Annual	—	—	—	10.68	13.29	—	—	—
Average	62.8	39.1	50.9	—	—	—	—	—
Total	—	—	12.11	—	33	21.4	—	—

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	4/ 1 to 10/28 210 days	4/28 to 10/14 170 days	5/10 to 10/ 4 147 days
70 percent *	3/24 to 11/ 5 226 days	4/22 to 10/20 181 days	5/ 5 to 10/ 9 157 days

\* Percent chance of the growing season occurring between the Beginning and Ending dates.

Station : BOISE LUCKY PEAK DAM ID Nmber: 1018  
 Latitude: 4333 Longitude: 11604 Elevation: 2840 feet  
 County Name: Ada  
 Start yr. - 1961 End yr. - 1990

Month	Temperature (Degrees F.)				days	Precipitation (Inches)			
	avg daily max	avg daily min	avg	avg		30% chance will have		avg	avg
						less than	more than	# of	total
							w/.1 or more	snow fall *	
January	37.2	21.1	29.2	1.68	1.06	2.02	4	6.5	
February	44.7	27.4	36.0	1.18	0.73	1.43	5	3.0	
March	53.3	31.3	42.3	1.56	0.88	1.90	4	1.5	
April	62.0	36.8	49.4	1.47	0.94	1.77	4	1.0	
May	71.8	43.9	57.9	1.22	0.66	1.49	3	0.5	
June	81.6	51.7	66.6	0.97	0.50	1.19	3	0.0	
July	90.8	57.9	74.3	0.32	0.13	0.50	1	0.0	
August	89.4	57.8	73.6	0.53	0.12	0.68	1	0.0	
September	78.4	49.2	63.8	0.86	0.48	1.16	2	0.0	
October	66.4	40.3	53.3	0.88	0.48	1.15	2	0.5	
November	49.4	31.5	40.4	1.94	1.20	2.35	5	3.0	
December	39.0	23.5	31.2	1.52	0.78	1.86	5	7.5	
Annual	—	—	—	11.64	15.00	—	—	—	
Average	63.7	39.4	51.5	—	—	—	—	—	
Total	—	—	14.12	—	—	39	23.5	—	

\* Data is inadequate - these figures are projected

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	3/23 to 11/11 233 days	4/14 to 10/28 197 days	5/ 6 to 10/14 161 days
70 percent *	3/16 to 11/18 246 days	4/ 9 to 11/ 2 207 days	4/30 to 10/20 172 days

\* Percent chance of the growing season occurring between the Beginning and Ending dates.

Station : KUNA 2 NNE ID Number: 5038  
 Latitude: 4331 Longitude: 11624 Elevation: 2680 feet  
 County Name: Ada  
 Start yr. - 1961 End yr. - 1989

Month	Temperature (Degrees F.)				Precipitation (Inches)			
	avg		avg		30% chance will have		avg	avg
	daily	daily	avg	avg	less	more	# of	avg
	max	min		days	than	than	w/.1 or more	snow fall
January	36.7	19.9	28.3	1.15	0.70	1.39	3	4.2
February	46.0	25.7	35.9	0.78	0.36	0.95	2	1.4
March	55.6	29.0	42.3	0.87	0.45	1.06	2	0.4
April	64.0	33.6	48.8	1.00	0.50	1.22	3	0.2
May	72.4	41.1	56.8	1.01	0.57	1.23	3	0.0
June	81.1	48.4	64.8	0.83	0.41	1.01	2	0.0
July	88.4	52.5	70.5	0.27	0.14	0.44	0	0.0
August	86.8	51.4	69.1	0.44	0.17	0.69	1	0.0
September	76.6	43.2	59.9	0.63	0.38	0.86	2	0.0
October	65.6	35.2	50.4	0.67	0.42	0.92	2	0.0
November	49.5	28.9	39.2	1.33	0.79	1.61	4	1.9
December	38.3	21.6	29.9	1.13	0.52	1.38	4	4.0
Annual				8.72		11.21		
Average	63.4	35.9	49.6					
Total			10.10			28	12.2	

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	4/18 to 10/16 181 days	4/29 to 10/ 7 160 days	5/22 to 9/27 128 days
70 percent *	4/12 to 10/22 192 days	4/25 to 10/11 169 days	5/18 to 10/ 1 136 days

\* Percent chance of the growing season occurring between the Beginning and Ending dates.

Station : SWAN FALLS POWER HOUSE ID Number: 8928  
 Latitude: 4315 Longitude: 11623 Elevation: 2,320 feet  
 State FIPS/County(FIPS): 16001 County Name: Ada  
 Start yr. - 1961 End yr. - 1990

Month	Temperature (Degrees F.)				Precipitation (Inches)				
	avg daily max	avg daily min	avg	avg	days total	30% chance will have		avg	avg
						less than	more than	# of	fall more
January	40.3	24.4	32.4	0.82	0.44	1.00	2	2.0	
February	49.1	29.4	39.2	0.53	0.29	0.65	2	0.4	
March	58.7	34.6	46.7	0.81	0.48	1.02	2	0.2	
April	67.7	40.4	54.0	1.02	0.49	1.25	3	0.0	
May	77.6	48.3	63.0	0.96	0.54	1.17	2	0.0	
June	87.2	56.3	71.8	0.81	0.42	0.99	2	0.0	
July	96.3	63.1	79.7	0.26	0.15	0.47	0	0.0	
August	94.6	60.9	77.7	0.35	0.15	0.49	1	0.0	
September	83.5	51.2	67.3	0.55	0.30	0.81	1	0.0	
October	70.1	41.6	55.9	0.51	0.23	0.64	1	0.0	
November	52.7	33.2	43.0	0.93	0.60	1.12	3	0.4	
December	41.0	25.2	33.1	0.70	0.41	0.88	2	1.4	
Annual				7.08	9.07				
Average	68.2	42.4	55.3						
Total			8.26		21	4.3			

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	2/27 to 11/17 264 days	3/26 to 11/ 3 221 days	4/20 to 10/17 180 days
70 percent *	2/20 to 11/23 277 days	3/21 to 11/ 8 231 days	4/15 to 10/23 191 days

\* Percent chance of the growing season occurring between the Beginning and Ending dates.

## APPENDIX B:

### Vegetal Retardance - Cover Type - Biofiltration Swales\*

N value range	Cover	Avg. expected height <sup>2</sup>	Preferred slope
0.17-0.37 <sup>1</sup>	<ul style="list-style-type: none"> <li>• Reed Canarygrass</li> <li>• Creeping Foxtail</li> </ul>	20-36"	5-10%
0.1-0.31 <sup>1</sup>	<ul style="list-style-type: none"> <li>• Smooth Bromegrass</li> <li>• Reed Canarygrass</li> <li>• Tall Fescue</li> <li>• Grass/Legume/Forb Mix Timothy<sup>3</sup>/brome/ orchardgrass<sup>3</sup>/ tall fescue/ tall wheatgrass/ alfalfa<sup>3</sup>/forbs</li> </ul>	12-20"	<5%
0.06-0.27 <sup>1</sup>	<ul style="list-style-type: none"> <li>• Redtop</li> <li>• Smooth Bromegrass</li> <li>• Streambank Wheatgrass</li> <li>• Intermediate Wheatgrass</li> <li>• Pubescent Wheatgrass</li> <li>• Western Wheatgrass</li> <li>• Grass/Legume/Forb Mix Bromegrass, orchardgrass<sup>3</sup>/sod or bunch wheatgrasses<sup>3</sup>/ alfalfa<sup>3</sup>/forbs</li> </ul>	6-15"	<5%
0.05-0.2 <sup>1</sup>	<ul style="list-style-type: none"> <li>• Kentucky Bluegrass</li> <li>• Red Fescue</li> <li>• Intermediate Wheatgrass</li> <li>• Grass/Legume/Forb Mix Sheep fescue<sup>3</sup>/hard fescue<sup>3</sup>/ bromegrass/sod or bunch wheatgrasses<sup>3</sup>/alfalfa<sup>3</sup>/forbs</li> </ul>	2-6"	<5%

\* Not for use for primary flow conveyance channels with vegetal lining

- 1 n values vary according to product velocity and hydraulic radius (low velocity and shallow flows result in higher Mannings "n"; high velocity and deep flows result in lower Mannings "n"). Refer to SCS-TP-61 "Handbook of Channel Design for Soil and Water Conservation" for experimental results of Vegetal Retardance/VR/Mannings "n" relationships.
- 2 During normal critical flow periods, if vegetation has been mowed or flattened due to snow cover, the appropriate n value should be used.
- 3 These are bunchgrasses or bunch type legumes and should be used only in seed mixtures and on slopes less than or equal to 5%.

## **APPENDIX C:**

### **Storm Water Plant Materials Tables**

The following tables contain information on grass and grass-like plants, riparian trees and shrubs and upland trees and shrubs that are suitable for storm water management facilities. The tables are to be used as a guide for general planning and planting purposes. Landscape architects and nursery suppliers may be able to provide more information about specific site conditions that are necessary for successfully establishing plants within different hydrologic zones.

Below is a list of some of the information provided in the tables:

- Scientific name - arranged alphabetically; common name is also provided.
- Hydrology zones - indicates the most suitable planting location for successful plant establishment
- Plant indicator status - shows estimated probability of a species occurring in wetlands or non-wetland areas
- Flood tolerance - used in conjunction with plant indicator status; provides additional information on the plant's ability to withstand the depth or duration of flooding

## Description of Herbaceous Grass and Grass-Like Plants (Zones 2-6)

Description of Herbaceous Grass and Grass-Like Plants (Zones 2-6)														
Species	Elevation Range (1)	Root Type	Hydrologic Regime (2)	Availability In Field (3)	Commercial Availability (4)	Height	Rate of Spread (5)	Acidity Tolerance (6)	Salinity Tolerance (7)	Wildlife Value	Notes	Use in Hydrologic Zone (8)	Flood Tolerance (9)	Plant Ind. Status (10)
<i>Agropyron cristatum</i>	Low-Med	Bunch	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Drought tolerant	6	L	Upland
<i>Crested wheatgrass</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Drought tolerant	6	L	Upland
<i>Agropyron desertorum</i>	Low-Med	Bunch	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Very drought tolerant	6	L	Upland
<i>Agropyron sibiricum</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Very drought tolerant	6	L	Upland
<i>Siberian wheatgrass</i>	Low-Med	Bunch	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Very drought tolerant	6	L	Upland
<i>Agrostis species</i>	Low-Med	Rhizomatous	Seasonally-Flooded	Introduced	Yes-Seed	18-36"	Rapid	High	Low	Waterfowl food	Good soil stabilizer	3,4,5	H	FACW
<i>Redtop bentgrass</i>	Low-Med	Perennial	Seasonally-Flooded	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACW
<i>Alopecurus arundinacea</i>	Low-Med	Rhizomatous	Seasonally-Flooded	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACW
<i>Creeping foxtail</i>	Low-Mid	Perennial	Well Drained	Introduced	Yes-Seed	12-24"	V. Slow	Low	Medium		Drought tolerant	6	L	Upland
<i>Beckmannia syzigachne</i>	Low-Mid	Stoloniferous	Seasonally-Flooded	Fairly Common	Yes-Seed & Plugs	36"	Rapid	U	U	Waterfowl and small mammal food	Palatable forage grass	3,4,5	H	OBL
<i>Sloughgrass</i>	Low-Mid	Annual	Seasonally-Flooded	Fairly Common	Yes-Seed & Plugs	36"	Rapid	U	U	Waterfowl and small mammal food	Palatable forage grass	3,4,5	H	OBL
<i>Bromus erectus</i>	Low-High	Rhizomatous	Seasonally-Saturated	Introduced	Yes-Seed	24-48"	Medium	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	4,5,6	H	FACU
<i>Meadow brome</i>	Low-High	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Medium	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	4,5,6	H	FACU
<i>Bromus inermis</i>	Low-High	Rhizomatous	Seasonally-Saturated	Introduced	Yes-Seed	18-36"	Rapid	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	4,5,6	H	FACU
<i>Smooth brome</i>	Low-High	Perennial	Well Drained	Introduced	Yes-Seed	18-36"	Rapid	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	4,5,6	H	FACU
<i>Calamagrostis canadensis</i>	Mid-High	Rhizomatous	Seasonally-Saturated	Common	Yes-Seed	24-36"	Medium	Med	Low	Small mammal food and upland bird cover	Excellent soil stabilizer	3,4,5	H	FACW+
<i>Blue-joint reed grass</i>	Mid-High	Perennial	Well Drained	Common	Yes-Seed & Plugs	24-36"	Medium	Med	Low	Small mammal food and upland bird cover	Excellent soil stabilizer	3,4,5	H	FACW+
<i>Carex aquatilis</i>	Mid-High	Rhizomatous	Up to 3" Water Depth	Fairly Common	Yes-Seed & Plugs	10-24"	Medium	Med	Low	Waterfowl food and cover		2,3,4	H	OBL
<i>Water sedge</i>	Mid-High	Perennial	Up to 3" Water Depth	Fairly Common	Yes-Seed & Plugs	10-24"	Medium	Med	Low	Waterfowl food and cover		2,3,4	H	OBL
<i>Carex nebrascensis</i>	Low-High	Rhizomatous	Seasonally-Saturated	Common	Yes-Seed & Plugs	10-24"	Medium	Low	Medium	Waterfowl food and cover	Tolerates heat if provided with adequate moisture	2,3,4	H	OBL
<i>Nebraska sedge</i>	Low-High	Perennial	Well Drained	Common	Yes-Seed & Plugs	10-24"	Medium	Low	Medium	Waterfowl food and cover	Tolerates heat if provided with adequate moisture	2,3,4	H	OBL
<i>Carex utriculata</i>	Low-High	Rhizomatous	Seasonally-Saturated	Common	Yes-Seed & Plugs	10-40"	Rapid	Med	Low	Waterfowl and small mammal food	Also known as <i>C. rostrata</i>	2,3,4	H	OBL
<i>Beaked sedge</i>	Low-High	Perennial	Well Drained	Common	Yes-Seed & Plugs	10-40"	Rapid	Med	Low	Waterfowl and small mammal food	Also known as <i>C. rostrata</i>	2,3,4	H	OBL
<i>Dactylis glomerata</i>	Low-Med	Bunch	Well Drained	Introduced	Yes-Seed	24-48"	Slow	Low	Low	Waterfowl, small mammal, and big game food		5,6	L	FACU
<i>Orchardgrass</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Slow	Low	Low	Waterfowl, small mammal, and big game food		5,6	L	FACU
<i>Deschampsia cespitosa</i>	Mid-High	Fibrous	Seasonally-Saturated	Common	Yes-Seed	18-30"	Medium	Med	Medium	Small mammal cover		3,4	H	FACW
<i>Tufted hairgrass</i>	Mid-High	Perennial	Seasonally-Saturated	Common	Yes-Seed	18-30"	Medium	Med	Medium	Small mammal cover		3,4	H	FACW
<i>Distichlis stricta</i>	Low-Mid	Rhizomatous	Seasonally-Saturated	Very Common	Yes-Seed & Plugs	12-18"	Medium	Low	High	Waterfowl food		3,4,5	H	FACW
<i>Inland saltgrass</i>	Low-Mid	Perennial	Well Drained	Very Common	Yes-Seed & Plugs	12-18"	Medium	Low	High	Waterfowl food		3,4,5	H	FACW
<i>Eleocharis palustris</i>	Low-High	Rhizomatous	Seasonally-Flooded	Very Common	Yes-Seed & Plugs	6-30"	Rapid	Low	Medium	Waterfowl food	Excellent soil stabilizer	2,3,4,5	H	OBL
<i>Spikerush</i>	Low-High	Perennial	Up to 6" Water Depth	Very Common	Yes-Seed & Plugs	6-30"	Rapid	Low	Medium	Waterfowl food	Excellent soil stabilizer	2,3,4,5	H	OBL
<i>Elymus lanceolatus</i>	Low-Med	Rhizomatous	Seasonally-Saturated	Common	Yes-Seed	6-12"	Medium	Low	Medium		Good soil stabilizer, low growth form, drought tol.	5,6	M	FACU
<i>Streambank wheatgrass</i>	Low-Med	Perennial	Well Drained	Common	Yes-Seed	6-12"	Medium	Low	Medium		Good soil stabilizer and very drought tolerant	5,6	M	FACU
<i>Elymus lanceolatus</i>	Low-Med	Rhizomatous	Seasonally-Saturated	Common	Yes-Seed	8-24"	Medium	Low	Medium		Good soil stabilizer and very drought tolerant	5,6	M	FACU
<i>Thickspike wheatgrass</i>	Low-Med	Perennial	Well Drained	Common	Yes-Seed	8-24"	Medium	Low	Medium		Good soil stabilizer and very drought tolerant	5,6	M	FACU
<i>Elytorgia elongata</i>	Low-Med	Bunch	Seasonally-Flooded	Introduced	Yes-Seed	30-60"	Rapid	Low	High		Good soil stabilizer and very saline tolerant	3,4,5,6	H	FAC
<i>Tall wheatgrass</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	30-60"	Rapid	Low	High		Good soil stabilizer and very saline tolerant	3,4,5,6	H	FAC
<i>Elytorgia intermedia</i>	Low-Med	Rhizomatous	Seasonally-Saturated	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Small mammal and big game food	Excellent soil stabilizer	5,6	M	FACU
<i>Intermediate wheatgrass</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Small mammal and big game food	Excellent soil stabilizer	5,6	M	FACU
<i>Elytorgia intermedia</i>	Low-Med	Rhizomatous	Seasonally-Saturated	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Small mammal and big game food	Excellent soil stabilizer	5,6	M	FACU
<i>Pubescent wheatgrass</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Rapid	Med	Medium	Small mammal and big game food	Excellent soil stabilizer	5,6	M	FACU
<i>Festuca arundinacea</i>	Low-Med	Bunch	Seasonally-Flooded	Introduced	Yes-Seed	24-48"	Rapid	High	High		Excellent soil stabilizer	2,3,4,5,6	H	FAC
<i>Tall Fescue</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Rapid	High	High		Excellent soil stabilizer	2,3,4,5,6	H	FAC
<i>Festuca ovina</i>	Low-Med	Bunch	Seasonally-Saturated	Introduced	Yes-Seed	6-18"	Slow	Med	Low		Excellent soil stabilizer	5,6	M	FACU
<i>Sheep Fescue</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	6-18"	Slow	Med	Low		Excellent soil stabilizer	5,6	M	FACU
<i>Festuca ovina duriuscula</i>	Low-Med	Bunch	Seasonally-Saturated	Introduced	Yes-Seed	6-18"	Slow	Med	Low		Excellent soil stabilizer	5,6	M	FACU
<i>Hard fescue</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	6-18"	Slow	Med	Low		Excellent soil stabilizer	5,6	M	FACU
<i>Festuca rubra</i>	Low-Med	Rhizomatous	Seasonally-Saturated	Introduced	Yes-Seed	6-12"	Medium	Med	Low		Excellent soil stabilizer	4,5,6	M	FAC
<i>Red fescue</i>	Low-Med	Perennial	Well Drained	Introduced	Yes-Seed	6-12"	Medium	Med	Low		Excellent soil stabilizer	4,5,6	M	FAC
<i>Glyceria striata</i>	Mid-High	Rhizomatous	Seasonally-Flooded	Fairly Common	Yes-Seed & Plugs	24-36"	Rapid	U	Low	Waterfowl and big game food	Excellent soil stabilizer	3,4,5	H	OBL
<i>Mannagrass</i>	Mid-High	Perennial	Well Drained	Fairly Common	Yes-Seed & Plugs	24-36"	Rapid	U	Low	Waterfowl and big game food	Excellent soil stabilizer	3,4,5	H	OBL
<i>Juncus balticus</i>	Low-High	Rhizomatous	Seasonally-Saturated	Very Common	Yes-Seed & Potted	18-24"	Medium	Med	Medium	Waterfowl food	Tolerates wide range of hydrologic conditions	2,3,4,5,6	H	OBL
<i>Baltic rush</i>	Low-High	Perennial	Well Drained	Very Common	Yes-Seed & Potted	18-24"	Medium	Med	Medium	Waterfowl food	Tolerates wide range of hydrologic conditions	2,3,4,5,6	H	OBL
<i>Juncus mertensianus</i>	Mid-High	Rhizomatous	Saturated	Fairly Common	Yes-Seed & Plugs	4-16"	Medium	U	U	U		3,4,5	H	OBL
<i>Merten's rush</i>	Mid-High	Perennial	Saturated	Fairly Common	Yes-Seed & Plugs	4-16"	Medium	U	U	U		3,4,5	H	OBL
<i>Juncus tenuis</i>	Mid-High	Rhizomatous	Saturated	Fairly Common	Yes-Seed & Plugs	6-12"	Medium	U	U	U		3,4,5	M	FAC
<i>Poverty rush</i>	Mid-High	Perennial	Saturated	Fairly Common	Yes-Seed & Plugs	6-12"	Medium	U	U	U		3,4,5	M	FAC
<i>Pascopyrum smithii</i>	Low-Med	Rhizomatous	Seasonally-Flooded	Common	Yes-Seed	6-12"	Rapid	Med	Medium		Excellent soil stabilizer	4,5,6	H	FACU
<i>Western wheatgrass</i>	Low-Med	Perennial	Well Drained	Common	Yes-Seed	6-12"	Rapid	Med	Medium		Excellent soil stabilizer	4,5,6	H	FACU
<i>Poa pratensis</i>	Low-High	Rhizomatous	Seasonally-Flooded	Introduced	Yes-Seed	6-18"	Rapid	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACU
<i>Kentucky bluegrass</i>	Low-High	Perennial	Well Drained	Introduced	Yes-Seed	6-18"	Rapid	Low	Low	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACU
<i>Phalaris arundinacea</i>	Low-Mid	Rhizomatous	Seasonally-Flooded	Common	Yes-Seed	24-48"	Rapid	Low	Low	Waterfowl food	Excellent soil stabilizer	2,3,4,5,6	H	FACW
<i>Reed canarygrass</i>	Low-Mid	Perennial	Well Drained	Common	Yes-Seed	24-48"	Rapid	Low	Low	Waterfowl food	Excellent soil stabilizer	2,3,4,5,6	H	FACW
<i>Phleum pratense</i>	Low-High	Rhizomatous	Seasonally-Flooded	Introduced	Yes-Seed	24-48"	Medium	Med	Medium	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACU
<i>Timothy</i>	Low-High	Perennial	Well Drained	Introduced	Yes-Seed	24-48"	Medium	Med	Medium	Waterfowl, small mammal, and big game food	Excellent soil stabilizer	3,4,5,6	H	FACU
<i>P. spicata X E. repens</i>	Low-Mid	Weak Rhiz	Seasonally-Saturated	Introduced	Yes-Seed	8-18"	Slow	Low	V. High		Slow establishment	3,4,5,6	H	FAC
<i>Newly hybrid wheatgrass</i>	Low-Mid	Perennial	Well Drained	Introduced	Yes-Seed	8-18"	Slow	Low	V. High		Tolerates high salinity	3,4,5,6	H	FAC
<i>Puchinella nuttalliana</i>	Low-Mid	Fibrous	Seasonally-Saturated	Common	Yes-Seed	6-12"	Medium	Low	High	Small mammal cover	Tolerates high salinity	3,4,5,6	H	OBL
<i>Alkali grass</i>	Low-Mid	Perennial	Well Drained	Common	Yes-Seed & Plugs	6-12"	Medium	Low	High	Small mammal cover	Tolerates high salinity	3,4,5,6	H	OBL
<i>Scirpus acutus</i>	Low-High	Rhizomatous	Up to 36" Water Depth	Very Common	Yes-Seed & Plugs	Up to 6'	Rapid	Low	Medium	Waterfowl food and cover	Excellent soil stabilizer	2,3,4	H	OBL
<i>Hard-stem bulrush</i>	Low-High	Perennial	Well Drained	Very Common	Yes-Seed & Plugs	Up to 6'	Rapid	Low	Medium	Waterfowl food and cover	Excellent soil stabilizer	2,3,4	H	OBL
<i>Scirpus maritimus</i>	Low-Mid	Rhizomatous	Up to 6" Water Depth	Common	Yes-Seed & Plugs	24-36"	Medium	Low	High	Waterfowl cover and food	Tolerates high salinity	2,3,4,5	H	OBL
<i>Alkali bulrush</i>	Low-Mid	Perennial	Well Drained	Common	Yes-Seed & Plugs	24-36"	Medium	Low	High	Waterfowl cover and food	Tolerates high salinity	2,3,4,5	H	OBL
<i>Scirpus pungens</i>	Low-Mid	Rhizomatous	Up to 6" Water Depth	Very Common	Yes-Seed & Plugs	24-48"	Rapid	Low	Medium	Waterfowl food and cover, small mammal cover	Tolerates some hydrologic drawdown	2,3,4	H	OBL
<i>Three-square bulrush</i>	Low-Mid	Perennial	Well Drained	Very Common	Yes-Seed & Plugs	24-48"	Rapid	Low	Medium	Waterfowl food and cover, small mammal cover	Tolerates some hydrologic drawdown	2,3,4	H	OBL
<i>Spartina pectinata</i>	Low-Mid	Rhizomatous	Seasonally-Flooded	Fairly Common	Yes-Seed & Plugs	24-48"	Rapid	Low	Medium	Small game cover	Not palatable for livestock	2,3,4,5	H	FACW
<i>Prairie cordgrass</i>	Low-Mid	Perennial	Well Drained	Fairly Common	Yes-Seed & Plugs	24-48"	Rapid	Low	Medium	Small game cover	Not palatable for livestock	2,3,4,5	H	FACW
<i>Typha latifolia</i>	Low-Mid	Rhizomatous	Up to 12" Water Depth	Very Common	Yes-Seed & Plugs	Up to 6'	Rapid	Med	High	Waterfowl food and cover, small mammal cover and food	Can be invasive	2,3,4	H	OBL
<i>Cattail</i>	Low-Mid	Perennial	Well Drained	Very Common	Yes-Seed & Plugs	Up to 6'	Rapid	Med	High	Waterfowl food and cover, small mammal cover and food	Can be invasive	2,3,4	H	OBL
<i>Verbena hastata</i>	Low-Mid	Fibrous	Seasonally-Saturated	Common	Yes-Seed	18-30"	Slow	U	Low	Upland bird food	Very fibrous root system	2,3,4	M	FACW
<i>Blue vervain</i>	Low-Mid	Perennial	Well Drained	Common	Yes-Seed & Plugs	18-30"	Slow	U	Low	Upland bird food	Very fibrous root system	2,3,4	M	FACW

- 1. Elevation Range:**  
for this region  
Low 2000-4500 feet  
Middle 4500-7000 feet  
High 7000-10,000 feet
- 2. Hydrologic Regime:**  
This indicates optimal moisture conditions although local conditions are the best benchmarks for design. Well-drained species may tolerate short periods of saturation. Seasonally saturated species prefer soil that is saturated early in the season, but later dry out. Seasonally flooded species prefer flooding in the early portion of the season. Saturated indicates species that prefer very wet conditions all season. Others prefer standing water to the depths indicated.
- 3. Availability in the Field:**  
This refers to natural occurrences in the region. Introduced are not native species and are probably not available in field. The order of the ranking is from least to greatest.  
**Fairly Common-Common-Very Common**
- 4. Commercial Availability:**  
This refers to whether the species is available in the seed or nursery trade.
- 5. Rate of Spread:**  
Refers to the horizontal rate of growth. These rates are only guidelines since rates will vary with growing season, elevation, soil, soil limitations, etc.  
**Rapid** More than 1.0- feet per year

## Description of Native Shrubs and Trees (Zones 2-6)

Description of Native Shrubs and Trees (Zones 2-6)								Riparian Shrubs and Trees					
Species	Size/Form	Elev. Range (1)	Root Type	Rooting From Cuttings	Hydrologic Zone (2)	Availability In Field (3)	Commercial Availability (4)	Deposition Tolerance (5)	Flooding Tolerance (6)	Drought Tolerance (7)	Salinity Tolerance (8)	Wildlife Value/Misc. Notes	Plant Ind Status (9)
<b>Riparian Shrubs and Trees</b>								<b>Riparian Shrubs and Trees</b>					
<i>Acer negundo</i>	Med-Lg Tree	Low-Mid	Moderately Spreading	Poor	4,5,6	Common	Yes	High	High	High	Med	Birds and small mammals eat fruits	FAC
<i>Boxelder</i>	Med Tree	Mid-High	Shallow Spreading	Poor	4,5	Fairly Common	Yes	Med	Med	Low	Low	Big game browse upland bird food	FAC
<i>Alnus rubra</i>	Med Tree	Mid-High	Shallow Spreading	Poor	4,5	Fairly Common	Yes	Med	Med	Low	Low	Big game browse upland bird food	FACW
<i>Alnus sinuata</i>	Sm-Med Tree	Mid-High	Shallow Spreading	Poor	3,4,5	Common	Yes	Med	Med	Low	Low	Big game browse upland bird food	FACW
<i>Alnus incana spp. tenuifolia</i>	Sm-Med Tree	Mid-High	Shallow Spreading	Poor	3,4,5	Common	Yes	Med	Med	Low	Low	Big game browse upland bird food	FACW
<i>Thinleaf alder</i>	Lg Shrub to Sm Tree	Mid-High	Shallow to Deep Spreading	Poor	3,4,5	Fairly Common	Yes	Med	Med	Low	Low	Big game browse	FACW
<i>Betula occidentalis</i>	Med Shrub	Mid	Shallow	Moderate	3,4,5,6	Fairly Common	Yes	Low	High	Med	Low	Big game browse small mammals food, upland bird food	FACW
<i>Cornus sericea</i>	Sm Tree	Low-Mid	Shallow to Deep Spreading	Poor	4,5,6	Fairly Common	Yes	Med	Low	High	Low	Browse for many species and cover	FAC,U
<i>Black/Douglas hawthorn</i>	Sm Shrub	Low-Mid	Shallow to Deep Spreading	Poor	5,6	Very Common	Yes	U	U	High	U	Big game browse	FACW
<i>Pentaphylloides floribunda</i>	Sm Shrub	Low-Mid	Shallow to Deep Spreading	Good	3,4,5	Common	Yes	U	High	U	U	Big game browse	FAC
<i>Shrubby cinquefoil</i>	Sm-Med Shrub	Low-Mid	Shallow to Deep Spreading	Good	3,4,5	Common	Yes	U	High	U	U	Big game browse	FAC,U
<i>Philadelphus lewisii</i>	Lg. Tree	Mid	Fibrous Shallow	Very Good	4,5,6	Very Common	Yes	Med	Med	High	Med	Big game browse	FACW
<i>Mockorange</i>	Med Shrub	Low-Mid	Shallow	Very Good	4,5,6	Fairly Common	Yes	Med	Med	Med	Med	Big game browse	FACW
<i>Populus angustifolia</i>	Lg. Tree	Low-Mid	Shallow	Very Good	4,5,6	Very Common	Yes	Med	Med	Med	Med	Big game browse	FACW
<i>Narrowleaf cottonwood</i>	Med Tree	Mid-High	Fibrous Shallow	Poor	4,5,6	Very Common	Yes	Low	Low	Med	Med	Big game browse	FAC
<i>Populus fremontii</i>	Med Tree	Mid-High	Shallow	Poor	4,5,6	Very Common	Yes	Low	Low	Med	Med	Big game browse	FAC
<i>Fremont cottonwood</i>	Lg. Tree	Low-Mid	Shallow	Very Good	4,5,6	Very Common	Yes	Med	Med	Med	U	Big game browse	FACU
<i>Populus tremuloides</i>	Med Tree	Mid-High	Shallow	Poor	4,5,6	Very Common	Yes	Med	Med	Med	U	Big game browse	FACW
<i>Quaking aspen</i>	Lg. Tree	Low-Mid	Shallow	Very Good	4,5,6	Very Common	Yes	Med	Med	Med	U	Big game browse	FACW
<i>Populus trichocarpa</i>	Med Shrub	Low-Mid	Fibrous Rhizomatous	Good from root cuttings	5,6	Common	Yes	Low	Low	Low-Med	Low-Med	Birds and small mammals eat fruits	FACU
<i>Black Cottonwood</i>	Med-Lg Shrub	Low-Mid	Rhizomatous	Good from root cuttings	5,6	Common	Yes	Low	Low	Low-Med	Low-Med	Birds and small mammals eat fruits	FACU
<i>Prunus virginiana</i>	Med-Lg Shrub	Low-Mid	Rhizomatous	Good from root cuttings	5,6	Common	Yes	Low	Low	Low-Med	Low-Med	Birds and small mammals eat fruits	FACU
<i>Chokecherry</i>	Med-Lg Shrub	Low-Mid	Deep Spreading Rhizomatous	Poor	4,5,6	Fairly Common	Yes	High	Med-High	Med-High	Med	Birds and small mammals eat fruits	FACU,U
<i>Rhus trilobata</i>	Lg Shrub	Low-Mid	Deep Spreading Rhizomatous	Poor	4,5,6	Fairly Common	Yes	High	Med-High	Med-High	Med	Doesn't tolerate long-term flooding	FACU,U
<i>Skunkbush sumac</i>	Sm - Med Shrub	Low-Mid	Spreading	Good	3,4,5,6	Common	Yes	U	U	U	U	Birds and small mammals eat fruits	FAC
<i>Ribes aureum</i>	Med Shrub	Low-Mid	Spreading	Good	3,4,5,6	Common	Yes	U	U	U	U	Birds and small mammals eat fruits	FACW
<i>Golden current</i>	Sm - Med Shrub	Mid-High	Spreading	Fair	4,5	Common	Yes	U	U	U	U	Birds and small mammals eat fruits	FACU,U
<i>Ribes cereum</i>	Med Shrub	Low-Mid	Shallow to Deep	Good	3,4,5	Very Common	Yes	U	Low	Low-High	Low	Rosehips eaten by many species	FACU
<i>Wax/Squaw current</i>	Sm - Med Shrub	Low-Mid	Shallow to Deep	Good	3,4,5	Very Common	Yes	U	Low	Low-High	Low	Rosehips eaten by many species	FACU
<i>Rosa woodsii</i>	Med Shrub	Mid	Rhizomatous	Poor	4,5,6	Fairly Common	Yes	Med	Med	Med	Low	Fruits are important for birds	FAC
<i>Wood's rose</i>	Sm Tree	Mid	Rhizomatous	Poor	4,5,6	Fairly Common	Yes	Med	Med	Med	Low	Fruits are important for birds	FAC
<i>Sambucus coerulea</i>	Med Shrub	Mid-High	Spreading	Poor	4,5,6	Fairly Common	Yes	Med	Med	Med	Low	Big game browse, fruits eaten by birds and small mammals	FACU
<i>Blue elderberry</i>	Lg Shrub	Low-Mid	Rhizomatous	Poor	3,4,5,6	Fairly Common	Yes	U	U	U	Low	Fruits eaten by birds and small mammals	FACU
<i>Sambucus racemosa</i>	Med Shrub	Mid-High	Spreading	Poor	4,5,6	Fairly Common	Yes	Med	Med	Med	Low	Big game browse, fruits eaten by birds and small mammals	FACU
<i>Red elderberry</i>	Lg Shrub	Low-Mid	Rhizomatous	Poor	3,4,5,6	Fairly Common	Yes	U	U	U	Low	Fruits eaten by birds and small mammals	FACU
<i>Shaphardia argentea</i>	Med Shrub	Mid-High	Spreading	Poor	4,5,6	Fairly Common	Yes	Med	Med	Med	Low	Big game browse, fruits eaten by birds and small mammals	FACU
<i>Silver buffaloberry</i>	Lg Shrub	Low-Mid	Rhizomatous	Poor	3,4,5,6	Fairly Common	Yes	U	U	U	Low	Fruits eaten by birds and small mammals	FACU
<b>Riparian Willows</b>								<b>Riparian Willows</b>					
<i>Salix alba</i>	Med-Lg Tree	Low-Mid	Shallow to Deep	Good	4,5	Common	Yes	High	High	Med	Low	Good	FACW
<i>White/Golden willow</i>	Sm Tree	Low	Fibrous	Very Good	4,5	Common	Yes-limited	High	High	Low	Med	Good	FACW
<i>Salix amygdaloides</i>	Lg Shrub	Low-Mid	Shallow to Deep	Good	4,5	Common	Yes-limited	High	High	Low-Med	Low	Good	FACW
<i>Peachleaf willow</i>	Med Shrub	Mid	Shallow to Deep	Moderate	3,4	Very Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Salix bebbiana</i>	Sm-Med Shrub	Mid-High	Shallow to Deep	Good	3,4	Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Bebb's willow</i>	Med Shrub	Low-Mid	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Salix boothii</i>	Med Shrub	Mid	Shallow to Deep	Moderate	3,4	Very Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Booth willow</i>	Sm-Med Shrub	Mid-High	Shallow to Deep	Good	3,4	Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Salix drummondiana</i>	Med Shrub	Low-Mid	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Drummond willow</i>	Med Shrub	Low-Mid	Rhizomatous	Very Good	2,3,4	Very Common	Yes	High	Med-High	Low-Med	Low	Good	OBL
<i>Salix exigua</i>	Med Shrub	Mid	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	High	Med-High	Low-Med	Low	Good	OBL
<i>Coyote willow</i>	Sm Tree	Low-Mid	Shallow to Deep	Good	4,5	Common	Yes	High	Med-High	Low-Med	Low	Good	FACW
<i>Salix geyeriana</i>	Sm-Med Shrub	Mid-High	Shallow to Deep	Good	2,3,4	Fairly Common	No	High	Med-High	Low-Med	Low	Good	FACW
<i>Geyer willow</i>	Med-Lg Shrub	Low	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	Med	Med-High	Low-Med	Med	Good	FACW
<i>Salix lasiandra</i>	Lg Tree	Low-Med	Shallow to Deep	Good	3,4,5	Common	Yes	Med	Med-High	Low-Med	Low	Good	OBL
<i>Pacific willow</i>	Sm-Med Shrub	Mid-High	Shallow to Deep	Good	2,3,4	Fairly Common	No	High	Med-High	Low-Med	Low	Good	FACW
<i>Salix lemmonii</i>	Med-Lg Shrub	Low	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	Med	Med-High	Low-Med	Med	Good	FACW
<i>Lemmon willow</i>	Med-Lg Shrub	Low	Shallow to Deep	Good	2,3,4	Very Common	Yes-limited	Med	Med-High	Low-Med	Med	Good	FACW
<i>Salix lutea</i>	Lg Tree	Low-Med	Shallow to Deep	Good	3,4,5	Common	Yes	Med	Med-High	Low-Med	Low	Good	OBL
<i>Yellow willow</i>	Sm Shrub	Mid-High	Shallow to Deep	Moderate	2,3,4	Fairly Common	No	High	Med-High	Low-Med	Low	Good	OBL
<i>Salix nigra</i>	Med Shrub	Mid-High	Shallow to Deep	Moderate	2,3,4	Fairly Common	No	High	Med-High	Low-Med	Low	Good	OBL
<i>Black willow</i>	Sm Shrub	Low-Med	Shallow to Deep	Good	4,5	Fairly Common	Yes-limited	High	Med-High	Low-Med	Low	Good	OBL
<i>Salix planifolia</i>	Sm Tree	Low-Med	Shallow to Deep	Good	4,5	Fairly Common	Yes-limited	High	Med-High	Low-Med	Low	Good	OBL
<i>Planeleaf willow</i>	Sm Tree	Low-Med	Shallow to Deep	Good	4,5	Fairly Common	Yes-limited	High	Med-High	Low-Med	Low	Good	OBL
<i>Salix prolixa</i>	Sm Tree	Low-Med	Shallow to Deep	Good	4,5	Fairly Common	Yes-limited	High	Med-High	Low-Med	Low	Good	OBL
<i>Mackenzie willow</i>	Lg Shrub	Low-Mid	Shallow to Deep	Need to treat with hormone	4,5,6	Fairly Common	Yes	High	Med-High	Low-Med	High	Good	FACU
<i>Scouler willow</i>	Sm-Med Tree	Low-Med	Shallow to Deep	Moderate	4,5	Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FAC
<i>Salix stichensis</i>	Sm-Med Tree	Low-Med	Shallow to Deep	Moderate	4,5	Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW
<i>Sitka willow</i>	Tree	Low-Med	Shallow to Deep	Moderate	4,5	Common	Yes-limited	High	Med-High	Low-Med	Low	Good	FACW

**U - Unknown**

**1. Elevation Range: for this region**

Low 2000-4500 feet  
Middle 4500-7000 feet  
High 7000-10,000 feet

**2. Hydrologic Zone**

1-Deep Water, 2-Shallow bench, 3-Shallow Fringe, 4-Shoreline Fringe, 5-Terrace, 6-Upland

**3. Availability in the Field:**

This refers to natural occurrences in the region. The order of the ranking is from least to greatest.

**Fairly Common-Common-Very Common**

**4. Commercial Availability:**

This refers to whether the species is currently available in the nursery trade.

**5. Deposition Tolerance:**

Regrowth following shallow coverage by soil

**6. Tolerance to Flooding:**

High - tolerates 10-30+ days of flooding  
Medium - tolerates 6-10 days of flooding  
Low - tolerates 1-5 days or less of flooding

**7. Tolerance to Drought:**

Resistance to drought relative to native vegetation on similar sites

**8. Tolerance to Salinity**

Resistance to salinity relative to native vegetation on similar sites

**9. Plant Ind. Status-Occurrence in Wetlands:**

OBL = Obligate  
FACW = Facultative Wet  
FAC = Facultative  
FACU/Upland = Facultative Upland/Upland

## Description of Upland Shrubs and Trees for Zone 6

Description of Upland Shrubs and Trees for (Hydrologic Zone 6)													
Species	Mature Size 20 Yr. Height	Crown Spread	Growth Rate (1)	Flower (2)	Fruit Usable (3)	Fall Leaf Color	Suckers (4)	Commer. Available	Cold/Wind Tolerance	Drought Tolerance	Salinity Tolerance	Wildlife Value/Misc Notes	Plant Ind. Status (5)
<b>Upland Shrubs</b>													
Description of Upland Shrubs and Trees for (Hydrologic Zone 6)													
Species	Mature Size 20 Yr. Height	Crown Spread	Growth Rate (1)	Flower (2)	Fruit Usable (3)	Fall Leaf Color	Suckers (4)	Commer. Available	Cold/Wind Tolerance	Drought Tolerance	Salinity Tolerance	Wildlife Value/Misc Notes	Plant Ind. Status (5)
<b>Upland Shrubs</b>													
<i>Shepherdia argentea</i>	6-14'	8-14'	Medium	Yes	Yes	None	Yes	Yes	Yes	Yes	Yes	Good nesting cover and food	FACU
Buffaloberry, silver												Thorns	
<i>Caragana arborescens</i>	10-25'	10-20'	Medium	Yes	No	Yellow	No	Yes	Yes	Yes	Yes	Good nesting cover and food	Upland
Caragana-Siberian peashrub												Seed Pods	
<i>Prunus fruticosa</i>	3-6'	3-6'	Slow	Yes	No	Yellow	Yes	Yes	Yes	Moderate	No	Good nesting cover and food	Upland
Cherry, Mongolian												Fruit Color	
<i>Prunus virginiana</i>	10-25'	10-25'	Medium	Yes	Yes	Yellow to Purple	Yes	Yes	Yes	Moderate	No	Excellent nesting cover and food	FACU
Chokecherry												Fruit	
<i>Cotoneaster integerrimus</i>	8-12'	8-12'	Medium	No	No	Yellow to Brown	No	Yes	Yes	Moderate	No	Fair-cover	Upland
Cotoneaster, European												Fruit Color	
<i>Ribes Aureum</i>	5-10'	5-10'	Medium	Yes	Yes	Yellow	Moderate	Yes	Yes	Moderate	Yes	Excellent nesting cover and food	FAC+
Golden Current												Bright Golden Flower	
<i>Cornus sericea</i>	5-10'	10-15'	Fast	Yes	No	Purple	Moderate	Yes	Yes	No	No	Excellent nesting cover and food	FACW
Dogwood, redosier												Red Stems-Winter Color	
<i>Forsythia X 'Meadowlark'</i>	6-11'	6-11'	Medium	Yes	No	Purple to Yellow	No	Yes	Yes	Moderate	No	Bright Yellow Spring Flowers	Upland
Forsythia, Meadowlark													
<i>Lonicera maackii</i>	10-14'	10-14'	Medium	Yes	No	Brown to Purple	No	Yes	Yes	Moderate	No	Good nesting cover and food	FAC
Honeysuckle, Amur												Aphid Resistant	
<i>Lonicera korolkowii</i>	10-14'	10-14'	Medium	Yes	No	Brown to Purple	No	Yes	Yes	Moderate	No	Good nesting cover and food	FAC
Honeysuckle, Blueleaf												Aphid Resistant	
<i>Amelanchier alnifolia</i>	6-15'	6-15'	Slow	Yes	Yes	Yellow	Yes	Yes	Yes	Moderate	No	Good nesting cover and food	FACU
Servicberry												Fruit	
<i>Syringa vulgaris</i>	8-12'	8-12'	Slow	Yes	No	Brown	Yes	Yes	Yes	Moderate	Yes	Fair nesting cover	Upland
Lilac, Common													
<i>Prunus americana</i>	8-10'	8-10'	Medium	Yes	Yes	Yellow to Orange	Yes	Yes	Yes	Moderate	No	Good nesting cover	Upland
Plum, American												Fruit	
<i>Potentilla fruticosa</i>	3-4'	3-4'	Slow	Yes	No	Brown	No	Yes	Yes	Yes	Moderate	Fair nesting cover	FAC
Shrubby Cinquefoil													
<i>Spiraea X vanhouttei</i>	4-8'	4-8'	Medium	Yes	No	Purple	No	Yes	Moderate	Moderate	No	Good nesting cover and food	FAC
Spiraea, Vanhoutte												Flower	
<i>Rhus aromatica</i>	3-9'	6-10'	Slow	Yes	No	Red to Yellow	Rarely	Yes	Moderate	Yes	No	Poor wildlife cover and food	Upland
Sumac, Fragrant												Fall Color	
<i>Rhus trilobata</i>	3-9'	5-12'	Medium	Yes	No	Red to Yellow	No	Yes	Yes	Yes	Yes	Excellent nesting cover and food	FAC
Sumac, Skunkbush												Fall Color	
<i>Rhus glabra</i>	5-15'	7-17'	Slow	Yes	No	Red	Yes	Yes	Yes	Moderate	No	Poor wildlife cover and food	Upland
Sumac, Smooth												Fall Color	
<i>Rhus typhina</i>	10-15'	12-20'	Medium	Yes	No	Red to Orange	Yes	Yes	Moderate	Moderate	No	Fair nesting cover and food	Upland
Sumac, Staghorn												Seedheads and Fall Color	
<b>Upland Small Trees</b>													
Description of Upland Small Trees													
Species	Mature Size 20 Yr. Height	Crown Spread	Growth Rate (1)	Flower (2)	Fruit Usable (3)	Fall Leaf Color	Suckers (4)	Commer. Available	Cold/Wind Tolerance	Drought Tolerance	Salinity Tolerance	Wildlife Value/Misc Notes	Plant Ind. Status (5)
<b>Upland Small Trees</b>													
<i>Prunus maackii</i>	15-25'	15-25'	Medium	Yes	No	Yellow	No	Yes	Yes	Moderate	No	Fair wildlife food value	Upland
Chokecherry, Amur												Orange Bark	
<i>Malus hybridis</i>	10-15'	15-25'	Medium	Yes	Yes	Yellow to Red	No	Yes	Moderate	Moderate	No	Good wildlife food value	Upland
Crabapple, flowering												Varied shape fruit, flowers	
<i>Crataegus arnoldiana</i>	15-30'	15-25'	Slow	Yes	No	Yellow	No	Yes	Yes	Yes	Moderate	Good nesting cover and food value	Upland
Hawthorn, Arnold												Thorns, Fruit	
<i>Acer ginnala</i>	15-20'	15-20'	Medium	No	No	Yellow to Red	No	Yes	Yes	Moderate	No	Fair wildlife nesting value	Upland
Maple, Amur												Fall Color	
<i>Acer tataricum</i>	18-30'	15-25'	Medium	No	No	Yellow	No	Yes	Yes	Moderate	No	Fair wildlife nesting value	Upland
Maple Tatarian												Fall Color	
<i>Sorbus aucuparia</i>	20-30'	15-25'	Medium	Yes	Yes	Red to Yellow	No	Yes	Moderate	No	No	Good wildlife food value	Upland
Mountain Ash												Fruit, Flower	
<i>Cercis canadensis</i>	20-30'	20-25'	Medium	Yes	No	Yellow to Green	No	Yes	Moderate	Moderate	No	Short-lived to 50 years	Upland
Redbud, Eastern													
<b>Upland Medium and Tall Trees</b>													
Description of Upland Medium and Tall Trees													
Species	Mature Size 20 Yr. Height	Crown Spread	Growth Rate (1)	Flower (2)	Fruit Usable (3)	Fall Leaf Color	Suckers (4)	Commer. Available	Cold/Wind Tolerance	Drought Tolerance	Salinity Tolerance	Wildlife Value/Misc Notes	Plant Ind. Status (5)
<b>Upland Medium and Tall Trees</b>													
<i>Fraxinus pennsylvanica</i>	35-65'	30-40'	Medium	No	No	Yellow	No	Yes	Yes	Yes	Yes	Fair wildlife food and cover	Upland
Ash, Green												Hardy Tree	
<i>Populus tremuloides</i>	25-60'	30-30'	Fast	No	No	Yellow	Yes	Yes	Yes	No	No	Good wildlife food and cover	FAC
Aspen, Quaking												Quaking Leaf	
<i>Betula papyrifera</i>	30-55'	20-40'	Medium	No	No	Yellow	No	Yes	Yes	No	No	Fair wildlife food	Upland
Birch, Paper												White Bark	
<i>Catalpa speciosa</i>	50-70'	30-50'	Fast	Yes	No	Yellow to Brown	No	Yes	Moderate	Moderate	Yes	Good wildlife food and cover	Upland
Catalpa, Northern												Hugh leaf and showy flowers	
<i>Ulmus pumila</i>	25-50'	20-40'	Medium	No	No	Brown	Moderate	Yes	Yes	Yes	Yes	Fair wildlife food and cover	Upland
Elm, Siberian													
<i>Corylus Colura</i>	40-50'	20-30'	Medium	No	No	Yellow to Purple	No	Yes	Moderate	Moderate	No	Good wildlife nesting cover	Upland
Fibbert													
<i>Koeleruteria paniculata</i>	30-40'	30-40'	Fast	Yellow July	No	Yellow	No	Yes	Moderate	No	No	Late summer yellow flowers	Upland
Golden Raintree												Seed capsules persist over winter	
<i>Celtis occidentalis</i>	40-60'	25-45'	Medium	No	No	Yellow	No	Yes	Yes	Moderate	No	Good wildlife food and cover	FAC
Hackberry												Ridged Bark	
<i>Gleditsia triacanthos</i>	30-50'	30-40'	Fast	No	No	Yellow	No	Yes	No	No	No	Fair wildlife food value	Upland
Honeylocust												Seeds and thorns	
<i>Tilia americana</i>	50-70'	30-50'	Medium	Yes	No	Brown to Yellow	Moderate	Yes	No	No	No	Fair wildlife food and cover	Upland
Linden, American												Flower, Seeds	
<i>Tilia cordata</i>	30-45'	20-30'	Medium	Yes	No	Brown to Yellow	Moderate	Yes	Yes	No	No	Fair wildlife food and cover	Upland
Linden, Littleleaf												Flower, Seeds	
<i>Acer species</i>	40-65'	30-50'	Fast	No	No	Yellow to Orange	Moderate	Yes	Moderate	No	No	Fair wildlife food and cover	Upland
Maple, Norway/Silver/Sugar												Soft Wood	
<i>Quercus macrocarpa</i>	40-70'	35-60'	Slow	No	No	Yellow to Brown	No	Yes	Yes	Yes	No	Fair wildlife food and cover	Upland
Oak, Bur												Acorn	
<i>Quercus species</i>	50-70'	50-70'	Slow to Medium	No	No	Brown to Yellow to Red	No	Yes	Yes	Moderate	No	Fair wildlife food and cover	Upland
Oak, Mongolian/Red/White												Partial Leaf Retention	
<i>Populus species</i>	40-60'	20-35'	Fast	No	No	Brown to Yellow	Moderate	Yes	Moderate	No	No	Fair wildlife food and cover	FAC
Poplar, Hybrids												Fast growth	
<i>Juglans nigra</i>	35-60'	30-50'	Medium	No	Yes	Brown to Yellow	No	Yes	No	No	No	Good wildlife food and cover	Upland
Walnut, Black												Wood, Nuts	
<i>Salix alba</i>	40-55'	40-55'	Fast	No	No	None to Yellow	No	Yes	Yes	No	No	Fair wildlife food and cover	FAC
Golden Willow												Yellow Stems	
<i>Salix pentandra</i>	25-40'	20-35'	Fast	No	No	Brown to Yellow	No	Yes	Moderate	No	No	Fair wildlife food and cover	FAC
Laurel Willow												Shiny Green Leaf	
<b>Upland Conifers</b>													
Description of Upland Conifers													
Species	Mature Size 20 Yr. Height	Crown Spread	Growth Rate (1)	Flower (2)	Fruit Usable (3)	Fall Leaf Color	Suckers (4)	Commer. Available	Cold/Wind Tolerance	Drought Tolerance	Salinity Tolerance	Wildlife Value/Misc Notes	Plant Ind. Status (5)
<b>Upland Conifers</b>													
<i>Thuja occidentalis</i>	15-40'	10-20'	Very Slow	No	No	Green	No	Yes	Moderate	No	No	Good wildlife food and cover	Upland
Arborvitae, American												Winter Burn	
<i>Pseudotsuga menziesii</i>	40-70'	20-30'	Slow	No	No	Green	No	Yes	Yes	No	No	Fair wildlife food and cover	Upland
Douglas Fir												Winter Hardy	
<i>Juniperus virginiana</i>	30-45'	15-30'	Medium	No	No	Green	No	Yes	Moderate	Yes	Yes	Excellent wildlife food and cover	Upland
Eastern Red Cedar												Wildlife Value	
<i>Juniperus scopulorum</i>	20-40'	12-20'	Medium	No	No	Green	No	Yes	Yes	Yes	Yes	Excellent wildlife food and cover	Upland
Rocky Mountain Juniper												Wildlife Value	
<i>Pinus mugo</i>	3-20'	5-30'	Slow	No	No	Green	No	Yes	Moderate	Moderate	Moderate	Fair wildlife values	Upland
Mugo Pine												Shape	
<i>Pinus ponderosa</i>	50-70'	25-30'	Medium	No	No	Green	No	Yes	Yes	Yes	Moderate	Excellent wildlife food and cover	Upland
Ponderosa Pine												Long Life	
<i>Pinus nigra</i>	25-50'	20-35'	Medium	No	No	Green	No	Yes	Yes	Yes	Moderate	Good wildlife food and cover	Upland
Austrian Pine												Calcium Soil Tolerant	
<i>Picea pungens</i>	30-65'	15-25'	Slow	No	No	Green to Blue	No	Yes	Yes	Moderate	Moderate	Good wildlife cover value	Upland
Colorado Spruce												Needle Color	

1. Growth Rate  
Slow = less than 1 foot per year  
Medium =

## **APPENDIX D:**

### ***Plant and Seed Vendors List for Idaho and Surrounding States***

The following lists seed and plant vendors for the Intermountain West and Pacific Northwest states. Users of this list should note that this is only a partial listing of conservation plant and seed sources (retailers, wholesalers, nurseries and private growers) for each state. This list does not constitute an endorsement of the included vendors, nor does it guarantee the reliability or quality of products.

#### **Idaho:**

All Seasons Landscape Nursery	3376 E. Overland Rd., Meridian, ID 83642	(208) 888-6268
Allied Seed, Inc.	1917 E. Fargo Ave., Nampa, ID 83651	(208) 466-9218
Aloha Landscape and Nursery	4291 S. Cloverdale Rd., Boise, ID 83704	(208) 362-2062
Asgrow Seed Co.	1811 E. Florida Ave., Nampa, ID 83651	(208) 466-3351
Bakker Bros. of Idaho	Eastland Dr. South, Twin Falls, ID 83301	(208) 459-1900
W.R. Baxter Wholesale Nursery	2615 Pioneer Ave., Emmett, ID 83617	(208) 365-6011
Baxter Wholesale Nursery	P.O. Box 621 Meridian, ID 83642	
Boise Valley Seed, Inc.	R.R.10, Darrow Land, Caldwell, ID 83651	(208) 459-7211
Brown King Nursery	1407 Arthur Street, Caldwell, ID 83605	
Buffaloberry Farm	51 East Lake Fork Rd, McCall, ID 83638	(208) 634-3062
Clayton Wholesale Nursery	6622 Joplin Road, Nampa, ID 83651	(208) 286-7801
Clearwater Nursery	PO Box 488, Bellevue, ID 83313	(208) 788-5774
Clifty View Nursery	Route 1, Box 509, Bonners Ferry, ID 83805	(208) 267-7129
Cloverdale Nursery	2528 N. Cloverdale Rd., Boise, ID 83704	
Coeur d'Alene Landscaping	Box 1556, Coeur d'Alene, ID 83814	
Cold Hardy Plant Material Inc	PO Box 714, Bonners Ferry, 83805	(208) 267-2798
Crookham Company	301 Warehouse Avenue, Caldwell, ID 83651	
D&G Turf Farm and Nursery	1267 N. Cloverdale Rd., Boise, ID 83704	
Dahlin's Landscape Nursery	Route 1, Box 304, Priest River, ID 83856	
Donnelly Nursery	11911 Franklin Rd., Boise, ID 83709	(208) 375-2000
Double D Feed and Seed, Inc.	215 Broadway Ave., Melba, ID 83641	
Down to Earth Garden Shop	1615 N. Woodruff, Idaho Falls, ID 83401	
Du-Rite Nursery and Landscaping	5321 W. Cherry Lane, Meridian, ID 83642	
Eagle Landscaping and Nursery	P.O. Box 8, 988 E. State Street, Eagle, ID 83616	(208) 939-8723
Erico Nursery	P.O. Box 209, Plummer, ID 83851	
Fantasy Farms Nursery	Route 2, Lenore, ID 83541	
Ferry Morse Seed Co.	3015 E. Comstock, Nampa, ID 83651	
Forest Tree Nursery	c/o College Forestry, Wildlife and Range Science, University of Idaho, Moscow, ID 83843	
Fruitland Nursery	P.O. Box 332, Fruitland, ID 83619	
Garden and Landscape Nursery	2900 N. 32nd, Boise, ID 83703	(208) 343-0755
Garden Center West, Inc.	11500 Fairview Ave., Boise, ID 83704	(208) 376-3322
Garden Square	Lewiston, ID 83501	
Globe Seed and Feed Company	224 4th Ave., Twin Falls, ID 83301	(208) 733-1373

Gooding Seed Company	Box 57, Gooding, ID 83330	(208) 934-8441
Graft Nursery and Landscaping	1602 East 16th, Burley, ID 83318	
Grassland West Company	Box A, CULDESAC, ID 83524	(208) 843-5121
Greenhurst Nurs. & Garden Cntr.	3209 S. Happy Valley Rd., Nampa, ID 83651	
Green Things Nursery	P.O. Box 1900, 2230 Michigan, Orofino, ID 83544	
Greenway Seed Co.	Caldwell	(208) 454-8342
Green Thumb, Inc.	2113 Idaho Avenue, Caldwell, ID 83605	(208) 459-3349
Grimm Alfalfa Growers Assn.	Box 269, Blackfoot, ID 83221	(208) 785-0830
Harker Bros.	Southside Blvd., Nampa, ID 83651	(208) 495-2308 (208) 466-5783
Hash Company Nurs. & Lndsc.	Troy Highway, Moscow, ID 83843	(208) 875-1030
Hash Tree Co.	Box 72A, Princeton, ID 83857	(208) 875-1030
High Altitude Gardens	P.O. Box 1048, Hailey, ID 83340	(208) 788-4363
Hillcrest Farms, Inc.	Route 1, Grangeville, ID 83530	
Hillside Nursery	2350 Hill Road, Boise, ID 83702	
Hoffmans Greenhouse&Nurs.	3332 Caldwell Blvd., Nampa, ID 83651	(208) 466-1977
Howards Nursery and Greenh.	7106 Ustick Rd., Boise, ID 83704	(208) 322-6000
Inland Gardens	2124 Longmont Ave., Boise, ID 83705	(208) 342-6953
Intermountain Landscape Co.	P.O. Box 1087, Hailey, ID 83333	
Jacklin Seed Company	17300 Jacklin Ave., Post Falls, ID 83854	(208) 773-7581
Jayker Tree Farms, Inc.	801 E. Beacon Light Rd., Eagle, ID 83616	(208) 939-0014
John's Gourmet Gardens	9010 Burnett Dr., Boise, ID 83709	(208) 362-4439
Johnson's Quality Evergreens	HCR 68, Box 293, Cocolalla, ID 83813	
Kellog Mills	223 Roedel Ave., Caldwell, ID 83605	(208) 459-0777
Ketchum Garden Center	P.O. Box 229, Sun Valley, ID 83353	
Kimberly Nurseries	Route 3, Twin Falls, ID 83301	
Leland Plato	Star Route 1, Bonners Ferry, ID 83805	
Levig Nursery	Star Route 1, Kings Row, Bonners Ferry, ID 83805	
McDonald's Garden Store	Route 2, Public Avenue, Moscow, ID 83843	
Moss Greenhouses Inc	269 S 300 E, Jerome, ID 83338	(208) 324-1000
Mountain Seed Nursery	Route 1, Box 271, Moscow, ID 83843	
Mountain View Nursery	Route 3, Box 170, Sandpoint, ID 83864	
Musser Seed Co., Inc.	301 Fourth Ave. South, Caldwell, ID 83605	(208) 459-8243
Native Seed Foundation	Star Route, Moyie Springs, ID 83845	(208) 267-7938
Nishek Nursery	Route 1, Box 516, Bonners Ferry, ID 83805	
Nishitani Greenhouse	P.O. Box 325, Caldwell, ID 83606	
N. American Plant Breeders	2323 11th Ave., North Ext., Nampa, ID 83651	(208) 467-2191
Northern Natives Nursery	903 E. Lincoln, Emmett, ID 83617	
Northplan Seed Producers	P.O. Box 9107, Moscow, ID 83843	(208) 882-8040
Northrup-King and Company	Box 124, Twin Falls, ID 83605	
Northrup-King and Company	223 Roedel Ave., Caldwell, ID 83605	(208) 459-0844
Northwest Nursery	P.O. Box 455, Sandpoint, ID 83864	
Northwest Turf and Garden	843 Lilac, Meridian, ID 83642	(208) 888-4467
Pickle Butte Farms	Route 4, Box 344, Caldwell, ID 83605	
Plato Nursery	HRC 60, Box 1, Bonners Ferry, ID 83805	(208) 267-3742

Ponderosa Garden Cntr.& Nurs.	6305 North Black Cat Rd., Meridian, ID 83642	
Providence Nursery	Route 1, Box 588, Sandpoint, ID 83864	
Puffer-Ridge Farms	Baldy Road, P.O. Box 132, Sandpoint, ID 83864	
Purple Sage Farms, Inc.	11741 Bullock Lane, Middleton, ID 83644	(208) 585-6140
Reggear Tree Farm	1525 Loseth Rd, Orofino, ID 83544	(208) 476-5913
Rick's College	Landscape and Horticulture Dept. 500 South Center, Rexburg, ID 83440	
Riteway Industries	Route 1, Box 31-B, Potlatch, ID 83855	
Sterling Nursery	1090 S 2200 W, Sterling, ID 83210	(208) 328-2461
Steve Rogan Co.	32121 Ave., Caldwell, ID 83605	(208) 632-3001
Rogers Bros. Seed Co.	Madison Ave., Nampa, ID 83651	(208) 467-1159
Sand Hollow Nursery	R.R.7, Caldwell, ID 83605	(208) 459-7389
Seeds BLUM		(208) 342-0858
Seed Specialists	10260 N Taryne St, Hayden Lake, ID 83835	(208) 762-8308
Sherwood Forest Nursery	244 N. 2nd East, P.O. Box 781, Rexburg, ID 83440	
Shields of Nampa, Inc.	1618 Avenue South, Nampa, ID 83651	(208) 466-3584
Silver Springs Nursery	HCR 62, Box 86, Moyie Springs, ID 83845	(208) 267-5753
Simplot Soilbuilders	Box 342, Meridian, ID 83642	
Smith Garden Square, Inc.	415 North 22nd Street, Lewiston, ID 83501	
Smith Tree Plantation	Route 1, Box 131-A, Idaho Falls, ID 83401	
Spencer Mountain	P.O. Box 3, Cocalalla, ID 83813	
Stonetree Landscaping	3226 Garrity Blvd., Nampa, ID 83651	
Storey Feed and Seed Co.	503 E. 1st., Meridian, ID 83642	(208) 888-4436
Sunseeds, Inc.	1832 Garrity Blvd., Nampa, ID 83651	(208) 466-4679
The Green Ranch	P.O. Box 2597, Boise, ID 83701	(208) 336-3312
The Hothouse	563 North 3rd Street, Montpelier, ID 83254	
The Rudy-Patrick Company	Box 1130, Nampa, ID 83651	
The Silva Star Co.	R.R. 1, Box 64-A, Potlatch, ID 83855	
Trail Creek Nursery	18 W 700 S, Victor, ID 83455	(208) 787-2470
Twin Butte Evergreens	416 N. Blaine Street, Moscow, ID 83843	
Union Seed Co. Inc.	PO Box 339, Nampa, ID 83651	(208) 466-3568
University of Idaho Nursery	Dept of Forest Resources, UofI, Moscow, ID 83844	(208) 885-6444
Webb Nursery	162 Glendale Rd, Bellevue, ID	(208) 788-2066
Western Premium Seed, Inc.	4696 Overland Rd., Boise, ID 83705	(208) 343-0871
Western Forest Systems	1509 Ripon Ave, Lewiston, ID	(208) 743-0147
Wildlife Habitat Institute	Rt 1, Box 102-A, Princeton, ID 83857	(208) 875-1246
Franz Witte, Lndsc. Contr./Nurs.	9770 W. State St., Boise, ID 83703	
Young's Nursery and Landsc.	Orchard and Ramsey Rds., P.O. Box 570, Hayden Lake, ID	

## Montana:

Adsit Farm and Ranch Service	Decker, MT 59025	(406) 757-2223
AgriBasics Seed Co	1400 Minnesota, Billings, MT 59101	(406) 252-8012
AgriBasics Seed Co	100 S. Broadway, Belgrade, MT 59714	(406) 388-4232
AgriBasics Seed Co	900 16th North, Great Falls, MT 59403	(406) 453-4321
Agrineeds	Box 622, Livingston, MT 59047	(406) 222-0332
A.L. Bruce Seed Company	Townsend, MT 59664	(406) 266-3835
Alpine Nursery	1763 Highway 2 East, Kalispell, MT 59901	
Amsterdam Store	6680 Amsterdam Rd., Manhattan, MT 59741	(406) 282-7223
Badland Nursery	P.O. Box 1615, Havre, MT 59501	
Barber Seed Service, Inc.	HC 76, Box 62, Denton, MT 59430	(406) 567-2211
Beartooth Grain and Feed	Box 1088, Red Lodge, MT 59068	(406) 446-1418
Beebe Grain	712 E. Front, Butte, MT 59701	
Big Sky Wholesale Seeds	P.O. Box 852, Shelby, MT 59474	(406) 434-5011
Billings Nursery	7900 Frontage Rd., Billings, MT 59101	
Bitterroot Nursery	521 East Side Hwy., Hamilton, MT 59828	(406) 961-3806
Bitterroot Restoration	445 Quast Lane, Corvallis, MT 59828	(406) 961-4626
Blake Nursery	Otter Creek Rd., Big Timber, MT 59011	(406) 932-4195
Bridger Tree Farm	8860 Bridger Canyon Rd., Bozeman, MT 59715	(406) 587-3406
Buffalo Bill Nursery	Route 2, Box 66, Plains, MT 59859	
Bud Burta	Rd. 2, #2241, Lewistown, MT 59457	(406) 538-8397
Canyon Creek Nursery	Billings, MT 59101	
Del Carey	Box 1, Volborg, MT 59351	(406) 421-5562
Cashman Nursery	P.O. Box 242, Bozeman, MT 59715	(406) 587-3406
Cenex Seed Co.	P.O. Box 1748, Billings, MT 59103	(406) 656-7150
Cenex/Farmers Union Oil	Box 339, Chinook, MT 59523	
Cenex Seed Plant	Box 956, Miles City, MT 59301	(406) 232-4760
Cenex/Farmers Union Oil	1820 St. Charles, Fort Benton, MT 59422	(800) 497-8295
Cenex/Farmers Union Oil	105 2nd Ave. North, Froid, MT 59226	(406) 766-2339
Cenex/Farmers Union Oil	Box 2483, Great Falls, MT 59403	
Cenex/Farmers Union Oil	1545 Northern Ave., Worden, MT 59058	(406) 967-3100
Cenex/Power Farmers Elev. Co.	Box 215, Power, MT 59468	(406) 463-2281
Cenex Supply and Marketing	4570 N. Reserve, Missoula, MT 59802	(406) 543-8383
Cenex Supply and Marketing	1408 Hwy 93 So., Ronan, MT 59864	(406) 676-2201
Central Feed Co.	220 East Main, Lewistown, MT 59457	(406) 538-5451
Chadwick Landscape Nursery	2101 East Custer Ave., Helena, MT 59601	
Circle S Seeds	Box 130, Three Forks, MT 59752	(406) 285-3269
Clear Creek Herford Ranch	PO Box 595, Chinook, MT	(406) 357-4207
Co-op Supply, Inc.	700 North Montana St., Dillion, MT 59725	(406) 683-2308
Co-op Supply Inc.	Box 36, Valier, MT 59486	(406) 279-3277
Cramer Irrigation and Seed	Box 432, Hysham, MT 59038	(406) 342-5281
CX Ranch, Inc.	341 Rd. 422, Circle, MT 59215	
Chip Dye	HC 50, Box 4, Alzada, MT 59311	(406) 828-4487
Earth and Wood Craftsman, Inc.	3204 Highway 93 South, Stevensville, MT 59870	
Eastern Montana Seeds	HC Box 3050, Forsyth, MT 59327	(406) 356-2374
Eisenman Seed Co.	P.O. Box 129, Fairfield, MT 59436	(406) 467-2521
Farmers Exchange	115 Main St., Stevensville, MT 59870	(800) 240-5441
Forestry Seeds	Lewistown, MT 59457	
Forsyth Seed Co.	Box 185 Forsyth, MT 59327	(406) 356-7627
Four Winds Nursery	5853 E. Shore Rd., Polson, MT 59860	
Gallatin Farmers Co.	114 Northern Pacific, Belgrade, MT 59714	(406) 388-6242
Garden City Seeds	1324 Red Crow Rd., Victor, MT 59875	
Grain Growers Oil Co.	Box 847, Scobey, MT 59263	(406) 487-2741
R.M. Gregor Landscaping	1310 Greene St., Helena, MT 69501	

Harding Land and Cattle Co.	Box 3022, Miles City, MT 59301	(406) 232-2754
Hardy Trees	P.O. Box 9346, Kalispell, MT 59904	
Lloyd A. Harris	3921 Springhill Rd., Bozeman, MT 59715	(406) 587-5696
Harvest States Co-op	Box 66, Valier, MT 59486	(406) 279-3615
Hi-Mountain Farm	Route 1, Box 29, Seligman, MT	
Heartland, Inc.	Belgrade, MT 59714	(406) 388-4232
Heisel Nursery	4463 Springhill Rd., Bozeman, MT 59715	(406) 587-4858
K and K Seed Co.	Route 3, Conrad, MT 59425	
K-W Feed and Grain, Inc.	Box 1389, Big Timber, MT 59011	(406) 932-5132
Lake Milling, Inc.	Box 288, Hamilton, MT 59840	(406) 363-2334
Lawsons Greenhouse	1405 Hillside Dr., Bozeman, MT 59715	(406) 586-5771
Lawyer's Nursery	950 Hwy. 200 West, Plains, MT 59859	(406) 826-3881 (800) 551-9875
Laurel Co-op Assn,	Box 7, Edgar, Mt 59026	(406) 962-3792
Lone Pine Ranch	HC 31, Box 3125, Wolf Point, MT 59201	(406) 525-3390
Mannakee Seed Co.	Box 68, Cascade, MT 59421	
Marchie's Nursery	1845 South Third West, Missoula, MT 59801	
Mo's Greenhouse	185 Swan River Rd., Bigfork, MT 59911	
Montana Bitterroot Gardens	1990 Lower Valley Rd., Kalispell, MT 59901	
Montana Cons. Seedling Nursery	2705 Spurgin Rd, Missoula, MT 59804	(406) 542-4244
Montana Merchandising Co.	Box E, Great Falls, MT 59405	(800) 332-1812
Montana Seeds, Inc.	Route 3, Conrad, MT 59425	(406) 278-5547
Mountain Brooks Nursery	P.O. Box 1114, Eureka, MT 59917	
Mountain Home Nursery	Deborgia, MT 59830	
Hugo Muggli, Inc.	Tongue River Stage, Miles City, MT 59330	(406) 232-5578
Northern Ag Service	HC65, Box 5500, Hwy 2 East	(406) 654-2022
Northland Seed Co.	PO Box 1675, Billings, MT 59101	(406) 252-0568
Northrup-King and Co.	Box 398, Billings, MT 59103	(406) 252-0508
Patrick Seed Farms, Inc.	HC 72, Box 7300, Malta, MT 59538	(406) 654-1958
Ed Peterson	Rt. 1, Box 2908, Troy, MT 59935	
Pioneer Hi-Bred Int'l	Box 400, Wibaux, MT 59353	(406) 654-1958
Powder River Seed Co.	Box 673, Broadus, MT 59317	
Quality Seed Co.	P.O. Box 31, Lewistown, MT 59457	(406) 538-8738
Renn's Blue Spruce Nursery	6305 Highway 2 East, Columbia Falls, MT 59912	
Reynolds Feed and Seed	3460 Buffalo Trail, Molt, MT 59057	(406) 669-3219
Shades of Green Nursery	3403 Cooney Dr., Helena, MT 59601	
Bill Skorupa	Rt. 1, Box 1211, Bridger, MT 59014	(406) 662-3358
Snow Line Tree Co., Inc.	Highway 93 South, Kalispell, MT 59901	
Spanish One	Conrad, MT 59425	(406) 627-2329
State Nursery Company	Helena, MT 59601	
Townsend Seeds, Inc.	P.O. Box 1338, Townsend, MT 59644	(406) 266-4444
Treasure State Seed, Inc.	Box 698, Farifield, MT 59436	(406) 467-2557
Tri-Valley Feed	Rt. 62, Box 3252, Livingston, MT 59047	(406) 222-1132
Two Dog Seed Co.	800 Steel Bridge Rd., Kalispell, MT 59901	(406) 752-3656
Valley Feed	Rt. 62, Box 3252, Livingston, MT 59047	(406) 222-1132
Valley Nursery	Box 4845, Helena, MT 59601	(406) 442-8460
Wanner Nursery	Corvallis, MT 59828	
West Butte Ranch	Box 32, Sweetgrass, MT 59484	(406) 937-2281
West Feeds/Agribasics	1420 Minnesota Ave., Billings, MT 59101	(406) 252-5196
Western Seed and Supply, Inc.	1308 Round Butte Rd, Ronan, MT 59864	(406) 676-4100
Westland Seed, Inc.	Box 57, Charlo, MT 59824	(406) 644-2202
Wild Flower Seeds	16000 Hwy 10A West, Anaconda, MT 59711	
Wildwood Landscaping	P.O. Box 322, Big Sky, MT 59716	

## Oregon:

Balance Restoration Nursery	PO Box 587, Scottsburg, OR 97473	(503) 587-4261
Barber Nursery	23561 Vaughn Rd, Veneta, OR 97487	(503) 935-7701
Belcher Nursery	33755 SE Buff Rd, Boring, OR 97009	(503) 663-3593
Brooks Tree Farm	9785 Portland Rd NE, Salem, OR 97305	(503)393-6300
Callahan Seed	6045 Foley Ln, Central Point, OR 97502	(503) 855-1164
Carlton Plants Co	PO Box 398, Dayton, OR 97114	(503) 868-7971
C.L. Danner Nursery	8102 SE 242nd Ave, Gresham, OR 97030	(503) 667-9843
Daenfeldt Inc	PO Box 947, 1100 Jackson SE, Albany, OR 97321	(503) 928-5868
Douglas Nursery	PO Box 47, Canby, OR 97013	(503) 266-9419
D.L. Phillips Nursery	2424 Wells Rd, Elkton, OR 97436	
Drakes Crossing Nursery	19774 Grade Rd SE, Silverton, OR 97381	(503) 873-4932
Ferris Landscaping	PO Box 258, Newport, OR 97365	(503) 867-4100
Forest Farms Nursery	990 Tetherow Rd, Williams, OR 97544	(503) 846-6963
Four Mile Nursery	27027 S. Hwy 170, Canby, OR 97013	(503) 266-9572
Greenleaf Nursery	9335 SW Greenhill Lane, Tualatin, OR 97062	(503) 692-3483
Harold Miller Landscape/Nurs.	PO Box 379, Hubbard, OR 97032	(503) 651-2835
Huckleberry Lane Nursery	PO Box 316, North Bend, OR 97459	(503) 756-7326
International Seeds Inc	PO Box 168, Halsey, OR 97348	(503) 369-2251
Jacklin Seed Co	1490 Industrial Way SW, Albany, OR 97321	(503) 928-3677
J. Frank Schmidt & Sons	PO Box 189, Boring, OR 97009	(503) 663-4128
Lava Nursery	5301 Culbertson Rd, Box 370, Parkdale, OR 97041	
Lofts Great Western Seed Co	810 Jackson, Box 387, Albany, OR 97321	(503) 928-3100
Lumberman's Inc	Baker City, OR	(541) 523-6551
Mount Jefferson Farms	3394 Brown's Island, Salem, OR 97307	(503) 363-0467
O.K.I. Nursery	23788 NE Airport Rd, Box 115, Aurora, OR 97002	(503) 678-1241
Oregon Garden Products	3150 SE Minter Bridge Rd, Hillsboro, OR 97123	(503) 640-4633
Pendleton Grain Growers	1000 SW Dorian St, Pendleton, OR 97801	(541) 687-8000
Round Butte Seed Growers	Culver, OR	(541) 546-5222
Samuel Rich Nursery	9803 yergan Rd, Aurora, OR 97002	(503) 678-2828
Sevenoaks Native Nursery	3530 NW Roosevelt, Corvallis, OR 97330	(503) 745-5540
Siskiyou Rare Plant Nursery	2825 Cummings Rd, Medford, OR 97501	(503) 772-6846
Teufel Nursery	12345 NW Barns Rd, Portland, OR 97229	(503) 646-1111
Trillium Gardens	PO Box 803, Pleasant Hill, OR 97455	
Turf Seed Inc	PO Box 250, Hubbard, OR 97032	(503) 981-9571
Wave Beachgrass Nursery	PO Box 1190, Florence, OR 97439	(503) 997-2401
Week's nursery	6494 Winsor Island Rd, Salem, OR 97303	(503) 393-8112
Willamette Prairie Seed	434 NW 6th Ave, Portland, OR 97209	(503) 224-0333
Wood's Native Plants	5740 Berry Dr, Parkdale, OR 97041	(503) 352-7497
Woodsman Native Nursery	4385 Hwy 101, Florence, Or 97439	(503) 997-2252

## Utah:

C & S Intermtn. Seed Enter.	Box 74 or Box 62, Ephraim, UT 84627	(801) 283-4383
Coble Seed Co.	P.O. Box 175, Gunnison, UT 84634	(801) 528-3234
Granite Seed	1697 West 2100 North, Lehi, UT 84043	(801) 768-4422
Hillview Water Gardens	1044 East Hillview Dr., Salt Lake City, UT 84124	(801) 261-4912
Charles Inouye	Box 396, Gunnison, UT 84634	
Granite Seed Co	1697 West 2100 North, Lehi, UT 84043	(801) 768-4422
Lone Peak State Nursery	271 W Bitterbrush Lane, Draper, UT 84020	(801) 571-0900
Maple Leaf Industries	480 S. 50 E., Ephraim, UT 84627	(801) 283-4701
Mountain Wildland Seed Co.	Box 3201, Logan, UT 84321	(801) 283-4701
Native Plants Inc	417 Wakara Way, Salt Lake City, UT 84108	(800) 533-8498
Porter Lane Nursery	262 W 400 S, Centerville, UT 84014	(800) 533-8498
Progressive Plants	9180 S. Wasatch Blvd., Sandy, UT 84093	(801) 942-7333
Steve Regan Co.	451 South 400 West, Salt Lake City, UT 84101	

Stevens Bros Wild Ind Sds & Nurs	Box 496, Ephraim, UT 84627	
Stevenson Int. Seed	Box 2, Ephraim, UT 84627	(801) 283-6639
William Roger Steward and Sons	Box 124, Ephraim, UT 84627	
Porter Walton Co.	Box 1919, 522 South Third West, Salt Lake City, UT 84110	

## Washington:

Abundant Life Seed Found.	P.O. Box 772, Port Townsend, WA 98368	(206) 385-5660
Aldrich Berry Farm and Nursery	190 Aldrich Rd, Mossyrock, WA 98564	(206) 983-3138
Arnold Thomas Seed Services	Lowden, WA 99360	(509) 529-4580
Bamboo Gardens of WA	5016 192nd Place NE, Redmond, WA 98053	(206) 868-5166
Barfod's Hardy Ferns	23622 Bothell Way, Bothel, WA 98021	(206) 483-0205
Bear Creek Nursery	PO Box 411, Northport, WA 99157	
B&D Lillies	330 P St, Port Townsend, WA 98368	(206) 385-1738
Briggs Nursery	4407 Henderson Blvd, Olympia, WA 98501	(206) 352-5405
Brown Seed Co	PO Box 1792, Vancouver, WA 98668	(206) 892-4111
Buckley Nursery	16819 92nd St E, Sumner, WA 98390	(206) 863-9564
Burnt Ridge Nursery	432 Burnt Ridge Rd, Onalaska, WA 98570	(206) 985-2873
Central Marketing Inc	517 Northtown Office Bldg, Spokane, WA 99207	(509) 484-4554
Clarke Nursery	Rt 1, Box 168, long Beach, WA 98631	(206) 642-2241
Columbia Basin Nursery	PO Box 458, Quincy, WA 98848	(509) 787-4411
Colvos Creek Farm	1931 2nd Ave, Seattle, WA 98101	(206) 441-1509
Coulee Co-op	310-W. Main, Coulee City, WA 99115	(509) 632-5292
Davenport Seed Corp	PO Box 187, Davenport, WA 99122	(509) 725-1235
Dewilid Wholesale Nursery	6930 Old Guide Meridian Rd, Lynden, WA 98264	(206) 398-1960
Fancy Fronds	1911 4th Ave. West, Seattle, WA 98119	(206) 284-5332
Firstline Seeds	11703 Rd 1 SE, Moses Lake, WA 98837	(509) 765-1772
Five Corners Nursery	15826 First Ave S, Seattle, WA 98148	(206) 242-2931
Frosty Hollow Nursery	PO Box 53, Langley, WA 98260	(206) 221-2332
Full Circle	3132 Rd "O" NE, Moses Lake, WA 98837	(509) 765-5617
Furney's Nursery	21215 Pacific Hwy S, Des Moines, WA 98198	(206) 878-0673
Gibson's Nursery	S. 1401 Pines Rd, Spokane, WA 99206	(509) 928-0973
Golden West Services	524 S. 7th, Sunnyside, WA 98944	(509) 839-4700
Grassland West	PO Box 489, Clarkston, WA 99403	(509) 758-9100
Hart's Nursery	1578 Best Rd, Mt Veron, WA 98273	(206) 466-3821
Hillview Gardens	5405 W. Metaline Ave, Kennewick, WA	(509) 783-2695
Inland Native Plants	PO Box 30292, Spokane, WA 99223	
Jacklin Seed Co	PO Box 181, Ritzville, WA 99169	(509) 659-1065
Kent Nursery	15310 176th St East, Orting, WA 98360	(206) 893-5721
Kinder Garden Nursery	1137 S. Hwy 17, Othello, WA 99344	(509) 488-5017
Krause Nursery	S. 205 Pines, Box 14130, Spokane, WA 99215	(509) 926-1572
Lamb Nursery	East 101 Sharp Ave, Spokane, WA 99202	(509) 328-7956
L&H Seeds	4756 W Hwy 260, Connell, WA 99326	(509) 234-4433
LMF Feeds Inc	N 39124 Sherman Rd, Deer Park, WA 99006	(509) 276-6018
McLean Seed Co.	PO Box 815, Coulee City, WA 99115	(509) 632-8709
Moses Lake Cons. Dist. Nursery	1775 SE Hwy 17, Moses Lake, WA 98837	(509) 765-5333
Natives NW Co	190 Aldrich Rd, Mossyrock, WA 98564	(206) 983-3138
Nelson Landscaping Service	N 10801 Newport Hwy, Spokane, WA 99218	(509) 466-6050
Newell Wholesale Nursery	PO Box 372, Ethel, WA 98542	(206) 985-2460
Pacific Wetland Nursery	7035 Crawford Dr, Kingston, WA 98346	(206) 297-7575
Pendleton Grain growers	Pasco, WA	(509) 786-7469
Plants of the Wild	PO Box 866, Tekoa, WA 99033	(509) 284-2848
Rainer Seed Co	PO Box 1549, Port Orchard, WA 98366	(360) 769-8113
Rex Bulb Farm	PO Box 774, Port Townsend, WA 98368	(206) 385-4280
Rosso Wholesale Nursery	PO Box 80345, Seattle, WA 98108	(206) 763-1888

Silvaseed Co	PO Box 118, Roy, WA 98580	(206) 843-2246
Storm Lake Growers	21809 89th SE, Snohomish, WA 98290	(206) 794-4842
Teufel Nursery	666 134th St SW, Everett, WA 98204	(206) 743-4444
Vibert Nursery	15025 124th Ave NE, Woodinville, WA 98072	(206) 488-1155
Viewcrest Nurseries	12713 NE 184th St, Battle Ground, WA 98604	(206) 687-5167
Walla Walla Grain Growers	North 2nd St, Walla Walla, WA 99362	(509) 529-3253
Watershed Garden Works	PO Box 8636, Port Orchard, WA 98366	(206) 857-2785
Webster State Nursery	Dept of Natural Resources, Olympia, WA 98504	(206) 753-5307
Wetlands Northwest	8414 280th St E, Graham, WA 98338	(206) 846-2774
Weyerhaeuser Co Nursery	WWC-2F2, Tacoma, WA 98477	(206) 924-2547
Wildlands Inc	1941 Saint St, Richland, WA 99352	(509) 375-4177
Wolfkill Feed & Fertilizer	11763 Rd 1 SE, Moses Lake, WA 98837	(509) 765-7252

### Wyoming:

Dean Anderson	2527 Hwy. 215, Pine Bluffs, WY 82082	
Carroll Riggs Seed Co.	Rt 1, Box 402, Riverton, WY 82501	(307) 856-3004
Clouds Seed Co.	P.O. Box 937, Sheridan, WY 82801	
Etheridge Seed Farms	2028 Lane 11, Powell, WY 82435	(307) 754-2366
Faxon Farms	598 Rd. 11, Powell, WY 82435	
Parko Farms	Star Route, Box 162A, Powell, WY 82435	(307) 754-3080
Riggs Seed Co., Inc.	Shoshoni, WY 82649	(307) 856-2278
Spiering Farms	1170 Road 19, Powell, WY 82435	(307) 754-4349
Wind River Seed Co.	3075 Lane 51 1/2, Manderson, WY 82432	(307) 568-3361
Yoder Grain and Lumber Co.	Torrington, WY 82240	

## APPENDIX E:

### References

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