

***OREGON & WASHINGTON
GUIDE FOR CONSERVATION
SEEDINGS AND PLANTINGS***

USDA – NRCS
PORTLAND, OREGON
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INTRODUCTION

HOW TO USE THIS GUIDE FOR CONSERVATION SEEDING & PLANTINGS

This guide is divided into two major sections: east of the Cascade Mountains and west of the Cascade Mountains with supporting appendices. Determine the Major Land Resource Area (MLRA) that is to be seeded/planted by referring to the MLRA map.

MLRA are geographically associated land types that have been developed for the nation and are characterized by a particular pattern of soils, climate, water resources, and land uses. MLRA's have been given symbols for easy identification.

The MLRA's for Washington and Oregon are as follows:

- A1 --Northern Pacific Coast Range Foothills and Valleys
- A2 --Willamette & Puget Sound
- A3 --Olympic Mountains & West Slope Cascade Mountains
- A5 --Siskiyou - Trinity Area
- B6 --East Slope, Cascade Mountains
- B7 --Columbia Basin
- B8 --Columbia Plateau
- B9 --Palouse & Nez Perce Prairie
- B10 --Upper Snake River
- B11 --Snake River Plains
- D21 --Klamath - Shasta Valleys and Basins
- D23 --Malheur High Plateau
- D24 --Humboldt Area
- D25 --Owyhee High Plateau
- E43 --Northern Rocky Mountains, Okanogan Highlands & Blue Mountains
- E44 --Mountain Valleys & Low Terraces

To determine the effective precipitation zone of the site, it may be helpful to refer to the Mean Annual Precipitation map. Familiarity with the site conditions, such as slope, exposure, and soil depth is necessary. For example: with 13 inches precipitation, a north-facing slope may be capable of producing plants as if it were receiving 15 inches. A south-facing slope in the same area may perform as if it were receiving ten inches of precipitation. Other factors, such as clayey subsoils, gravelly substrata, restricting layers, and timeliness of moisture during the growing season can change the effective precipitation from what is indicated solely by the precipitation that falls on the land.

Growing environments also may differ within sites. Seep areas, shallow soils, deep soils, droughty soils, etc., all may be present in the area to be planted (sites for forage seedings generally should be uniform). Seed mixtures and planting should accommodate these differences.

After determining the approximate local rainfall, turn to the appropriate section covering Eastern Washington and Oregon or Eastern Washington and Oregon and find the type of seeding to be made, i.e., forage, erosion control, wildlife, etc.

Do not confuse purposes of conservation seeding/planting. Example: Forage seedings are for that intended purpose. For ecological site restoration, consult other references for additional information.

Seeding mixture alternatives are generally given for each use within a precipitation zone. The mixtures are designated A, B, C. The species and minimum seeding rates in pounds of pure live seed per acre for a mixture are determined by reading down the column beneath each letter.

Note: Not all possible seeding/planting mixtures are provided in the Guide. Consideration of other plant species or use of a single species may be justified for some conservation practices. All seeding recommendations are the drilled rate, broadcast rates are double drilled rate.

Seeding rates are given in pounds of pure live seed (PLS) per acre. PLS Seeding Rate is determined by multiplying the percent purity times the percent germination of the seed.

$$\text{Bulk Seeding Rate} \times \% \text{ purity (in decimal)} \times \% \text{ germination (in decimal)} = \text{PLS Seeding Rate}$$

The purity and germination percentages are obtained from the tag that comes on each bag or container of seed.

ESTABLISHING AND MANAGING A SEEDING

General Guidelines

1. Select species and varieties on the basis of the location and condition of the site, the soil characteristics, precipitation, and the intended purpose of the seeding or planting. Many federal programs are requiring the use of native plants in conservation seedings and plantings.
2. Prepare a weed-free seedbed.
3. Inoculate legume seeds with proper inoculants.
4. Seed and plant at proper time and rate.
5. Seed at the proper depth and cover the seed adequately. Generally, one-quarter to three-quarters inch for grasses and legumes; one to two inches for small grains.
6. Protect from damage such as grazing, trampling, and traffic during establishment.
7. Fertilization of seedings is not recommended on areas where competitive species are likely to respond to the detriment of the seeded species. Do not fertilize when establishing a diversity of forbs, legumes, and grasses, or native grasses. Do not fertilize seedings on rangeland, wetland, CRP, permanent pastures, and riparian sites.
8. Fertilize only when the subsoil is exposed. An example is erosion control seeding or planting on a highly disturbed site (Critical Area Planting). Any fertilization is based upon nutrient status of the soil; obtain a soil test when in doubt.
9. Good management of the seeding is essential to successful establishment of the plants. Fertilization in subsequent years may be necessary.
10. Control weedy plant competition as needed.

Successful Legume Inoculation

Use inoculates specifically labeled for the legume you are treating. Use only fresh, age-dated inoculate purchased from dealers who store their supplies in cool, dark places to minimize deterioration. Best storage conditions are provided by refrigerators with temperatures just above freezing.

Dampen the legume seed using as little liquid as possible. Approximately one pint of liquid per 100 pounds of seed is required. Milk or soda pop can be used as adhesives. Mix the seed and liquid thoroughly until every seed is moist but not wet enough to cause the seeds to stick together. Add the inoculant and mix thoroughly until every seed has come into contact with the inoculant. When seeding under conditions that are not ideal, increase the inoculant rate. Avoid exposing the seed to sunlight, severe drying conditions, or high temperatures. If seed is not

planted within 24 hours, repeat inoculation step because previous treatment may have been destroyed by desiccation. Plant seeds into a well-prepared, firm seedbed immediately after inoculation.

Considerations for Stabilization Seedings

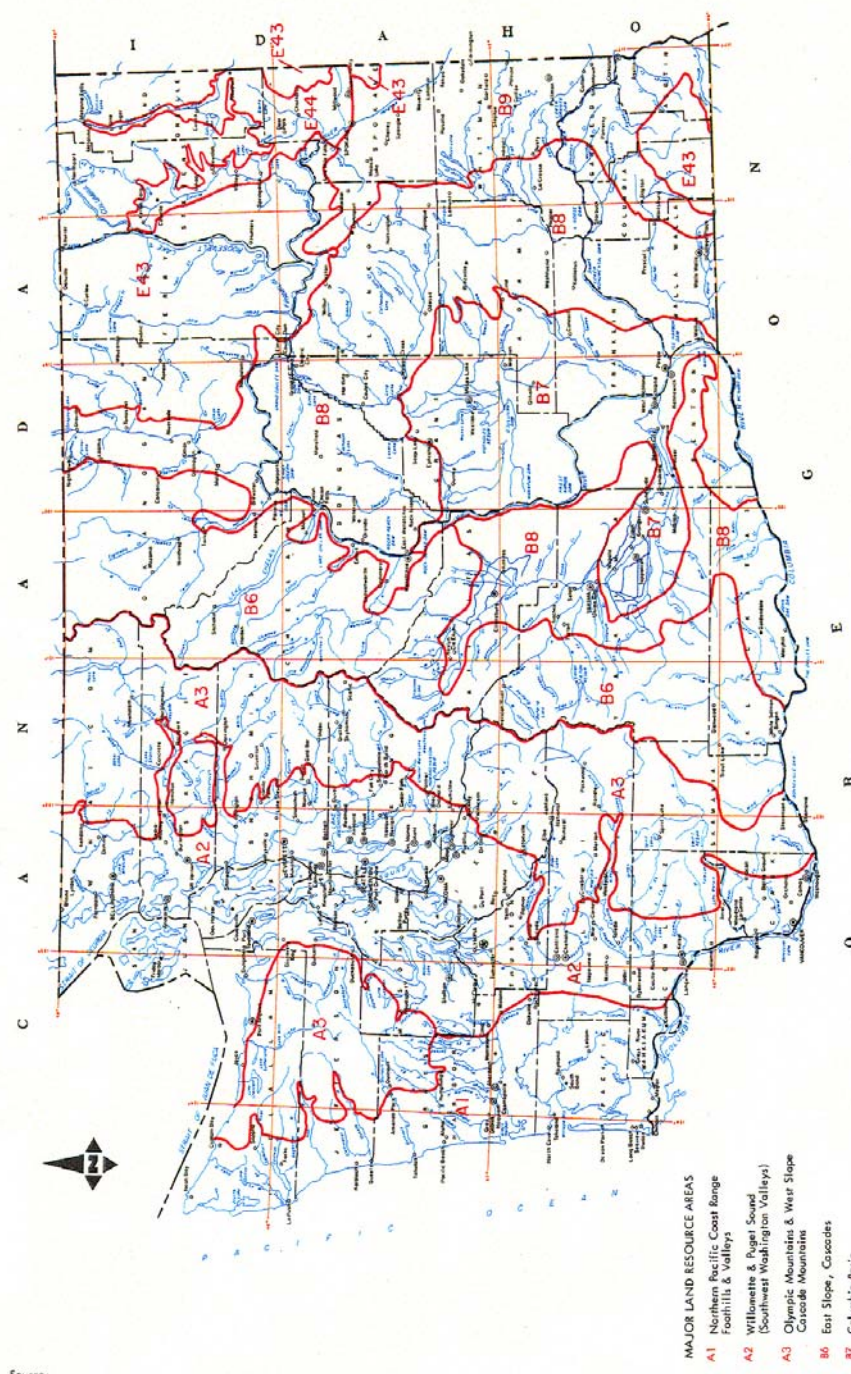
Subsoil exposed during construction of roads, bridges, urban and rural development, usually offer harsh conditions for establishing stands of grass and legumes. Drilling is normally not possible, thus surface seeding is a necessity. Such stands may be irregular in plant distribution and may lack the vigor of grassland seedings. However, significant reduction in sediment yields often begins with stands having as low as 35-40 percent ground cover. The following are some special considerations:

1. Leave the exposed soil in roughened condition rather than bladed smooth.
2. Broadcast onto fresh seedbed. Rescarify old, settled seed beds.
3. Early autumn seedings are usually needed to obtain maximum winter erosion control.
4. Select a mixture of species to cover the full range of soil moisture and soil quality conditions.
5. Since exposed subsoils are normally low in nutrients, a balanced fertilizer (such as 20:20:20) is usually needed to start and maintain the seeding.
6. Use a heavier-than-normal rate of seed to allow for higher plant mortality on infertile soils.
7. Include fast-developing species in the mix to give quick ground cover.
8. Use straw, wood-fiber mulch, or other mulching materials to increase erosion control and aid in germination. Avoid straw containing weed seeds or unwanted crop seeds.
9. Refertilize when necessary in subsequent years to maintain vigor of cover.
10. Include a long-lived legume to provide nitrogen as well as green vegetation during the summer.

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MAPS



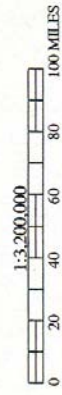
Source:
Base Map prepared by SCS, Portland Carto Unit from USGS 1:1,000,000 National Atlas.
Thematic detail compiled by Washington State Staff.
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
USDA-SCS NATIONAL CARTOGRAPHIC CENTER, FT. WORTH, TX. 1967

- MAJOR LAND RESOURCE AREAS**
- A1** Northern Pacific Coast Range
Foothills & Valleys
 - A2** Willamette & Puget Sound
(Southwest Washington Valleys)
 - A3** Olympic Mountains & West Slope
Cascade Mountains
 - B6** East Slope, Cascades
 - B7** Columbia Basin
 - B8** Columbia Plateau
 - B9** Palouse & Nez Perce Prairie,
(Annual Cropping)
 - E43** Northern Rocky Mountains,
Olympic Highlands & Blue Mountains
 - E44** Mountain Valleys & Low Terraces
(Mostly Cultivated)

A3 Major Land Resource Area Boundary
Major Land Resource Area Symbol

MAJOR LAND RESOURCE AREAS
WASHINGTON
FEBRUARY 1977
SCALE 1:5,000,000

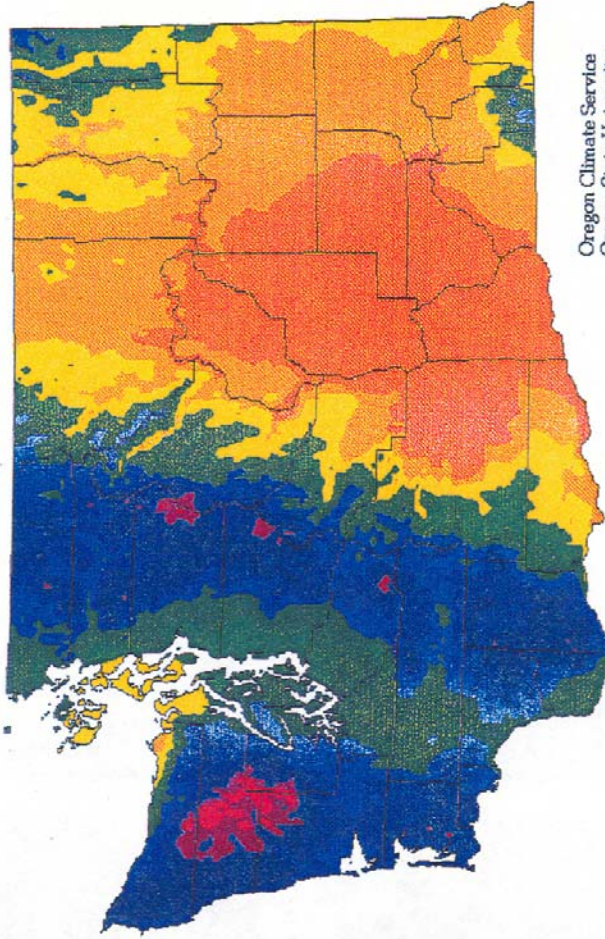
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Source: MLRAs were derived from 1997 Common Resource Areas. This map is for general planning purposes only. It was produced at MO-1, Portland, Oregon, Lambert Conic Conformal Projection.

Average Annual Precipitation

Washington



Oregon Climate Service
Oregon State University

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisberg and Nathaniel DeYoung. Funding was provided by USDA-NRCS National Water and Climate Center.

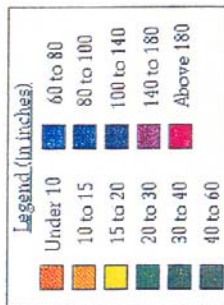
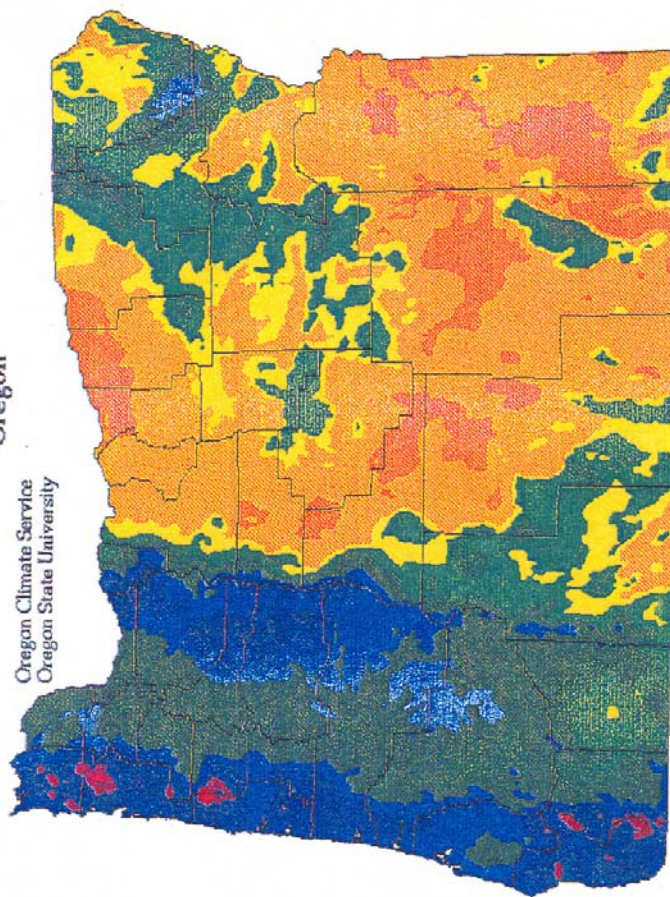


Period: 1961-1990

Average Annual Precipitation

Oregon

Oregon Climate Service
Oregon State University



Period: 1961-1990

This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisberg and Nathaniel DeYoung. Funding was provided by USDA-NRCS National Water and Climate Center.

12/7/97

SEEDING AND PLANTING
RECOMMENDATIONS

FOR

EASTERN WASHINGTON AND
EASTERN OREGON

MLRA'S: B6, B7, B8, B9, B10, B11, E43, E44
(See Major Land Resource Areas Map)

I. SEEDING MIXTURES - RANGELAND REVEGETATION

Effective precipitation 9 to 12 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u> [*]	<u>D</u> [^]
thickspike wheatgrass (N)	2	2	2	1
bluebunch wheatgrass (N)	3	2		2
big bluegrass or Sandberg bluegrass (N)	1	1.5	1	2
indian ricegrass (N)			2	
basin wildrye (N)				1
crested wheatgrass (I)	2			
Siberian wheatgrass (I)			2	
alfalfa (I)	2		2	
yellow sweetclover (I)		2		
(native lupine or milkvetch may be substituted for a legume)				
<u>Seeds/sq ft/mixture</u>	<u>55</u>	<u>55</u>	<u>58</u>	<u>55</u>

* sandy or sandy loam soils

^ four native grass species mixture

N) native plant, also may use any native plant listed in the NRCS ecological site description

(I) Introduced, non-native plant

indian ricegrass is seeded at 4-6 inch depth

II. LIVESTOCK FORAGE PRODUCTION

A. Rangeland and Pastureland

1. Effective precipitation less than 9 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
crested wheatgrass (I)		3		
Siberian wheatgrass (sandy loam) (I)	3		3	
big bluegrass or Sandberg bluegrass (N)		2	2	2
bluebunch wheatgrass (N)				3
thickspike wheatgrass (N) (sandy loam)	2			

(Use wide row spacings 12-18 inches and deep furrow drill.)

2. Effective precipitation 9-12 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>						
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
crested wheatgrass (I)	5						
Siberian wheatgrass (I)		4					
beardless wheatgrass (N)			5		3		
big bluegrass (N)				3			1
sheep fescue (I)						2	
bluebunch wheatgrass (N)				1		3	
alfalfa (I)	1	1	1	1			1
thickspike wheatgrass (N)		1					3
<u>seeds/sq ft/mixture</u>	<u>27</u>	<u>30</u>	<u>31</u>	<u>71</u>	<u>30</u>	<u>37</u>	<u>36</u>

3. Effective precipitation 12-15 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>						
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
big bluegrass (N) <u>1</u> /	2		1				
thickspike wheatgrass (N)		4	1				0.5
beardless wheatgrass (N)				4		2	
pubescent wheatgrass (I)			4		7		
intermediate wheatgrass (I)						7	
alfalfa (I) <u>2</u> /	1	2	2	2	2	2	2
sheep fescue (I) <u>3</u> /		1		1			
bluebunch wheatgrass (N)	3				2		5
<u>seeds/sq ft/mixture</u>	<u>56</u>	<u>38</u>	<u>42</u>	<u>36</u>	<u>30</u>	<u>30</u>	<u>35</u>

1/ Earliest spring forage

2/ Add alfalfa at 1-2 lbs/ac for grazing and 3-4 lbs/ac for hay.

3/ Add sheep fescue at 2 lbs/ac for weed and erosion control. Canby bluegrass (N) may be substitute/alternative for sheep fescue.

4. Effective precipitation 15-18 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>						
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
big bluegrass (N) <u>1/</u>	2						
thickspike wheatgrass (N)		6					
beardless wheatgrass (N)			7				
tall wheatgrass (I)				10 ^{2/}		8	
intermediate wheatgrass (I)					7		
alfalfa (I)	2	2	2		4	4	2
bluebunch wheatgrass (N)	3						
Idaho fescue (N)							6
<u>seeds/sq ft/mixture</u>	<u>61</u>	<u>31</u>	<u>31</u>	<u>18</u>	<u>36</u>	<u>35</u>	<u>70</u>

1/ Early spring forage

2/ Sodic soil tolerance, pure stands only

5. Effective precipitation over 18 inches, sites best suited for summer-early fall grazing use or hay.

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>					
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
intermediate wheatgrass (I)	7					
tall fescue (I)		7				
orchardgrass (late season type) (I)			4			
mountain brome (N)				7		
slender wheatgrass (N)						6
tall wheatgrass (I) <u>1/</u>					10	
alfalfa (I) <u>2/</u>	2	2	2	2		2
<u>seeds/sq ft/mixture</u>	<u>26</u>	<u>45</u>	<u>58</u>	<u>24</u>	<u>18</u>	<u>32</u>

1/ Tolerates sodic soils, use in pure stands only

2/ Hay only, or substitute white clover at 1 lb/ac for grazing, or substitute birdsfoot trefoil at 3-4 lbs/ac.

B. Dryland Hay

Effective precipitation less than 12 inches is insufficient to economically produce perennial grass hay.

All seeding alternatives in A3, 4, and 5 may be considered for dryland hay seeding.

- C. Grazable Woodland** - Seeded after logging, post-fire rehabilitation, or other site disturbance. Double seeding rate if broadcast. USE NATIVE SPECIES, PLANT DIVERSITY, WHEREVER POSSIBLE. NOTE: IN MOST CASES, PUBLIC LANDS ARE REQUIRING THE USE OF NATIVE SPECIES.

1. Effective precipitation 15-18 inches (pine-grassland)

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>				
	<u>A</u> ^{1/}	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
slender wheatgrass (N)		6		3	5
intermediate wheatgrass (I)	6				
big bluegrass (N)	1				1
alfalfa (I)	2				
hard fescue (I)		1			
orchardgrass (I)			4		
white dutch clover (I) or native clovers)		1	1	1	
Idaho fescue (N)				2	2
<u>seeds/sq ft/mixture</u>	<u>45</u>	<u>52</u>	<u>66</u>	<u>49</u>	

^{1/} Do not plant mixture in over 15% woodland canopy

2. Effective precipitation 18-25 inches (pine-fir-pinegrass)

<u>Common Name</u>	<u>Mixture (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
slender wheatgrass (N)	4	2		4
mountain brome (N)	3			3
orchardgrass (I)			2	
timothy (I)				
hard fescue (I)			1	
red clover, (I) or native clover (N)	1	1	1	
blue wildrye (N)		6		
<u>seeds/sq ft/mixture</u>	<u>39</u>	<u>43</u>	<u>60</u>	

3. Effective precipitation over 25 inches (mixed fir/true fir forest)

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
orchardgrass (I)	2		
native bentgrasses (N)			1
hard fescue (I)	1	1	
white clover (or native clover)	1	1	1
blue wildrye (N)		6	6
timothy (I)			
<u>seeds/sq ft/mixture</u>	<u>55</u>	<u>49</u>	<u>61</u>

D. Irrigated Pasture

1. Early Season Irrigation Only

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Regar meadow brome (I)			
Garrison creeping foxtail (I)			
intermediate wheatgrass (I)	8		
tall fescue or timothy (I)		6	
tall wheatgrass (I) ^{1/}			10
alfalfa (I)	2		
ladino clover (I)		2	
seeds/sq ft/mixture	<u>28</u>	<u>42</u>	<u>18</u>

^{1/} Tolerates sodic soil, use in pure stands only

2. Adequate irrigation, good drainage, neutral soils.

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
orchardgrass (I)	4		
tall fescue (I)		6	
smooth brome (I) or meadow brome (I)			8
ladino clover, alfalfa, or birdsfoot trefoil (I)	2	2	2
timothy (I)			
seeds/sq ft/mixture	<u>60</u>	<u>42</u>	<u>36</u>

3. Alkali soils, poor drainage. USE NATIVES AS FIRST CHOICE, THESE SITES MAY INVOLVE DELINEATED WETLANDS.

<u>Common Name</u>	<u>Single sp. Rate (lbs/ac)</u>
beardless wildrye (N)	10
tall fescue (I)	8
tall wheatgrass (I) ^{1/}	10
strawberry clover (I) ^{2/}	2
alsike clover (I)	3
cereal barley (annual) (I)	20
slender wheatgrass (N)	7

^{1/} Most alkaline tolerant, use in pure stands

^{2/} Most alkaline tolerant legume. Substitute alfalfa at 2-3 lbs/ac for clover or trefoil for slightly alkaline soils.

E. Irrigated Hay

1. No soil or water limitations

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
alfalfa (I)		8	8	8
orchardgrass (I)		6		
meadow brome (I)			10	
tall fescue (I)				8
timothy (I)	4			

2. Short water, no soil limitation

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
alfalfa (I)	4	4	2	4
intermediate wheatgrass (I)	7			
big bluegrass (N)		3		
tall wheatgrass (I)			10	
pubescent wheatgrass (I)				7
<u>seeds/sq ft/mixture</u>	<u>36</u>	<u>80</u>	<u>28</u>	<u>34</u>

F. Wetlands and Riparian Sites - USE NATIVE PLANTS (refer to Wetland/Riparian plant list in Appendix)

G. Effluent Disposal Sites

Species to consider

sedges (N)
bulrush (N)
cattails (N)
tall wheatgrass (I) or tall fescue (I)
native willows (N)
black cottonwood (N)
red-osier dogwood (N)
hybrid cottonwood (I), sudangrass (I), or corn (I)

III. EROSION CONTROL

(Refer to Considerations for Stabilization Seedings).

A. Stabilization of roadways and other disturbed areas. Consideration should be given to the traffic hazard to wildlife when/if selecting food species for roadside stabilization.

1. Effective precipitation less than 12 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
crested or Siberian wheatgrass* (I)	7		
bluebunch wheatgrass (N)		7	
indian ricegrass (sandy soil) (N)	2		
thickspike wheatgrass (N)			8
sheep fescue (I)		1	1
big bluegrass (N)	1	1	
(needle-and-thread grass) (N)			
<u>seeds/sq ft/mixture</u>	<u>63</u>	<u>56</u>	<u>64</u>

* Siberian wheatgrass is best suited to droughty, coarse-textured soils.

Erosion Control - critical area seedings (drilled seeding rates given, double if broadcast or hydro seeded).

2. Effective precipitation 12-15 inches

Do not use crested or Siberian wheatgrass on sites that receive > 12 inches mean annual ppt.

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
blue or beardless wheatgrass (N)		8	
pubescent wheatgrass (I)			7
indian ricegrass (N) ^{1/}	2		
sheep fescue (I)		1	2
big bluegrass (N)	1	1	
thickspike wheatgrass (N)	7		2
basin wildrye (N)		1	
<u>seeds/sq ft/mixture</u>	<u>53</u>	<u>63</u>	<u>49</u>

^{1/} Sandy or sandy loam soils

3. Effective precipitation 15-18 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>	
	<u>A</u>	<u>B</u>
blue or beardless wheatgrass (N)	8	
pubescent wheatgrass (I)		8
intermediate wheatgrass (I)		
thickspike wheatgrass (N)		
hard fescue (I) or sheep fescue (I)	2	2
big bluegrass (N)	1	1
Idaho fescue (N)		
native legume (N)	2	2
<u>seeds/sq ft/mixture</u>	<u>70</u>	<u>72</u>

4. Effective precipitation 18-24 inches

<u>Common Name</u>	<u>Mixtures (single spp. Seeding rate/lb/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
slender wheatgrass (N)	7		
blue wildrye (N)		8	
mountain brome (N)	2		8
Idaho fescue (N)			
hard fescue (I)	1	2	2
white dutch clover/red clover (I)			2
native lupines (N)		2	
northern sweetvetch. (N)			
native clover spp.(N)	2		
milkvetch sp. (N)			
<u>Seeds/sq ft/mixture</u>	<u>64</u>	<u>62</u>	<u>76</u>

5. Effective precipitation greater than 24 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>	
	<u>A</u>	<u>B</u>
annual ryegrass (I)		
hard fescue (I)		2
blue wildrye (N)	6	
red fescue (I)	1	
mountain brome (N)	2	4
slender wheatgrass (N)		4
white clover (I)	2	
native legume (N)		2
<u>seeds/sq ft/mixture</u>	<u>72</u>	<u>61</u>

B. Stabilization of grassed waterways (seeding rates may be doubled for critical area plantings)

1. Effective precipitation less than 15 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
pubescent wheatgrass (I)		10	
streambank wheatgrass (N)			7
thickspike wheatgrass (N)	7		
sheep fescue (I)		2	2
big bluegrass (N)	2		
<u>seeds/sq ft/mixture</u>	<u>66</u>	<u>48</u>	<u>56</u>

2. Effective precipitation 15-18 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
tall wheatgrass (I)	10		
pubescent wheatgrass (I)		10	
streambank wheatgrass (N)			
intermediate wheatgrass (I)			
hard fescue (I) or sheep fescue (I)	2	2	2
thickspike wheatgrass (N)			8
<u>seeds/sq ft/mixture</u>	<u>46</u>	<u>48</u>	<u>57</u>

3. Effective precipitation above 18 inches

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>		
	<u>A</u>		<u>C</u>
intermediate wheatgrass (I)	10		
mountain brome (N)		10	
annual or perennial ryegrass (I)	4		
hard fescue (I)		2	
tall wheatgrass (I)			10
<u>seeds/sq ft/mixture</u>	<u>40</u>	<u>46</u>	<u>38</u>

C. Stabilization of sand

<u>Alternatives</u>	<u>lbs/ac</u>	<u>Remarks</u>
1. mammoth wildrye (I)	40,000 culms/ac	18 inch spacing, 2 culms per hill
2. thickspike wheatgrass (N) and indian ricegrass (N)	10	seed mixture in fall, plant indian ricegrass 4-6 inches deep in a separate operation
3. winter wheat (I)	80	irrigate to establish

D. Stabilization of construction sites (temporary cover)

Single species

	<u>A</u>	<u>B</u>
winter or spring wheat (I)	80	
spring barley (I)		80

E. Orchard and other cover crops

1. Annually seeded cover

Single species

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
triticale (I)	50				
winter wheat (I)		50			
hairy vetch (I)			30		
turnips (I)					80
Peas (I)					50

2. Perennial cover (irrigated or over 18 inches precipitation)

Common Name

Mixtures (lbs/ac) (seeds/ft²)

	<u>A</u>	<u>B</u>	<u>C</u>
birdsfoot trefoil or red clover (I)	2	2	
orchardgrass (I)	4	4	
red fescue/hard fescue (I)	2		3
sheep fescue (I) ^{1/}		2	
perennial ryegrass (I)			5
<u>seeds/sq ft/mixture</u>	<u>83</u>	<u>86</u>	<u>63</u>

^{1/} Use in drip irrigated orchards or under 18 inches precipitation.

F. Green manure crop (irrigated or over 18 inches precipitation)

Single species rate (lbs/ac)

winter wheat (I)	80
hairy vetch (I)	30
Austrian winter pea (I)	80
slender wheatgrass (N)	20
mountain brome (N)	20
yellow sweetclover (I)	

G. Windbreaks (for additional shrubs and trees, refer to Appendix or NRCS Windbreak Handbook)

<u>Dense shrubs</u>	<u>Single row</u>	<u>Spacing</u>	<u>Multiple row</u>
mountain spirea (EP 25) (N)	2 ft		3 ft
caragana (EP 12) (I) ^{2/}			
lilac (EP 15) (I)			
red-osier dogwood (EP 25) (N)			
mockorange (EP 15) (N)			
chokecherry (EP 16) (N)			

<u>Medium deciduous trees</u>	<u>Single row</u>	<u>Spacing</u>	<u>Multiple row</u>
Douglas hawthorn (EP 15) (I or N)	6 ft		9 ft
serviceberry (EP 15) (N)			
native willows (EP 25) (N)			

<u>Tall deciduous trees</u>	<u>Single row</u>	<u>Spacing</u>	<u>Multiple row</u>
black cottonwood (EP 25) (N)	8 ft ^{1/}		12 ft ^{1/}

^{1/} Use 4-5 ft for cottonwoods in single row, and 5-6 ft for multiple row

^{2/} EP = the lowest effective precipitation that the species can tolerate for satisfactory survival and growth

<u>Tall evergreens</u>	<u>Single row</u>	<u>Spacing</u>	<u>Multiple row</u>
Ponderosa pine (EP 15) (N)	8 ft		12 ft
Scotch pine (EP 15) (I)			
Douglas fir (EP 18) (N)			

<u>Medium evergreens</u>	<u>Single row</u>	<u>Spacing</u>	<u>Multiple row</u>
blue spruce (EP 18) (I)	6 ft		9 ft
Austrian pine (EP 18) (I)			
Rocky Mountain juniper (EP 10) (N)			

H. Streambank stabilization (refer to Riparian plants list in Appendix)

Grasses and legumes

Select appropriate herbaceous seed mixture from IIA (pages)

<u>Shrubs</u>	<u>Plants/ac (1,000s)</u>	<u>Remarks</u>
coyote willow or other native sandbar willow (N)	10-20	hardwood cuttings

Shrubs for diversity (optional) (partial list)

snowberry	seedling/transplant
red-osier dogwood	seedling/transplant
blue elderberry	seedling/transplant
hawthorn	seedling/transplant
oceanspray	seedling/transplant
serviceberry	seedling/transplant
ninebark, mallow	seedling/transplant
Nootka rose, Woods rose	seedling/transplant
mockorange	seedling/transplant
chokecherry	seedling/transplant
Rocky Mountain maple	seedling/transplant
Select grass-legume mixture, one fast growing shrub, and one or more (optional) shrubs for diversity.	

I. Lake drawdown zone stabilization (refer to wetland and riparian plants list in Appendix)

<u>Species (example)</u>	<u>Plants/ac (1,000s)</u>	<u>Inundation tolerance ^{1/}</u>
native sedges	40	50 ft

^{1/} Vertical depth at which vigorous plants are found when inundated three months during summer.

J. Farm airports, camp, and picnic grounds

Mixtures (lbs/ac) ^{1/} ^{2/}

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
crested wheatgrass (EP 8-12)(I)	10	10		
hard fescue (I)		10	10	
sheep fescue (I)	10			
creeping red fescue (I)				10
streambank wheatgrass (N)		15		
white clover (I)				2
red clover (EP 18) (I)			6	

^{1/} Mixtures A-D listed in order of increasing effective precipitation adaptation.

^{2/} Use low growing plants for farm airports

K. Ski-slope and subalpine area stabilization

<u>Common Name</u>	<u>Mixtures (lbs/ac)</u>	
	<u>A</u>	<u>B</u>
blue wildrye (N)		
Idaho fescue (N)	10	
pubescent wheatgrass (I)		8
red fescue (I)		
sheep fescue (I)	2	2
hard fescue (I)		5
white clover (I)		2
bentgrasses (I)		
lupine (N)	2	

IV. WILDLIFE HABITAT – Eastside (Washington/Oregon Guide for Conservation Seedings and Plantings, USDA NRCS, Revised 12/99)

Wildlife enhancement plantings in Oregon and Washington State

Nearly all of the current Federal conservation programs are emphasizing restoring natural plant communities using native plants and enhancing wildlife habitat. These plant communities are designed considering the natural landscape mosaic of the native plants (trees, shrubs, forbs and grasses). The intent of these plantings is primarily for wildlife habitat, not to maximize tree/wood production or livestock forage. There is no requirement for plants in wildlife plantings to be placed in orderly, uniform-spaced rows or blocks.

In most cases, the natural plant community will consist of randomly spaced clumps or groupings of shrubs and/or trees with the surrounding areas seeded to herbaceous plants (grasses, sedges, and forbs). A clump of shrubs shall consist of at least seven plants. A clump of trees shall consist of at least three plants. Trees and shrubs may be mixed within clumps and/or in adjacent clumps. Areas of native grasses and wildflowers will be planted between the woody clumps as necessary to provide acceptable wildlife habitat. Depending on the local site conditions, wildlife enhancement plants will have 33 – 50 percent of the total area covered by trees and shrubs. Plants per acre will need to be figured according to different plant types in the planting design.

See the effective precipitation section for the rainfall requirements of conservation plants and select plants to suit the ecological site and wildlife species.

Spacing between plants in clump plantings:

- Small shrubs (<9 feet at maturity) 3 feet apart (at 33% coverage, 1,600 plants/acre)
- Medium – tall shrubs (9-15 feet) 4 feet apart (at 33% coverage, 900 plants/acre)
- Small trees (<40 feet) 8 feet apart (at 33% coverage, 680 plants/acre)
- Medium – tall trees (>40 feet) 10 feet apart (at 33% coverage, 150 plants/acre)

A. Upland Wildlife – Eastside 1

1. Plants for Wildlife Cover

<u>Species</u>	<u>Single Species Seeding PLS</u> <u>lbs/ac</u>	(seeds/sq. ft.)
tall wheatgrass (I)	10	20
basin wildrye (N)	7	27
Idaho fescue (N)	6	84
bluebunch wheatgrass (N)	7	22
blue wildrye (N)	8	24
orchardgrass (I)	6	72
hairy vetch (I)	30	12
white clover (I)	2	36

		<u>Spacing of plants</u>
western clematis (N)	Seedlings/transplants	3 ft
big sagebrush (N)	Seedlings/transplants	3 ft
bitterbrush (N)	Seedlings/transplants	3 ft
common snowberry (N)	Seedlings/transplants	3 ft
caragana (I)	Seedlings/transplants	4 ft

western chokecherry (N)	Seedlings/transplants	4 ft
mockorange (N)	Seedlings/transplants	4 ft
serviceberry (N)	Seedlings/transplants	4 ft
oceanspray (N)	Seedlings/transplants	4 ft
Rocky Mountain juniper (N)	Seedlings/transplants	8 ft
Ponderosa pine (N)	Seedlings/transplants	10 ft
Douglas fir (N)	Seedlings/transplants	10 ft
western larch (N)	Seedlings/transplants	10 ft
lodgepole pine (N)	Seedlings/transplants	10 ft
Austrian pine or Scotch pine (I)	Seedlings/transplants	8 ft
blue spruce (I)	Seedlings/transplants	10 ft
mountain willow (S. scouleriana)(N) unrooted or rooted cuttings or poles		4 ft

2. Wildlife Upland Food, eastside – seeds and fruit

<u>Species</u>	<u>Single Species Seeding (lbs/ac)</u>
wheat or barley (I)	60
corn (I)	15
millet, grain or sudangrass (I)	20
basin wildrye (N)	7
indian ricegrass (N)	5
alfalfa (I)	8
blue flax (I)	6
hairy vetch (I)	30
common vetch (I)	30
buckwheat (I)	35
sunflower, annual	12
forbs/legumes (native species such as western yarrow)	Varies with species

	<u>Spacing</u>
black hawthorn (N)	Seedlings/transplants 4 ft
blue elderberry (N)	Seedlings/transplants 8 ft
serviceberry (N)	Seedlings/transplants 4 ft
western chokecherry (N)	Seedlings/transplants 4 ft
Woods' rose (N)	Seedlings/transplants 3 ft
Highbush cranberry (N)	Seedlings/transplants 4 ft
common snowberry (N)	Seedlings/transplants 4 ft
western mountain-ash (N)	Seedlings/transplants 4 ft
kinnikinnik (N)	Seedlings/transplants 3 ft

3. Wildlife Upland Forage – green leaves (herbage)

<u>Species</u>	Single Species Seeding (lbs/ac)
alfalfa (I)	8
red clover (I)	4
Ladino or Alsike clover (I)	2
yellow sweetclover (I)	2
small burnet (I)	12
forb/legumes (native species)	Varies

B. Wetland Wildlife – Eastside 1)

1. **Plants for Wildlife Cover** (Riparian/Wetland Plants sections of the Guide, Examples of native trees and shrubs: black cottonwood, red-osier dogwood, and native willows)

2. **Wetland Wildlife Food** - seeds

<u>Species</u>	Single Species Seeding (lbs/ac)
American sloughgrass (N)	20
mannagrass (Glyceria sp.) (N)	Varies with species
sedges and bulrushes (N)	Varies with species
tufted hairgrass (N)	3

If native plants are not available use acceptable introduced plants such as:

corn (I)	15
wheat or barley (I)	60
smartweed (Nor I)	Varies with species
millet, grain (I)	20

3. **Wetland Wildlife Food** – green leaves

Native wetland plants such as wapato, skunk cabbage, duckweed or pondweed or introduced plants such as:

- wheat or barley (I)
- orchardgrass (I)
- Ladino or Alsike clover (I)
- perennial or annual ryegrass (I)

1) Select plant species to suit the needs of ecological site and wildlife species. Information on many plant species may be found in the Descriptions of Conservation Plants section. Listings of riparian/wetland plants are in the Riparian and Wetland Plants sections of this Guide. For additional information on appropriate plants for wildlife habitat enhancement check the ecological site descriptions for native herbaceous plants. Consult other technical references or plant specialists for appropriate plants for wildlife habitat enhancement. (N) native plant species introduced plant species.

V. SPECIAL CONSIDERATIONS

<u>SPECIES</u>	<u>SOILS</u>	<u>SEED REQUIREMENT</u>	<u>ACTIONS</u>
indian ryegrass	sand-sandy loam	seed 2 + inches deep	separate seeding
needle-and-threadgrass	sandy loam	remove awns	
bluebunch wheatgrass	silt loam	remove awns	

(For Riparian Buffer/see list of native plants in Appendices)

SEEDING AND PLANTING
RECOMMENDATIONS

FOR

WESTERN WASHINGTON AND
WESTERN OREGON

MLRA'S: A1, A2, A3, and A5
(See Major Land Resource Areas Map)

RECOMMENDED CONSERVATION SPECIES AND PURE LIVE SEED SEEDING RATES

I. LIVESTOCK FORAGE PRODUCTION

A. Long-term Pasture

1. Effective precipitation below 40 inches

Spring -late autumn grazing single sp/mixtures (lbs/ac) (PLS seeds/ft2)

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
perennial ryegrass (I)	6		
tall fescue (I)			8
orchardgrass (I)		6	
tall wheatgrass (I)			
subclover (SW Oregon)(I)	4		
white clover (I)		2	2
<u>seeds/sq ft/mixture</u>	<u>40</u>	<u>93</u>	

Summer and Winter Grazing (lbs/ac) (PLS seeds/ft2)

<u>Common Name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
tall fescue (I)	8	
tall wheatgrass (I)		10
subclover (I)	2	2
<u>seeds/sq ft/mixture</u>	<u>50</u>	<u>28</u>

2. Effective precipitation 40-60 inches

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
orchardgrass (I)	8		
tall fescue (I)		10	
perennial ryegrass (I)			10
subclover (SW Oregon)(I)			4
ladino clover(I)	2		
alsike clover (clay loam)(I)		2	
<u>seeds/sq ft/mixture</u>	<u>101</u>	<u>82</u>	<u>62</u>

Winter grazing single sp/mixtures (lbs/ac) Do not graze when soil is wet/saturated.

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
tall fescue (I)	10	
perennial ryegrass (I)		10
birdsfoot trefoil (I)	2	2
<u>seeds/sq ft/mixture</u>	<u>74</u>	<u>75</u>

3. Effective precipitation above 60 inches

Spring -late autumn grazing mixtures (lbs/ac) (PLS seeds/ft2)

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
perennial ryegrass (I)	10	
orchardgrass (I)		8
ladino clover (I)	2	2
<u>seeds/sq ft/mixture</u>	<u>69</u>	<u>109</u>

Summer grazing mixtures (lbs/ac)

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
orchardgrass (I)	8	
tall fescue (I)		10
ladino clover (I)	2	2
<u>seeds/sq ft/mixture</u>	<u>104</u>	<u>68</u>

Winter grazing mixtures (lbs/ac)

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
perennial ryegrass (I)	10		10
tall fescue (I)		10	
subclover (SW Oregon)(I)	4	4	
red clover (I)			4
<u>seeds/sq ft/mixture</u>	<u>63</u>	<u>61</u>	<u>70</u>

4. Irrigated

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
perennial ryegrass (I)	10		
orchardgrass (I)		8	
tall fescue (I)			8
ladino clover (I)	2	2	
birdsfoot trefoil (I)			2
<u>seeds/sq ft/mixture</u>	<u>69</u>	<u>109</u>	<u>74</u>

B. Short Rotation Pasture

Effective precipitation above 40 inches or irrigated

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
tetraploid or perennial ryegrass (I)	20	20
red clover (I)	4	
ladino clover (I)		2
<u>seeds/sq ft/mixture</u>	<u>130</u>	<u>123</u>

C. Annual Pasture

1. Effective precipitation 40-60 inches or irrigated

Seed one species in pure stand or mixture (lbs/ac)

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
winter cereal grain (I)	50	
annual ryegrass (I)		20
red clover (I)	6	6
<u>seeds/sq ft/mixture</u>	<u>50</u>	<u>122</u>

2. Coastal fog belt

Seed in pure stand or mixture (lbs/ac)

<u>Common name</u>	<u>Mixture</u>
	<u>A</u>
annual ryegrass (I)	20
red clover (I)	6
<u>seeds/sq ft/mixture</u>	<u>122</u>

D. Hay and Silage

1. Effective precipitation 40-60 inches

Perennial mixtures (lbs/ac) (seeds/ft²)

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
perennial ryegrass (I)	2	
tall fescue (I)		6
orchardgrass (I)	6	
timothy (I)		1
birdsfoot trefoil (I)		2
red clover (I)	4	
<u>seeds/sq ft/mixture</u>	<u>107</u>	<u>82</u>

Annual species for hay and silage, (lbs/ac)

<u>Common name</u>	<u>Single sp.</u>	<u>seeds/ft²</u>
oats (I)	40	16
common vetch (I)	30	6
hairy vetch (I)	15	6

2. Coastal fog belt effective precipitation above 60 inches

Mixtures (lbs/ac)

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
orchardgrass (I)	6		8
perennial ryegrass (I)	2	8	
timothy (I)		2	
ladino clover (I)	2		
birdsfoot trefoil (I)			2
<u>seed/sq ft/mixture</u>	<u>98</u>	<u>73</u>	<u>118</u>

3. Irrigated

Perennial mixtures (lbs/ac)

<u>Common name</u>	<u>Mixtures</u>	
	<u>A</u>	<u>B</u>
timothy (I)	3	
orchardgrass (I)		8
birdsfoot trefoil (I)	2	2
<u>seed/sq ft/mixture</u>	<u>112</u>	<u>118</u>

Annual seeding in pure stand (lbs/ac) (PLS seeds/ft²)

<u>Common name</u>	<u>lbs/ac</u>	<u>PLS seeds/ ft²</u>
tetraploid ryegrass	20	100

II. WETLANDS AND RIPARIAN SITES - Native plants should be planted/seeded if site is a “wetland” or riparian site. Plant diversity may be important. Check list in the Appendix and consult with native plant specialists.

Note: Certain introduced herbaceous plants are invasive species in wetlands and riparian sites. These invasive plants include birdsfoot trefoil, tall fescue, orchardgrass, some clovers, perennial ryegrass, timothy, reed canary grass and meadow foxtail. Check the Appendix for invasive species

III. EFFLUENT DISPOSAL SITES (CONSTRUCTED WETLANDS)

(See Appendix or consult plant specialist)

Species for consideration

sedges (N)
bulrush (N)
cattails (N)
tall fescue (I)
tall wheatgrass (I)
perennial ryegrass (I)
orchardgrass (I)
willows & black cottonwood (N)

IV. EROSION CONTROL

(Refer to Introduction-Considerations for Stabilization Seedings) (Critical area plantings: double seeding rates)

A. Interim Protective Cover on Cutter Forest/Burned Forest

1. Effective precipitation 20-40 inches

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
annual ryegrass (I)	4		
red fescue (I)	2	2	2
white clover (I)	2		
pine lupine (N)		2	2
blue wildrye (N)		4	
slender wheatgrass (I)			
mountain brome (N)			6
<u>seed/sq ft/mixture</u>	<u>80</u>	<u>48</u>	<u>49</u>

2. Effective precipitation above 40 inches

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
mountain brome (N)	6		
annual ryegrass (I)		4	4
red fescue (I)	2	2	3
white clover (I)		2	
red clover (I)	2		2
pine lupine (or other native lupine, wildflowers, etc.)			
<u>seed/sq ft/mixture</u>	<u>56</u>	<u>81</u>	<u>72</u>

B. Stabilization of Roadways and Other Disturbed Areas, all effective precipitation zones.

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
annual or perennial ryegrass (I)	4	4	
blue wildrye (N)		4	4
bentgrass (I or N)	1/2		
white clover (I)	1	1	2
sheep fescue (40" ppt. or less) (I)	2		
pine lupine (N)		2	
hard fescue (above 40" ppt.) (I)			3
<u>seed/sq ft/mixture</u>	<u>160</u>	<u>40</u>	<u>82</u>

C. Stabilization of Sand Dunes, Deflation Plains, and Sandy Dredge Spoils. Native legumes, wildflowers, and grasses should be included in plantings.

1. Vegetative plantings for initial stabilization of sand dunes and dredge spoils.
2. Seedings for initial stabilization of sandy dredge spoils and secondary stabilization of sand dunes and deflation plains. Consider use of native plants such as American dunegrass (*legmus mollis*).

<u>Common names</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
perennial ryegrass (I)	4		4
barley (I)		15	15
red fescue (I)	3	3	
bentgrass (optional) (I)			
white clover (I)	1		2
hairy vetch (I)			
barley (N)		4	2
pine lupine (N)	2		
<u>seed/sq ft/mixture</u>	<u>87</u>	<u>55</u>	<u>72</u>

(shore pine/coast willow
optional woody plantings on
6 ft spacing)

D. Stabilization of Medium and Fine-Textured Dredge Spoils

<u>Common name</u>	<u>Mixtures</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
perennial ryegrass (I)	4	4	
tall fescue (dwarf vars) (I)	2		
red fescue (I)			4
bentgrass (optional) (I)			
pine lupine (N)	2	2	2
white dutch clover (I)	2	2	
red clover (I)			2
<u>seed/sq ft/mixture</u>	<u>75</u>	<u>63</u>	<u>25</u>

E. Stabilization of Waterways

1. Effective precipitation less than 40 inches

<u>Common name</u>	<u>Single sp. rate (lbs/ac)</u>	<u>PLS seeds/ft²</u>
blue wildrye (N)	10	32
annual or perennial ryegrass (I)	10	44
hard fescue (I)	6	78

2. Effective precipitation above 40 inches

<u>Common name</u>	<u>Single sp. rate (lbs/ac)</u>	<u>PLS seeds/ft²</u>
annual or perennial ryegrass (I)	10	44
bentgrass (I or N)	2	250
tufted hairgrass (N)	3	90

F. Stabilization of Construction Sites (temporary cover)

<u>Common name</u>	<u>Single sp. rate (lbs/ac)</u>	<u>PLS seed/ft²</u>
annual ryegrass (I)	15	66
cereal grains (I)	50	15
blue wildrye (N)	10	32

G. Orchard and Other Cover Crops

1. Not Irrigated

<u>Common name</u>	<u>Single sp. rate (lbs/ac)</u>	<u>PLS seeds/ft²</u>	<u>Mixtures</u>		
			<u>A</u>	<u>B</u>	<u>C</u>
hard fescue (I)	6	78	6		
red fescue (I)	6	84		6	
chewings fescue (I)	6	84			6
white dutch clover (I)	4	72	2	2	2

2. Irrigated Orchard Cover Crop

<u>Common name</u>	<u>Single sp. rate</u>	<u>PLS seeds/ft²</u>	<u>Mixtures</u>			
			<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
orchardgrass (I)	8	96	4	4	2	
hard fescue (I)	6	78		2		2
chewings fescue (I)	6	84	2			
tall fescue (dwarf turf type) (I)	10	52			6	
white clover (I)	2	36	2			2
ladino clover (I)	2	36		2	2	
perennial ryegrass (I)	7	36				3

H. Cover and Green Manure Crops

<u>Common name</u>	<u>Single sp. rate (lbs/ac)</u>	<u>PLS seeds/ft²</u>
field peas (I)		
annual ryegrass (I)	15	66
cereal grains (I)	50	15
hairy vetch (I)	15	6
pine lupine (N)	20	10
subclover (I)		

I. Streambank Stabilization

1. Grasses and legumes

Select appropriate native herbaceous seed mixture.

2. Fast growing shrub (select one or more)

	<u>Plants/ac (1,000s)</u>	<u>Remarks</u>
black cottonwood		All willows and black cottonwood can be grown from hardwood cuttings
Pacific willow (N)	10-20	
Sitka willow (N)	10-20	
Hooker willow (coastal areas) (N)	10-20	
Arroyo willow (N)		

erect willow (N)
 Scouler's willow (N)
 Columbia River willow

3. Shrubs for diversity at spacing of 3-4 feet (optional)

snowberry, common (N)	seedling transplants
Red-osier dogwood (N)	seedling transplants
hawthorn, Douglas (N)	seedling transplants
serviceberry, Pacific (N)	seedling transplants
blue elderberry (N)	seedling transplants
oceanspray (N)	seedling transplants
vine maple (N)	seedling transplants
evergreen huckleberry (N)	seedling transplants
ninebark, Pacific (N)	seedling transplants
mockorange (N)	seedling transplants
Douglas spirea (N)	seedling transplants

Select grass-legume mixture, one fast growing shrub, and one or more (optional) shrubs for diversity.

J. Lake and Pond Shorelines

<u>Alternatives</u> (partial list)	<u>Seed rate</u> <u>PLS lbs/ac</u>	<u>Plants/ac</u> (1,000s)	<u>Inundation tolerance</u> ^{1/}
slough sedge (N)		20	10 ft
Columbia sedge (N)		20	50 ft
Pacific willow (N)		4	50 ft
native sedges (N)		20	
tufted hairgrass (N)	3		

1/ Vertical depth at which vigorous plants are found when inundated three months during summer west of Cascades.

K. Windbreaks (Consult reference "Trees Against the Wind" for details on planting arrangements.)

<u>Medium evergreen trees</u>	Spacing	
	<u>Single-row</u>	<u>Multiple-row</u>
arborvitae (I)	6 feet	9 feet
mugo pine (I)		
shore pine (N)		
<u>Tall evergreen trees</u>	Spacing	
	<u>Single-row</u>	<u>Multiple-row</u>
Douglas fir (N)	8 feet	12 feet
grand fir (N)		
incense cedar (N)		
western redcedar (N)		
western hemlock (N)		
Ponderosa pine (N)		

Sitka spruce (N)

Tall deciduous trees

	Spacing	
	<u>Single-row</u>	<u>Multiple-row</u>
red alder (N)		
black cottonwood (N)	6 feet	8 feet
Oregon ash (N)		
Oregon white oak (N)		

L. Farms, airports, and recreation areas

<u>Common name</u>	<u>Single sp. rate</u>	<u>PLS seeds/ft²</u>	<u>Mixtures (lbs/ac)</u>		
			<u>A</u>	<u>B</u>	<u>C</u>
blue wildrye (N)	20	64			
chewings or hard fescue (I)	10	130			
red fescue (I)	10	130			
tall fescue (dwarf turf) (I)	12	62			
bentgrass (I or N)	2	250			
red clover (I)	4	26			
white dutch clover (I)	2	36			
sheep fescue (I)	8	120			
native legumes (if applicable) (N)					

1/ Use low-growing plants for farm airports

M. Ski-slope stabilization

<u>Common name</u>	<u>Mixtures (lbs/ac)</u>	<u>PLS seeds/ft²</u>
western fescue or greenleaf fescue (N)	10	80
sheep fescue (I)/Idaho fescue (N)	8	120
annual or perennial ryegrass (I)	5	22
bentgrass (optional) (I or N)	1	125
white dutch clover (I)	2	36
native lupines (optional) (N)	10	5
blue wildrye (N) (option in place of ryegrass)	10	32

1/ Use mulch if seed is not drilled.

V. WILDLIFE HABITAT – Westside (Washington/Oregon Guide for Conservation Seedings and Plantings, USDA NRCS, Revised 12/99)

Wildlife enhancement plantings in Oregon/Washington State

Nearly all of the current Federal conservation programs are emphasizing restoring natural plant communities using native plants and enhancing wildlife habitat. These plant communities are designed considering the natural landscape mosaic of the native plants (trees, shrubs, forbs and grasses). The intent of these plantings is primarily for wildlife habitat, not to maximize tree/wood production or livestock forage. There is no requirement for plants in wildlife plantings to be placed in orderly, uniform-spaced rows or blocks.

In most cases, the natural plant community will consist of randomly spaced clumps or groupings of shrubs and/or trees with the surrounding areas seeded to herbaceous plants (grasses, sedges, and forbs). A clump of shrubs shall consist of at least seven plants. A clump of trees shall consist of at least three plants. Trees and shrubs may be mixed within clumps and/or in adjacent clumps. Areas of native grasses and wildflowers will be planted between the woody clumps as necessary to provide acceptable wildlife habitat. Depending on the local site conditions, wildlife enhancement plantings will have 33-50 percent of the total area covered by trees and shrubs. Plants per acre will need to be figured according to different plant types in the planting design.

See the effective precipitation section for the rainfall requirements of conservation plants and select plants to suit the ecological site and wildlife species.

Spacing between plants in clump plantings:

- Small shrubs (<9 feet at maturity) 3 feet apart (at 33% coverage, 1,600 plants/acre)
- Medium – tall shrubs (9-15 feet) 4 feet apart (at 33% coverage, 900 plants/acre)
- Small trees (<49 feet) 8 feet apart (at 33% coverage, 680 plants/acre)
- Medium – tall trees (>40 feet) 10 feet apart (at 33% coverage, 150 plants/acre)

A. Upland Wildlife – Westside 1)

1. Plants for Wildlife Cover

<u>Species</u>	<u>Single Species Seeding (lbs/ac)</u>	<u>PLS seeds/sq ft</u>
red fescue (I or N)	6	84
Roemer's fescue (N)	6	80
blue wildrye (N)	8	24
orchardgrass (I)	6	72
hairy vetch or common vetch (I)	30	12
white clover (I)	2	36
<u>Average spacing between plants</u>		
salmonberry (N)	Seedlings/transplants	3 ft
Pacific ninebark (N)	Seedlings/transplants	3 ft
oceanspray (N)	Seedlings/transplants	4 ft
common snowberry (N)	Seedlings/transplants	3 ft
black twinberry (N)	Seedlings/transplants	4 ft
mockorange	Seedlings/transplants	4 ft
osoberry (N)	Seedlings/transplants	4 ft

western serviceberry (N)	Seedlings/transplants	4 ft
Pacific madrone (N)	Seedlings/transplants	8 ft
Oregon white oak (N)	Seedlings/transplants	10 ft
mountain or western hemlock (N)	Seedlings/transplants	10 ft
Douglas fir (N)	Seedlings/transplants	10 ft
Sitka spruce (N)	Seedlings/transplants	10 ft
shore pine (N)	Seedlings/transplants	8 ft
Scotch pine (I)	Seedlings/transplants	8 ft
western redcedar (I)	Seedlings/transplants	10 ft
mountain willow (<i>S. scouleriana</i>) (N)	Unrooted or rooted cuttings or poles	4 ft

2. Wildlife Upland Food, westside - seeds and fruit

<u>Species</u>	<u>Single Species Seeding</u> (lbs/ac)
cereal grain (I)	60
corn (I)	15
millet, grain or sudangrass (I)	20
alfalfa (I)	8
white clover (I)	2
hairy vetch	30
common vetch (I)	30
buckwheat (I)	35
sunflower, annual	12
forbs/legumes (native species)	Varies with species
black hawthorn (N)	Seedlings/transplants 4 ft
blue or red elderberry (N)	Seedlings/transplants 8 ft
Pacific crabapple (N)	Seedlings/transplants 8 ft
western hazelnut (N)	Seedlings/transplants 4 ft
western serviceberry (N)	Seedlings/transplants 4 ft
western chokecherry (N)	Seedlings/transplants 4 ft
Oregon viburnum (N)	Seedlings/transplants 4 ft
Woods' rose (N)	Seedlings/transplants 3 ft

4. Wildlife Upland Forage--green leaves (Herbage)

<u>Species</u>	<u>Single Species Seeding</u> lbs/ac
alfalfa (I)	8
red clover (I)	4
Ladino or Alsike clover (I)	2
small burnet (I)	12
blue wildrye (N)	10
forb/legumes (native species)	Varies

B. Wetland Wildlife – Westside 1)

1. **Plants for Wildlife Cover** (see **Riparian/Wetland Plants sections of Guide**, examples of native trees and shrubs: black cottonwood, Oregon ash, western redcedar, native willows)
2. **Wildlife Food - seeds**

<u>Species</u>	<u>Single Species Seeding (lbs/ac)</u>
American sloughgrass (N)	20
mannagrass (Glyceria sp) (N)	Varies with species
sedges and bulrushes (N)	Varies with species
tufted hairgrass (N)	3
If native plants are not available use acceptable introduced plants such as:	
cereal grains (I)	60
corn (I)	15
smartweed (N or I)	Varies with species
millet, grain (I)	20

3. **Wildlife Food-green leaves**

Native wetland plants such as wapato, skunk cabbage, pondweed, or duckweed or introduced plants such as:

cereal grains (I)
orchardgrass (I)
Ladino or Alsike clover (I)
perennial or annual ryegrass (I)

1) Select plant species to suit the needs of ecological site and wildlife species. Information on many plant species may be found in the Descriptions of Conservation Plants section. Listings of riparian/wetland plants are in the Riparian and Wetland Plants sections of this Guide. For additional information on appropriate plants for wildlife habitat enhancement, check the ecological site descriptions for native herbaceous plants, consult other technical references or plant specialists for (N) native plant species. (I) introduced plant species.

ADDENDUM: NRCS Oregon Guide for Conservation Seedings & Plantings

SOUTHWESTERN OREGON CONSERVATION SEEDING and PLANTING (seed amounts are for the drilled rate, lbs./ac.; broadcast seeding is double the drilled rate)

December, 1999

Forage plantings - Pastures

	(a)	(b)	(c)	(d)
tall fescue (<i>Festuca arundinacea</i>)(I)	10			
orchardgrass (<i>Dactylis glomerata</i>)(I)		8		
perennial ryegrass (<i>Lolium perenne</i>)(I)			10	
intermediate wheatgrass (<i>Elytrigia intermedia</i>)(I)				10
ladino clover or N.Z. white clover (I)	2	2	2	
(<i>Trifolium repens</i>)				
alfalfa (<i>Medicago sativa</i>) (I)	<u>10</u>	<u>12</u>	<u>12</u>	<u>2</u>
<u>Pounds per acre</u>				<u>12</u>

Forage plantings - Hayland

	(a)	(b)	(c)	(d)	(e)
tall fescue (I)	3				
orchardgrass (I)		4			4
tetraploid ryegrass (<i>L. perenne</i>)(I)			6		
timothy (<i>Phleum pratense</i>)(I)				6	
alfalfa (<i>Medicago sativa</i>)(I)	6	6			6
birdsfoot trefoil (<i>Lotus corniculatus</i>)(I)				4	
subclover (<i>Trifolium subterranean</i>) (non			5		
Irrigated, well-drained soil)(I)					
<u>Pounds per acre</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>10</u>	<u>10</u>

Forage plantings - Irrigated land

	(a)	(b)	(c)	(d)
tall fescue (I)	10			
orchardgrass (I)		8		
timothy (I)			6	
perennial ryegrass (I)				10
alfalfa (I)		5		5
birdsfoot trefoil (I)	4		4	
<u>Pounds per acre</u>	<u>14</u>	<u>13</u>	<u>10</u>	<u>15</u>

Erosion Control, Critical Area Plantings - road banks, ditches, canals

perennial ryegrass (turf-type) (<i>Lolium perenne</i>)(I)	3 lbs/ac
red fescue (<i>Festuca rubra</i>)(I)	8 lbs/ac
white or red clover (<i>Trifolium repens</i>) (I)	<u>2 lbs/ac</u>
	13 pounds per acre

Erosion Control - short duration cover

blue wildrye (<i>Elymus glaucus</i>)(N)	10 lbs/ac
sterile wheatgrass (I)	5 lbs/ac
annual ryegrass (<i>Lolium multiflorum</i>)(I)	<u>3 lbs/ac</u>
	18 pounds per acre

(I) A plant introduced to Southwestern Oregon since European settlement and not considered an invasive plant when used for the intended purpose.

(N) A plant native to Southwestern Oregon.

Use native plants/seed when available and for appropriate conservation uses. Native species will be used as the first choice when restoring natural areas, riparian/wetland sites, and wildlife habitat. Species/cultivar substitutions may be made upon approval of state technical specialist.

See other sections of the Washington and Oregon Conservation Seedings and Plantings Guide for information on wildlife enhancement planting and riparian/wetland planting recommendations.

California oatgrass (*Danthonia californica*) and balloon milkvetch (*Astragalus whitneyi*) are examples of plants that are endemic to serpentine soil common in the Siskiyou area. Check with the local technical specialists for information on other species adapted to serpentine.

Additional conservation trees and shrubs (native species) for Southwestern Oregon plantings include: chinquapin (*Castanopsis chrysophylla*), Klamath plum (*Prunus subcordata*), pinemat manzanita (*Arctostaphylos nevadensis*), California black oak (*Quercus kelloggii*), Jeffrey pine (*Pinus jeffreyi*), redwood (*Sequoia sempervirens*), sugar pine (*Pinus lambertiana*), Port Orford cedar (*Chamaecyparis lawsoniana*) and incense-cedar (*Calocedrus decurran*s).

SCOTT LAMBERT, USDA NRCS, Washington State University, Pullman, WA
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12/99

CONSERVATION DESCRIPTIONS

FOR

GRASSES, WILDFLOWERS,
LEGUMES, TREES, AND SHRUBS

INDEX

CONSERVATION GRASSES

Bentgrass

Bluegrass

- Big Bluegrass
- Bog Bluegrass
- Canada Bluegrass
- Canby/Sandberg Bluegrass
- Cusick's Bluegrass
- Kentucky Bluegrass
- Upland Bluegrass

Bromegrass

- Meadow Brome
- Mountain Brome
- Smooth Brome
- Prairie Grass

Fescue Grass

- Creeping Red Fescue
- Hard Fescue
- Idaho Fescue
- Sheep Fescue
- Tall Fescue
- Western Fescue

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- Tufted Hairgrass

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- Prairie Junegrass

Mannagrass

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- Lemmon's Needlegrass
- Needle and Thread Grass
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- Indian Ricegrass

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- Annual Ryegrass
- Hybrid Ryegrass
- Perennial Ryegrass

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- Bottlebrush Squirreltail

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- Bluebunch Wheatgrass
- Crested Wheatgrass

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Pubescent Wheatgrass
RS1/RS2 Wheatgrass
Rush Wheatgrass
Siberian Wheatgrass
Slender Wheatgrass
Streambank Wheatgrass
Tall wheatgrass
Thickspike wheatgrass
Western Wheatgrass

Wildrye

Altai Wildrye
Basin Wildrye
Beardless Wildrye
Blue Wildrye
Mammoth Wildrye
Russian Wildrye

CONSERVATION WILDFLOWERS AND LEGUMES

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Balsamroot

Arrowleaf Balsamroot

Black-eyed Susan

Blanketflower

Burnet

Small Burnet

Clovers

Crownvetch

Flax

Lewis Flax

Flatpea

Perennial Peavine Platpea

Globemallow

Salmon Globemallow

Lupine

Medics/Alfalfa

Medic/Alfalfa

Milkvetch

Cicer Milkvetch

Peas

Field Peas

Penstemon

Blue Mountain Penstemon
Rydberg's Penstemon
Eaton's Penstemon
Whipple's Penstemon

Sainfoin

Trefoil

Birdsfoot Trefoil

Vetch

Yarrow

Western Yarrow

PARTIAL LIST OF CONSERVATION TREES & SHRUBS FOR OREGON AND WASHINGTON

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Sitka Alder

Ash

Green Ash
Oregon Ash
European Mountain-Ash
Sitka Mountain-Ash
Western Mountain-Ash

Barberry

Oregon Grape Barberry

Birch

Water Birch

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Currant

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Pacific Dogwood
Western Red-Osier Dogwood

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Hackberry

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Hemlock

Western Hemlock

Honeylocust**Honeysuckle**

Blueleaf Honeysuckle

Twinberry Honeysuckle

Hopsage

Spiny Hopsage

Huckleberry

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Rocky Mountain Juniper

Kinnikinnik**Kochia**

Forage Kochia

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Bigtooth Maple

Douglas' Maple

Vine Maple

Mockorange**Mountain Mahogany****Ninebark****Oak**

Oregon White Oak

Oceanspray**Pine**

Austrian Pine

Mugo Pine

Ponderosa Pine

Scotch Pine

Western White Pine

Plum

American Plum

Rose

Woods Rose

Sagebrush

Big Sagebrush

Sagewort

Fringed Sagewort

Louisiana Sagewort

Saltbush

Fourwing Saltbush

Nuttall's Saltbush

Serviceberry

Western Serviceberry

Cusick's Serviceberry

Snowberry

Common Snowberry

Spirea

Douglas Spirea

Spruce

Blue Spruce
Norway Spruce
White Spruce

Sumac

Skunkbush Sumac
Smooth Sumac

Thuja

Northern Whitecedar
Western Redcedar

Willow

Arroyo Willow
Bebb's Willow
Columbia River Willow
Coyote Willow
Drummond Willow
Erect Willow
Geyer's Willow
Golden Willow
Hooker Willow/Coast Willow
Laurel Willow
Lemmon's Willow
Mackenzie Willow
Pacific Willow
Purple-Osier Willow
Scouler's Willow/mountain Willow
Sitka Willow
White Willow
Willow Hybrid

Winterfat**Yew**

Pacific Yew

Yucca

CONSERVATION DESCRIPTIONS

FOR

GRASSES, WILDFLOWERS, LEGUMES, TREES, AND SHRUBS

CONSERVATION GRASSES

(usually planted as seed)

BENTGRASS (*Agrostis* L.)

The genus *Agrostis* includes many species, usually perennial, often occurring on hydric soils; there are over 100 species worldwide. Some of the introduced species, such as colonial BENTGRASS and creeping BENTGRASS, are important turfgrasses. About 20 species are native to the United States. Two species native to the Western United States are *A. exarata* and *A. oregonensis*. A common grass found in wet areas or along streams, redtop (*A. alba*), was probably introduced from Europe.

BLUEGRASS

BIG BLUEGRASS

(*Poa secunda* J. Presl) (formerly: *Poa ampla*)

A long-lived, native bunchgrass found throughout the continental climatic area of the Western United States, a component of the sagebrush-grass and Palouse prairie plant community. Occurs on loamy to silt-loam soils where the annual precipitation is nine to 16 inches. It is often used for early spring livestock grazing, but is easily destroyed by overgrazing. Seeding recommendation: shallow, in late fall or early spring with adequate moisture. Big bluegrass competes with winter annual weeds such as cheatgrass (*Bromus tectorum*.).

‘Sherman’ is the only selected cultivar, released by the SCS, Pullman PMC. It was originally collected from a native sagebrush-grass plant community in Sherman County, Oregon. It is frequently used for herbage production, erosion control, and plant community diversity.

General: 917,000 seed/lb, 21 seed/sq ft/lb

Seed rate: 2 lbs/ac in mix, 4 lbs/ac alone

BOG BLUEGRASS

(*Poa leptocoma* Trin.)

A native perennial grass. Naturally occurs on hydric soils, in meadows, pond margins and along streams; from Alaska to Northern California, east to New Mexico and Colorado; usually found at middle to high elevations. Requires at least 30 inches of annual precipitation for establishment and survival. Fowl bluegrass (*P. palustris*), introduced from Europe, is also sometimes found on wetland and adjacent sites.

CANADA BLUEGRASS

(Poa compressa L.)

A low-growing, introduced bluegrass, with short-rhizomes. It has some tolerance to shade, low soil fertility, and medium acid soil. A low maintenance groundcover for roadsides, ditchbanks, around trees, recreational areas, and borrow pits. A minimum of 18 inches of annual precipitation, or equivalent irrigation or runoff, is required for establishment and maintenance of Canada bluegrass. 'Reubens' Canada bluegrass is an introduced commercial cultivar; it has been used with some success for critical area stabilization of roadbanks.

General: 2,500,000 seeds/lb, 57 seeds/sq ft/lb

Normal seed rate: 4 lbs/acre

CANBY BLUEGRASS, SANDBERG BLUEGRASS

(Poa secunda J. Presl.) Poa canbyi).

A long-lived, low-growing bunchgrass native to the arid rangelands of Western United States and Canada. It is vernal dominant and adapted to short season moisture sites. Recommended for seeding as an understory grass for erosion control and herbage on sites with nine to 20 inches annual precipitation. Sandberg bluegrass is drought tolerant, actually drought escaping by going dormant before mid-June until the fall rains may begin plant regrowth in September. It greens up in early spring, has low herbage production, but is high quality for most grazing animals.

'Canbar' canby bluegrass is a cultivar released by the Pullman PMC. It has good vigor, seed production, and is adapted to low-precipitation areas in the interior Pacific Northwest.

Two native PNW rangeland species, Nevada bluegrass (P. nevadensis) and alkali bluegrass (P. juncifolia), may be included, taxonomically, with (P. secunda) (K. Presl).

Pullman, Aberdeen and Bridger PMCs currently have initial evaluation studies of additional ecotypes of sandberg bluegrass.

General: 926,000 seeds/lb, 21 seeds/sq ft/lb

Normal seeding rate: 2 lbs/acre in mixture

CUSICK'S BLUEGRASS

(Poa fendleriana ssp. fendleriana (Steud.) Vasey)

A native perennial bluegrass found on dry and rocky slopes at middle to high elevation, from British Columbia to Central California, east to North Dakota and Colorado. It naturally occurs on silt loams to sandy loams, eight to 20 inches mean annual precipitation. A highly valued grass for herbage production for wildlife and livestock; and is also an excellent plant for soil erosion control.

KENTUCKY BLUEGRASS

(Poa pratensis L.)

A major lawn and turf grass, introduced from Europe, adapted to cool climates and moist growing conditions. Usually has low herbage production. It may persist and outcompete other

desired species in high elevation meadows and along streambanks. It may be a good erosion control grass where adapted. Do not use in conservation planting in riparian areas, adjacent to wetlands and native meadows. Requires at least 18 inches average annual precipitation, or equivalent irrigation or runoff.

Numerous cultivars, especially turf type, are available. 'Newport', 'Cougar', and 'Troy' have been developed for use in the Pacific Northwest.

General: 2,150,000 seeds/lb, 50 seeds/sq ft/lb

Seeding rate: 4 lbs/ac in conservation seedings

UPLAND BLUEGRASS

(Poa glauca ssp. glauca (Gaudin) Lindm.)

A perennial bunchgrass, introduced from Turkey, loosely tufted, and glaucous. Plants steadily increase in size by slow tillering. It is low-growing, similar to Canada bluegrass in appearance and characteristics, but does not sodbound as readily. It has performed better than Canada bluegrass on coarse-textured soils. Eighteen inches or greater annual rainfall is required. 'Draylar' is a cultivar released by the Pullman PMC, currently not available in the commercial market.

BROMEGRASS

MEADOW BROME

(Bromus commutatus Schrad.)

A perennial, weakly rhizomatous, brome grass introduced from Turkey. The leaves are mostly basal, long, lax, and softly pubescent. Seedling vigor is strong; it is palatable to grazing animals; may also be used by some wildlife. It has been used for pasture and hayland where the mean annual precipitation exceeds 16 inches, or receives equivalent irrigation. It does best at higher elevations; usually does not go dormant under high summer temperatures as does smooth brome. 'Regar' meadow brome has been released by the Aberdeen PMC.

General: 93,000 seeds/lb; 2.1 seeds/sq ft/lb.

Seeding rate: 10 lbs/acre.

MOUNTAIN BROME

(Bromus marginatus (Nees. ex Steud.)(B. carinatus)

A short-lived perennial, cool season, rapidly developing native bunchgrass. It has moderately coarse culms and broad leaves; good palatability to livestock when green. It naturally occurs at middle to high elevations on moderately deep to deep loam soils in the Western United States. Mountain brome does best on fertile and moist sites (minimum of 16 inches annual ppt.); but often does well on infertile, coarse, dry soils. Tolerant of some soil salinity, intolerant of flooding. Moderate drought tolerance, good shade tolerance and good winter hardiness. It does not respond well to irrigation.

'Brome' is the only released variety of mountain brome. It was selected primarily for high herbage production potential in crop rotations when mixed with clovers for green manure. Maximum seed and herbage production is in the second growing season. It may also be used in seed mix for critical area plantings; especially useful for reseeding after woodland fires.

General: 75,000 seed/lb; 1.7 seed/sq ft/lb.
Seeding rate: 14 lbs/acre.

Mountain brome has been combined for taxonomic purposes with Bromus carinatus. This species includes some annual forms that may also occur at low elevations from British Columbia to Baja California, called California brome.

SMOOTH BROME
(Bromus interims Leys)

A highly variable, cool season, long-lived, introduced from Europe, sod-forming grass. It has been used for many years for introduced pasture and hayland plantings. It has also been used for erosion control on critical areas and in grassed waterways. A minimum of 18 inches of annual precipitation is required for establishment. 'Manchar' is the recommended cultivar for pasture and waterways plantings in Washington and Oregon. There are many other released cultivars, but are better suited to other regions of the United States.

General: 125,000 seed/lb; 2.9 seed/sq ft/lb.
Seeding rate: 7 lbs/acre.

PRAIRE GRASS
(Bromus catharticus Vahl)

A short-lived perennial grass, introduced from Europe as a pasture grass, does best with at least 30 inches annual rainfall. Several private varieties are available.

FESCUE GRASS

CREEPING RED FESCUE
(Festuca rubra L.)

A long-lived, low-growing competitive (but slow developing), weakly rhizomatous, fine-leaved grass; introduced from Europe. It performs best on acid soils and may increase in herbage production with increase in acidity. It has been used for erosion control on critical area seedings, especially roadside stabilization. Required precipitation is at least 18 inches mean annual rainfall. 'Fortress' and 'Illahee' have performed well on harsh, infertile sites in Western Oregon and Washington. Other cultivars are also available commercially.

General: 615,000 seeds/lb; 14.1 seeds/sq ft/lb
Seeding rate: 4 lbs/acre.

HARD FESCUE
(Festuca trachyphylla (Hack) Krajina) (Festuca longifolia)

A fine-leaved, low-growing, perennial, competitive (slow establishment) bunchgrass adapted to well-drained sites where the mean annual precipitation exceeds 14 inches. Introduced from Europe. It has a dense and voluminous root system. It has been used for erosion control on critical area seeding, including highways. 'Durar' is the recommended conservation cultivar. 'Aurora' hard fescue is seeded west of the Cascades for a permanent cover crop in orchards and vineyards, and is used for turfgrass. Many other cultivars are commercially available.

IDAHO FESCUE

(Festuca idahoensis Elmer)

A native, cool season, perennial bunchgrass. It has fine leaves; basal. It is ten to 30 inches in height, with mature seedhead. It has good herbage production, especially in the spring. It is palatable to livestock, and elk and deer. Idaho fescue is long-lived, with low annual seed production. It is much less common on native rangelands that have been heavily grazed by livestock. But with good management, it is often one of the most desirable rangeland plants, as it is also excellent for soil erosion control. It does best on moderately deep to deep, fertile, silt loam to clay loams. It is tolerant of slightly saline, alkaline and acid soils. Idaho fescue thrives at 14 to 24 inches annual precipitation; and grows on some north aspects deep silt loam soils in the Columbia Basin at ten inches ppt. It is moderate in shade tolerance; plant crowns may be damaged or killed by fire. It is slow to establish from seed, with weak seedling vigor; fair tolerance to fall burning when dormant. 'Joseph' and 'Nezpurs' were released by the University of Idaho, but commercial seed is very limited.

General: 450,000 seeds/lb; 10.3 seeds/sq ft/lb.

Seeding rate: 4 lbs/acre.

SHEEP FESCUE

(Festuca ovina L.)

A low-growing, fine-leaved, long-lived bunchgrass; basal leaf blades. It is more drought tolerant than other fine-leaved fescue; does best on silt loam to loamy soils at nine to 24 inches annual precipitation. Production of herbage is low, but root production is outstanding. It is slow to establish. It is excellent as ground cover for erosion control, also used as an understory plant with taller species on rangeland. Good for competition, or suppression, with many annual weeds, also used as a perennial cover crop in orchards and vineyards. 'Covar' is a cultivar released by the Pullman PMC, introduced from Turkey, it is very short statured, the most drought tolerant, and attractive bluish-green. 'Bighorn' is a privately released cultivar, used primarily as a cover crop and turfgrass west of the Cascades. F. o. var. glauca, blue fescue, is an ornamental variety. Mechlenburg sheep fescue has been used west of the Cascades as a cover crop and turfgrass; requires at least 30 inches annual rainfall.

General: 680,000 seeds/lb.

Seed rate: 4 lbs/ac.

TALL FESCUE

(Festuca arundinacea Schreb.)

A perennial, introduced bunchgrass; a broad-leaved, robust fescue. It is tolerant of strongly acid to strongly alkaline soil conditions. It is suited to irrigation, moderately poorly drained conditions or dryland areas where the effective annual precipitation exceeds 18 inches. It is most often used for pasture and hayland plantings, high forage production, usually does not go dormant in summer or in mild winters. It is not recommended for native meadows, riparian areas or wetlands as it is very aggressive on those sites. Forage type tall fescues are endophyte-free. Turf types have been inoculated with endophyte. Endophyte is a fungus that grows within and around the grass's roots. It is beneficial to the grass's health by providing better nutrient uptake. A disadvantage to endophyte is that it may cause the grass to be toxic livestock forage.

‘Alta’ and ‘Fawn’ are cultivars most often used in Oregon and Washington. There are many other released cultivars.

General: 225,000 seeds/lb, 5.2 seeds/sq ft/lb.

Seeding rate: 6 to 8 lbs/acre.

WESTERN FESCUE

(Festuca occidentalis Hook.)

A tufted, erect, perennial bunchgrass native to the Western United States and Canada. It is found on moist, wooded slopes, streambanks, and lake margins, also in ponderosa pine and Douglas fir woodlands. It has excellent-potential for erosion control for critical area plantings, and after fire or other disturbances. Annual herbage production is moderate. Seed production is low to fair, similar to hard fescue. Western fescue grows on silt loam to sandy loam soils; requires a minimum of 18 inches annual precipitation. This species is closely related to Idaho fescue.

The Corvallis PMC has selected an accession, 9028822, from Jackson County, Oregon for advanced evaluations. Limited quantities of seed are available for approved SCS field plantings.

Seeding rate: 8 lbs/acre.

HAIRGRASS

TUFTED HAIRGRASS

(Deschampsia cespitosa L. Beauv.)

A native, tussock-forming, perennial grass found along streambanks, and moist meadows, wetlands, coastal estuaries, bottomlands, creeks, and lake and pond margins. Its natural range is circumboreal on seasonally wet or hydric soils, extending throughout cooler regions of the Northern Hemisphere. This grass may be found at elevations from sea level to alpine meadows. Potential uses include streambank and shoreline stabilization, wetland enhancement and restoration, wildlife habitat plantings, filter strips, pasture and recreation area plantings. It is slow to establish, but is very long-lived. It has moderate herbage production and low seed production.

There are great genetic and morphologic differences in tufted hairgrass ecotypes. For example, the coastal ecotype is often a very robust plant with coarse, broad leaves, very high tolerance to salt spray. Whereas an alpine ecotype may be a small, delicate, fine-leaved, low-growing plant, with very low salt tolerance. About the only characteristics all tufted hairgrass ecotypes have in common are the spikelets which are two-seeded, the plants are cespitose with basal leaves, and they grow on moist to wet soils.

The Corvallis PMC has selected two ecotypes from advanced evaluations for testing in SCS field plantings. Accession 9019731 is an ecotype collected from a coastal estuary near Tillamook, Oregon. 9019737 is a low elevation meadow ecotype from the Willamette Valley, Oregon.

The Upper Colorado Plant Center at Meeker, Colorado has selected ‘Peru Creek’ for evaluation on moist sites at high elevations.

A cultivar was released for Alaska: 'Nortran' was developed from Alaska and Iceland sources. It is not recommended for Washington and Oregon.

JUNEGRASS

PRAIRE JUNEGRASS

(Koeleria macrantha (Ledeb.) J.A. Schultes)

A long-lived, cool-season, native, tufted perennial grass; one to three feet in height. It naturally occurs on moderately deep silt loam to sandy soils in prairies, sagebrush steppe, and open woodlands of the Intermountain and Pacific Northwest. Prairie junegrass is rarely found in pure stands, but is very often a component of the prairie or grassland plant community. It does best at 12 to 20 inches annual rainfall. No released cultivars are available, but limited quantities of common seed are commercially sold. As with all common seed of native plants, request "source identified" with a seed tag stating the purity and current germination test.

General: 2,315,400 seeds/lb, 53 seeds/sq ft/lb.

Seed rate: one-two lbs/ac, in mixture.

MANNAGRASS (Glyceria R. Br.)

A genus of wetland annual and perennial grasses including several species native to North America. Important facultative and obligate wetland plants. Species include: fowl mannagrass (G. striata), tall mannagrass (G. elata), northern mannagrass (G. borealis).

NEEDLEGRASS

GREEN NEEDLEGRASS

(Nassella viridula (Trin.) Barkworth)

Native to the northern Great Plains. Moderately tall, cool season, long-lived, perennial bunchgrass; densely tufted; bright green leaves; deep extensive root system; makes good regrowth in summer with moisture; moderately palatable to cattle year-long when green; best on clay soils, fractured shale soils, native on overflow sites; moderately tolerance short term flooding; 12-20" precipitation zones; good drought tolerance; tolerant moderately alkaline soils derived from calcareous shale; extremely winter hardy; variable tolerance to fire in dormant state.

'Green Stipa' released out of Midwest. 'Lodorm' released as lower dormancy variety.

General: 181,000 seeds/lb, 4.1 seeds/sq ft/lb

Seed rate: 6 lbs/acre

LEMMON'S NEEDLEGRASS

(Stipa lemmonii (Vasey) Scribn.)

Native species that has a limited distribution in foothills and mountains, especially in the ponderosa pine regions of Southern Oregon, Washington, and California.

NEEDLEANDTHREAD GRASS
(Stipa comata Trin. & Rupr.)

Native, cool-season, tufted, perennial bunchgrass; one to three feet high; adapted principally to sandy soils; often used for winter grazing; long awned seed can be injurious to animals; wide-spread in-Intermountain and Pacific Northwest. No cultivars are available at this time. Several PMCs have some accessions to evaluate.

General: Estimated at 150,000 seeds/lb, 3.4 seeds/sq ft/lb

Seed rate: 7 lbs/acre

THURBER'S NEEDLE GRASS
(Stipa thurberiana Piper)

A short to medium sized cool season, native bunchgrass found in Oregon, Idaho, Washington, Nevada, and California. It is very drought resistant being found often on rocky, shallow soils with southern exposures. It has fair to good forage early spring and fall, with fine, rough textured leaves. It is currently in the "collection" phase of initial evaluation at Aberdeen PMC. A selection is sought for low precipitation rangeland six-12 inches annual precipitation. Criteria will include good seedling vigor and rapid establishment possibly from deeper planting depths, good seed production, and leaf to stem ratios for good forage.

General: Estimated 150,000 seeds/lb, 3.4 seeds/sq ft/lb

Seed rate: 7 lbs/acre

WHEN PURCHASING SEED OF COMMON NATIVE GRASS REQUEST "SOURCE IDENTIFIED."

OATGRASS

CALIFORNIA OATGRASS
(Danthonia californica Boland.)

A native perennial bunchgrass that occurs from Southern California to British Columbia, and east to Montana, Colorado and New Mexico. It is found in moist or dry woodlands, meadows, hillsides, grasslands, coastal prairies, or along rocky ridges. It has moderate annual herbage production, but of high quality to grazing animals and low to moderate seed production.

Elevation: sea level to 5,000 feet. Annual precipitation: 18 to 45 inches. Soil: loam, silt loam, and clay loam, and serpentine or granitic soils. The Corvallis PMC has a study comparing 60 ecotypes of California oatgrass. Potential uses include rangeland restoration, natural plant community diversity, and erosion control on hillsides and open woodlands.

ORCHARDGRASS (<u>Dactylis glomerata</u> L.)
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A long-lived, introduced, high-producing bunchgrass adapted to well-drained soils. Can be grown under irrigation or on dryland where effective annual precipitation is greater than 16 inches. Is shade tolerant. Suited for pasture, hay, silage and erosion control. Forage varieties are

early, mid and late season in maturity. Late-season varieties are preferred in mixtures with alfalfa.

Released cultivars for NW and Intermountain areas:

Early: 'Hallmark', 'Potomac', 'Sterling'.

Mid: 'Napier', 'Pennmead', 'Akaroa'.

Late: 'Pennlate', 'Latar'.

Dwarf variety: 'Pomar' is a low-growing variety specifically for cover crops such as in orchards, and for erosion control. Good seed yields.

'Latar' was released by the Pullman PMC for forage and hayland uses. It requires at least 16 inches annual rainfall. 'Paiute' orchardgrass is a variety released by the US Forest Service. It easily winterkills compared to 'Latar'. It performs best in hayland plantings with at least 30 inches annual rainfall.

General: 433,000-500,000 seeds/lb, 10.7 seeds/sq ft/lb, 17-18.8 lbs seed/bushel.

Seed production: seed @ 1.5-2 lbs/acre in wide rows.

Yield: 300 lbs/ac under irrigation.

Seed rate: 6 lbs/acre, usually seeded with a legume (alfalfa).

REEDGRASS

BLUEJOINT PINEGRASS

(Calamagrostis canadensis (Michx.) Beauv.)

A widespread native grass commonly found in marshes, mountain parts and subalpine areas and on hydric soils. It occurs from Alaska to the Atlantic States, south to Arizona and New Mexico. No commercial varieties are available of any *Calamagrostis* species.

PINEGRASS

(Calamagrostis rubescens Buck.)

Perennial; culms in tufts, 60-100 cm. Tall; plants producing rhizomes; leaf blades scabrous, 2-4 mm. Wide, flat or somewhat rolled; panicles dense and cylindrical, 7-15 cm. long, pale or purplish in color; glumes 4-5 mm. Long; sterile rachilla joint about 1 mm. Long, its hairs about twice as long. While common, pinegrass is low in palatability to livestock, but is used by wildlife when young and green. The plants make a strong, tough turf which resists heavy grazing and trampling. Most of the reproduction is by rhizomes. A native grass that occurs in coniferous forests in the Pacific Northwest, up to alpine zones in mountains.

RICEGRASS

INDIAN RICEGRASS

(Oryzopsis hymenoides (Roemer & J.A. Schultes) Ricker ex Piper)

A cool-season, drought tolerant, perennial native bunchgrass commonly found on sandy soils of the arid rangelands of North America. Indeterminate flowering habit causes seed maturation throughout the growing season. Indian ricegrass seed has a very high protein and fat content, edible to humans as well as animals. It does best on sandy sites with six to 15 inches annual rainfall. It is tolerant of weak salinity and alkalinity, intolerant of shade. It has good tolerance to fire when dormant.

Released cultivars of indian ricegrass: 'Nezpar' was released by the Aberdeen, Idaho PMC for superior seed germination and seedling. 'Paloma' was released by the Los Lunas, New Mexico PMC for use in the Southwestern United States.

General: 160,000 to 180,000 seeds/lb; 3.8 seeds/sq ft/lb. Normal seeding rate: Six-seven lbs/acre, three-four inches deep in coarse sandy soil, one-three inches in silty to sandy soils.

RYEGRASS

ANNUAL RYEGRASS

(Lolium perenne ssp. multiflorum (Lam.) Husnot)

A vigorous, winter-active annual grass introduced from Eurasia, adapted to a wide variety of soil conditions. Can be grown under irrigation or on dryland where the effective precipitation is comparable to 15 inches or more. Makes a good winter cover crop or temporary-seeding on disturbed areas. May be seeded with red clover for hay in short rotations. Establishes rapidly, is strongly competitive and retards establishment of perennial grasses and legumes if it is seeded too heavily in a mixture. Several varieties are available. Annual ryegrass usually is a perennial west of the Cascades, but is not cold hardy. It is adapted to intensive grazing system if the climate is favorable.

Seed rate: 3-4 lbs/ac in mixture.

HYBRID RYEGRASS

(Lolium L.)

Though very similar in performance to perennial ryegrass, hybrid ryegrass has demonstrated seedling vigor equal to that of annual ryegrass. It is more compatible than annual or perennial ryegrass with long-lived grasses and legumes in erosion control seedings and short term pasture. 'Astor' has performed very well in erosion control seedings. However, seeding rates above 3 lbs/ac in a mixture usually retard development of slower growing plants.

PERENNIAL RYEGRASS
(Lolium perenne ssp. perenne L.)

A relatively short-lived, rapidly developing, vigorous, introduced perennial bunchgrass adapted west of the Cascades to a wide variety of soil conditions. Can be grown under irrigation or on dryland where the effective precipitation is 15 inches or more. Well adapted to short rotations with clover. Retards establishment of other perennials if it is seeded too heavily in a mixture. Has good recovery after grazing in the spring but tends to go dormant in summer. 'Linn,' and 'Manawa (HI)' have performed well in comparisons at Corvallis, Oregon. Tetraploid varieties are also available. Turf varieties of perennial ryegrass have been inoculated with the endophyte fungus for improved health. Forage varieties of ryegrass are endophyte-free as endophytes may cause the plants to be toxic to livestock.

SQUIRRELTAIL

BOTTLEBRUSH SQUIRRELTAIL
(Elymus elymoides (Raf.) Swezey)

A drought-tolerant, cool season, native bunchgrass. Widespread in the Northwest and Intermountain area mid to high elevations. It is a short to medium size, tufted bunchgrass, fair early livestock forage. Poor forage after seed heads develop. Often an increaser on improving rangeland. It is currently under evaluation at Bridger and Aberdeen PMC. A release is sought with good seedling vigor and rapid establishment, good seed production and leafiness for use on low precipitation range sites and droughty critical areas. Recommended for rangelands with six-12 inch mean annual precipitation.

General: 192,000 seeds/lb, 4.4 seeds/sq ft/lb

Seed rate: 7 lbs/acre

No released cultivar.

WHEATGRASS

BEARDLESS WHEATGRASS
(Pseudoroegneria spicata ssp. inermis (Scribn. & J.G. Sm.) A. Love)

A long-lived, drought-tolerant, native bunchgrass adapted to a wide range of soils where the effective precipitation is 15-25 inches. Provides later green forage than crested wheatgrass and cures well for standing hay. Generally has low seedling vigor which delays establishment about one year. Use in bluebunch sites. 'Whitmar' is the released cultivar from the Pullman PMC.

BLUEBUNCH WHEATGRASS
(Pseudoroegneria spicata ssp. Spicata (Pursh) A. Love)

Long-lived, drought-tolerant, wide-spread native bunchgrass. Major grass component of shrub-steppe plant communities in the Northwest. More drought-tolerant than beardless wheatgrass and crested wheatgrasses. Early spring growth. Eight to 30 inch precipitation zones. Wide variety of soil but not on high-water tables, poor drainage or moderate saline soils. Fair seedling vigor.

General: 120,000-150,000 seeds/lb
Seed yield: 200-500 lbs/ac irrigated, 100-400 lbs/ac dryland
Seed rate: 8 lbs/ac, drilled.

'Goldar' was released by the Aberdeen PMC, has good yields, basal area, stand establishment, and seedling vigor; requires 12 to 20 inches annual precipitation; greater than 3,500 feet elevation. 'Secar' Snake River wheatgrass was formerly identified as a bluebunch wheatgrass variety. Good seedling vigor, but moderately slow to establish. Best in eight to 14 inch ppt. zone on coarse, well-drained soils. 'Secar' is closely related genetically to thickspike wheatgrass.

CRESTED WHEATGRASS **(Agropyron cristatum (L.) Gaertn.)**

Long-lived, introduced, drought-tolerant bunchgrasses adapted to a wide range of ecological sites and precipitation zones as low as 6-9 inches. Best suited to nine-12 inch annual precipitation. Early spring growth. Tolerant to grazing and traffic. Generally good seedling vigor.

A. desertorum: known as standard crested wheatgrasses.

Released cultivars:

- 'Nordan': superior seed, seedling vigor, high production, highest forage quality.
- 'Summit': Canadian release of standard crested.
- 'Douglas': released by ARS, Logan, Utah.

General: 153,000 seeds/lb, 25.8 lbs seed/bushel.

Seed rate: 7 lbs/acre.

A. cristatum: known as Fairway crested wheatgrasses.

Released cultivars:

- 'Parkway': a Canadian release, good seed yields, more erect.
- 'Kirk': high yield, good seedling vigor, from Canada.
- 'Ruff': a dwarf variety.
- 'Ephraim': leaf height and forage production similar to common Fairways.

General: 200,000 seeds/lb, 25.8 lbs/bushel

Seed rate: 6 lbs/ac on rangeland

Agcrc X Agde: Hybrid cross.

Released cultivar:

- "Hycrest": Excellent seedling vigor and good establishment. It is usually larger initially than either parental species, but often is less leafy. ("Nordan" has equaled production after establishment years). It has slightly more seed production; better root development and emergence from deep plantings. It appears to be between Fairway and standard in coarseness of leaf and stem.

Seed rate for rangeland: 6-7 lbs/ac.

INTERMEDIATE WHEATGRASS **(Elytrigia intermedia (Host) Nevski)**

A late maturing, long-lived, introduced, mild sod-former suited for use as hay and pasture, alone or with alfalfa. Can be grown under irrigation or on dryland where effective precipitation is 15 inches or more (down to 12 inches on better soil situations). Requires good drainage and moderate to high fertility. Good seedling vigor. Heavy root production. Common seed grown in South America, Eurasia or from other foreign sources is not recommended for use in federal cost-shared programs such as Conservation Reserve Program. Certified seed of Canadian cultivars may be acceptable in Washington State.

Released cultivars:

---- ‘Greenar’: best forage producer in mid-rainfall area, released by Pullman PMC. Best overall forage quality. 90,000 seed/lb.

---- ‘Amur’: a little more drought tolerant than ‘Greenar’, released by Los Lunas PMC.

---- ‘Oahe’: slightly better than ‘Greenar’ in higher rainfall areas. Generally a better seed producer than ‘Greenar’.

---- ‘Tegmar’: dwarf cultivar for erosion control, waterways. Released by Aberdeen PMC.

---- ‘Chief’: Cultivar released by Agriculture Canada. A good variety for grass-legume mixtures. Minimum precipitation 14 inches.

---- ‘Mandan 759’: A northern cultivar released by the Bismarck PMC, North Dakota. Good forage production in grass-legume mixes.

---- ‘Reliant’: A northern cultivar released by ARS, North Dakota.

---- ‘Rush’: A good cultivar for soil erosion control and site stabilization. Forage quality is less than the other cultivars. Released by Aberdeen PMC, Idaho.

Seed rate: 12 lbs/ac

Seed production: seed 3-4 lbs/ac in 24-36 inch rows. Up to 500 lbs/ac seed yield under irrigation and 200-500 lbs/ac dryland.

PUBESCENT WHEATGRASS **(Elytrigia intermedia (Host) Nevski)**

An introduced, long-lived aggressive sod-former adapted to low-fertility sited and fine-textured soils where effective precipitation is at least 12 inches. Will tolerate more alkali and drier conditions than intermediate wheatgrass. Matures a little earlier than intermediate wheatgrass. Is better adapted for pasture than for hay. Its ability to remain green during the summer, when soil moisture is limited is a significant characteristic. Suitable for erosion control on a wide range of sites. Good seedling vigor. Common seed grown in South America, Eurasia, or from other foreign sources is not recommended for use in federal cost-shared programs such as Conservation Reserve Program. Certified seed of Canadian cultivars may be acceptable in Washington State.

Released cultivars:

---- ‘Topar’: Lower growing than ‘Luna’ or ‘Greenleaf’, but denser sod. Does better at cooler, higher elevations than ‘Luna’. Released by Aberdeen PMC.

---- ‘Luna’: Better forage plant than ‘Topar’, released by Los Lunas PMC. ‘Luna’ does better at warmer, lower elevations. 80,000 seeds/lb, 11 lbs/ac rangeland seeding rate.

---- ‘Greenleaf’: Canadian release. Very pubescent. Foliage bright green. A better forage type than ‘Topar’.

---- ‘Manska’: A northern cultivar released by ARS, North Dakota. Used in grass-legume mixtures.

General: 23.4 lbs seed/bushel. 67,000 seed/lb, 1.5 seed/sq ft/lb.

Seed production: seed @ 3-4 lbs/ac in 24-36 inch rows. Up to 500 lbs/ac seed yields under irrigation and 200-500 lbs dryland.

Seed rate on rangeland: 12 lbs/ac, pure live seed (PLS).

RS1/RS2 WHEATGRASS

(Agropyron spicatum X A. repens)

A bluebunch wheatgrass x quackgrass cross-developed by ARS in Utah. Cool season, strongly sod-forming, leafy, excellent seedling vigor. It may have good saline-alkaline tolerance. Good forage, but it probably won’t out-produce intermediate wheatgrass. It is adapted to areas with at least 14 inches mean annual precipitation. It may be a good fire and weed suppression species. It should be used with caution; physically resembles quackgrass. ‘NewHy’ is a recently released cultivar by USDA-ARS, Logan, Utah. It is seeded at the rate of ten pounds/acre.

SIBERIAN WHEATGRASS

(Agropyron fragile (Roth) P. Candargy)

Has the same general characteristics as crested wheatgrass. Generally finer stems. It is considered to be slightly more drought-tolerant than crested, and better suited on coarse-textured or sandy soils, 6-12” MAP. Grows one to two weeks later into summer before maturing, providing later forage. 160,000-250,000 seeds/lb. Origin of Siberian wheatgrass is Central Russia and Kazakhstan.

Released cultivars:

---- ‘P-27’: fine, leafy stems, good seedling vigor, good seed yields. 163,000 seeds/lb, 3.7 seeds/sq ft/lb, 22 lbs seed/bushel. Released by the Aberdeen PMC.

Seed production: seed @ 3lbs/ac in 24-36 inch rows.

Seed yields: 500 lbs under irrigation, 100-200 lbs/ac dryland.

Rangeland seeding rate: 6-7 lbs/ac

---- ‘Vavilov’: cultivar released by ARS, Logan, Utah.

SLENDER WHEATGRASS

(Elymus trachycaulus ssp. trachycaulus (Link) Gould ex Shinnars)

A short-lived, native perennial bunchgrass with rapid rate of establishment. Good for critical areas in mix with long lived perennials. Adapted to a wide variety of soils, but prefers sandy loams. Shade tolerant, and somewhat alkali tolerant. Dryland seedings above 15 inch mean annual precipitation (MAP). It can be used on irrigated hay and pasture when in short term rotation with other crops, usually seeded with clovers in these situations. Can be used as green manure crop with sweet clover. Palatable range plant, may seed at 2 lbs/ac in mix. 125,000-160,000 seeds/lb, average 3.3 seeds/sq ft/lb.

Rangeland seeding rate: 7-8 lbs/ac.

Released cultivars:

---- 'Primar': early maturing, leafy, rapid development, strong seedling vigor. Good top growth, heavy root production. Good alkali tolerance. Released by the Pullman PMC in 1950s.

---- 'Revenue,': a Canadian private release. Excellent establishment, salinity tolerance, forage and seed yields, high leaf to stem ratios.

---- 'San Luis': Recent release from Meeker PMC. Still short life, but longer than 'Primar'. Excellent salinity tolerance.

A recent release from Bridger PMC is 'Pryor', very drought tolerant. Adapted to salinity seeps, up to EC of 25. Excellent seedling vigor and good establishment. Originated in the Pryor Mountains of Montana.

'San Luis', 'Revenue', and 'Pryor' are available commercially.

STREAMBANK WHEATGRASS

(Elymus lanceolatus ssp. psammophilus (Gillet & Senn) A. Love)

A native, long-lived, drought-tolerant, creeping sod-former adapted to fine and medium-textured-soils. Has excellent seedling vigor and is particularly well adapted for erosion control where effective precipitation is 12-25 inches (down to 9" in some situations in Idaho). It has little forage value and used primarily for stabilization of roadsides, ditchbanks; good weed suppression, relative long green period, therefore good fire suppression; good traffic ability and low maintenance turf. Good seedling vigor; usually seeded in mix with bunchgrasses. Streambank wheatgrass is related genetically to thickspike wheatgrass.

'Sodar' is the only released cultivar. Excellent seedling vigor. 170,000 seeds/lb, 3.9 seeds/sq ft/lb, 22 lbs seed/bushel. Seed production: seed 3 lbs/ac in 24-36 inch rows. Yields: 200-400 lbs/ac irrigated and <100 lbs/ac dryland.

Rangeland seeding rate: 7 lbs/ac

TALL WHEATGRASS

(Elytrigia elongata (Host) Nevski)

A tall-growing, long-lived, introduced, very late-maturing bunchgrass; coarse textured, heavy root production, good seedling vigor. Suitable for hay or pasture under irrigation or dryland where effective precipitation is 12 inches or more. Once established, it is tolerant of strongly sodic conditions and wet alkali conditions. Does not tolerate close grazing. Wide variety of soils and climate adaption. Useful for critical areas, wildlife cover and calving areas. Common seed grown in South America, Eurasia or from other foreign sources is not recommended for use in federal cost-shared programs such as Conservation Reserve Program. Certified seed of Canadian cultivars may be acceptable in Washington State.

Released cultivars:

---- 'Alkar': late-maturing, excellent seedling vigor. Released from Pullman PMC.

---- 'Jose,': earlier maturing, more leafy. Released from Los Lunas PMC.

---- 'Largo': also a release from New Mexico. Maybe a little leafier than above. Mostly used in the Southern Intermountain area.

---- Orbit'; Released by Agruculture Canada. Extremely good winter hardiness, otherwise very similar to 'Alkar'.

General: 75,000-80,000 seeds/lb, 1.8 seeds/sq ft/lb.

Seed production: 300 lbs/ac under irrigation.

Rangeland seeding rate: 12 -14 lbs/ac,

THICKSPIKE WHEATGRASS

(Elymus lanceolatus ssp. Lanceolatus (Scribn. & J.G. Sm.) Gould)

A native, long-lived, sod-forming grass widely distributed in the northern part of the Intermountain region. More drought-tolerant than western wheatgrass, it is well suited for wind erosion on coarse-textured soils. It is best utilized as forage when crested wheatgrass is fully headed and low in nutritive value. Stays green longer than crested, fire tolerant. Ten to 20 inches mean annual precipitation is required for establishment of thickspike wheatgrass. Good seedling vigor.

Released cultivars:

---- 'Critana': low growing, erosion control, low forage production, string rhizomes, released by the Bridger PMC.

---- 'Elbee': a Canadian release.

---- 'Secar' Snake River wheatgrass is a native variety of thickspike wheatgrass released by the Pullman PMC. Originated in Lewiston Grade, Idaho.

---- 'Schwendimar' was released by the Pullman PMC in 1994. The original collection was from a native stand near The Dalles, Oregon on sandy loam soil. Accession was selected for good seedling vigor and increased herbage production.

---- 'Bannock': A bulked cultivar from sources in Idaho, Oregon, and Washington. Released by Aberdeen PMC, Idaho.

General: 133,000-156,000 seeds/lb, 3.5 seeds/sq ft/lb.

Seed production: seed @ 3.5 lbs/ac in wide rows.

Yield: 200-500 lbs/ac under irrigation, and <100 lbs/ac dryland.

Rangeland seeding rate: 7-8 lbs/ac.

WESTERN WHEATGRASS

(Pascopyrum smithii (Rydb.) A. Love)

A native, cool season, long-lived aggressive, sod-former. Relative coarse leaves. Adapted to weakly acid to strongly saline moist soils, ten to 20 inch precipitation zones, usually heavy texture soils, clays to clay loams. Critical areas, waterways, rangeland usually seeded in mix with other adapted species. It is found in very limited habitats in Washington State.

Released cultivars:

---- 'Rosana': a Bridger PMC release, high seed germination, establishment, dense sodding, low growing, clay soils.

---- 'Arriba': Los Lunas PMC, NM variety for medium textured soils in the southwest.

Other released cultivars include: 'Barton,' 'Flintlock', 'Rodan', 'Mandan 456', all from the Midwest.

General: 100,000-126,000 seeds/lb, 2.6 seeds/sq ft/lb.

Seed production: 200- 500 lbs/ac irrigated and <100 lbs/ac dryland.
Rangeland seeding rate: 9-10 lbs/ac

WILDRYE

ALTAI WILDRYE

(Leymus angustus (Trin.) Pilger)

A winter hardy, drought tolerant, long-lived, cool season, introduced perennial bunchgrass (or short rhizomes). Basal leaves are relatively coarse-textured but very palatable. Adapted to moderately deep to deep loams and clay loams with a minimum of 14 inch annual precipitation. Can withstand saline conditions almost as well as tall wheatgrass. Seedlings develop slowly and a good seedbed and weed control is essential. It is suited for pasture and range. Should be considered for summer, fall and winter forage, and saline areas.

'Prairieland' is the only released cultivar, released from Canada. Introduced from Siberia.

General: 58,000 seeds/lb.

Seed rate: 15 lbs/ac

BASIN WILDRYE

(Leymus cinereus (Scribn. & Merr.) A. Love)

Cool season, slightly spreading native grass throughout Western United States, common on alkaline and bottom soils. Tall, coarse, long-lived, low to moderate palatability for livestock, but useful for calving pasture, standing hay, excellent wildlife cover, wind barriers. More tolerant of summer drought than tall wheatgrass, and is native to most of the same soils where tall wheatgrass has been planted for pastures. It has an extensive root system. Basin wildrye matures three weeks earlier than tall wheatgrass.

Recommended for upland sites with 11 to 20 inches annual precipitation. Stays green well into summer with adequate soil moisture and could help in suppressing wild fires. Fair seedling vigor, relatively slow to establish. Good herbage production on irrigated soils. Spring grazing by livestock is most detrimental to plant health.

Two cultivars are in commercial production:

---- 'Magnar' is a released cultivar from Aberdeen PMC, origin: Saskatchewan, Canada. Improved seedling vigor, good seed production, uniformity. 17.5 lbs seed/bushel.

---- 'Trailhead' is a recent release from the Bridger PMC, origin: Central Montana. Good seedling vigor and establishment.

General: 95,000-166,000 seeds/lb. 3.0 seeds/sq ft/lb.

Seed production: seed @ 3.5 lbs/ac in wide rows.

Yield: 100-200 lbs/ac with irrigation, and <100 lbs/ac dryland.

Seed rate: 7-9 lbs/ac

BEARDLESS WILDRYE
(Leymus triticoides (Buckl.) Pilger)

A cool season, sod-forming grass native at low and medium elevations from Montana to Washington and south to Texas and California. It is a species most tolerant to salt and alkali and is adapted to a wide range of soil textures on moist subirrigated soils.

'Shoshone' is a Bridger PMC release, non-native origin, and commercial seed is available. It is best used on moist, saline soils, 12 to 20 inches average annual precipitation.

General: 51,000 seeds/lb, 1.2 seeds/sq ft/lb.

Seed rate: 16 lbs/ac.

BLUE WILDRYE
(Elymus glaucus Buckl.)

A fast developing, short-lived, cool season, perennial bunchgrass native to the Western United States. Typical habitat is prairies, open woods, thickets and moist to dry hillsides from sea level to about 6,000 feet in the Blue Mountains. It requires at least 16 inches annual precipitation for establishment. Important characteristics include a broad native area of occurrence, high seed production, strong natural ability to reseed, provides soil protection rapidly after fires or other disturbances, high seedling vigor, and is relatively compatible with coniferous tree plantings. It may also provide herbage for wildlife, especially whitetailed deer and elk.(wapiti), and other animals. 'Arlington', a variety released by the Corvallis PMC, from a Northeastern Washington source. 'Elkton', a variety released by the Corvallis PMC, from a Southwestern Oregon source. Lockeford, California and Pullman PMCs have also studied blue wildrye ecotypes.

Seed rate: 10 lbs/ac (drilled); 20 lbs/ac (broadcast).

MAMMOTH WILDRYE
(Leymus racemosus (Lam.) Tzvelev)

A coarse, introduced, drought-tolerant, creeping grass. It is unpalatable to livestock, but can provide good cover. Long-lived on inland sand dunes and dredge spoils where it will stop sand movement and provide permanent cover. Grown from seed or propagated vegetatively. 100,000 seeds/lb, 2.3 seeds/sq ft/lb.

'Volga' is the only released variety, Pullman PMC. It was selected for superior performance in stabilizing inland sands in Washington, also useful for critical area seeding on coarse textured soils.

Bridger PMC has also tested mammoth wildrye and found that it performs well on a variety of soils, including some clays, and a minimum of six inches of precipitation.

Seed rate: 10 -12 lbs/ac., drilled.

RUSSIAN WILDRYE
(Psathrostachys juncea (Fisch.) Nevski)

A cool season, introduced, bunchgrass with densely tufted basal leaves that are relatively coarse. It is adapted to a wide variety of soils but best on silty to clayey textures with ten to 20 inches annual rainfall. It is highly tolerant of salinity and fairly tolerant to alkalinity. It stays green well into summer. It requires a minimum of 12 inches of annual rainfall.

Released cultivars:

---- 'Vinall' was released for good seed yields from North Dakota.

---- 'Sawki', a Canadian release is superior to common, slightly more erect, higher seed yield, and higher production than common Russian wildrye.

---- 'Bozoisky-select' recently released by USDA-SCS ARS has superior seedling vigor, forage yield and seed production over above cultivars. Forage nutritive value exceeds crested wheatgrass.

---- 'Swift' and 'Cabree' are releases from Canada.

General: Seed in 14 -18 inch rows.

175,000 seeds/lb, 4.0 seeds/sq ft/lb

Seed rate: 6-8 lbs/ac.

CONSERVATION WILDFLOWERS AND LEGUMES

CONSERVATION WILDFLOWERS AND LEGUMES

ASTER

PACIFIC ASTER

(Aster chilensis var. invenustus (Greene) Jepson)

A hardy, perennial, native wildflower; 12 to 24 inches tall. Lavender to white flowers. Grows in full sunlight. Requires at least 18 inches annual rainfall. It may be drought tolerant once established. It has potential for plant diversity in critical area, rangeland, and wildlife plantings.

General: 2,668,000 seed/lb; 61 seeds/sq ft/lb

Seeding rate: < 1 lb/acre in seeding mixture

At least 30 aster species are native to Oregon and Washington. Other asters are sometimes used for conservation plantings, although some are introduced species. Some species may be low-growing shrubs.

BALSAMROOT

ARROWLEAF BALSAMROOT

(Balsamorhiza sagittata (Pursh) Nutt.)

A cool season, perennial wildflower with a woody taproot, native to the Western United States. Large basal, arrow-shaped leaves; thick resinous, fleshy taproot and sunflower-like yellow flowerheads. It grows on foothills, benches and mountain slopes on moderately alkaline to weakly acidic soils; well-drained silt loam and loams. It is intolerant of shallow water tables or shade. Balsamroot does best in the 12 to 20 annual precipitation zone. It appears to be tolerant of domestic livestock grazing on some sites, it has survived 200 years of intensive use. Balsamroot has good tolerance to fires when dormant. It has very good potential for improving plant community diversity in rangeland seedings and critical area plantings; seed in the fall.

It has been evaluated at the Aberdeen PMC, but no commercial varieties are available. Limited quantities of commercial plants and seed is available, request information on source identity.

General: 55,000 seeds/lb; 1.3 seeds/sq ft/lb

Seeding rate: 3 to 5 lbs in mix

BLACK-EYED SUSAN (<u>Rudbeckia hirta</u> L.)

A perennial, to reseeding biennial wildflower; member of the Composite family. It is native to east of the Rocky Mountains. Has broad basal and cauline leaves; and long peduncled flowerheads, very showy. The stems and leaves are scabrous; the ray flowers have golden to yellowish colors, with darker brownish center. May be used in mixture for erosion control, plant diversity, and wildlife habitat plantings. It may be aggressive on some sites.

'Golden Jubilee' black-eyed susan was released by the Big Flats PMC, New York, and is commercially available.

General: 1,710,000 seeds/lb; 39 seeds/sq ft/lb
Seeding rate: 1 lb/acre in mixture

BLANKETFLOWER (<u>Gaillardia Foug.</u>)
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Several species are native to Western North America. May be annual or perennial wildflowers; solitary, large, showy, daisy-like, yellow to reddish-purple flowers. They are usually drought tolerant; adapted to moderately deep to deep loamy soils. Intolerant to shade.

G. aristata is native to Eastern Washington and Oregon, found on some moist sites with at least 16 inches of annual rainfall. It has some potential for conservation plantings improving plant diversity.

Limited quantities of seed/plants available on the commercial market.

General: 132,000 seeds/lb; 3.2 seeds/sq ft/lb
Seeding rate: 1 to 3 lbs in mix

BURNET

SMALL BURNET
(Sanguisorba minor Scop.)

A perennial, winter active, herbaceous plant; grows up to two feet in height. A herbaceous member of the Rose family; is deep rooted (moderate herbage production and good palatability for deer, elk, domestic livestock. Plant growth is most vigorous in spring and fall. It is best adapted to well-drained soils; but can be grown in low fertility, droughty soils, as well as moist, shallow soils. Germinates and emerges readily, but then establishes slow, usually long lived. It is susceptible to many herbicides; partial shade tolerance. The leaves are edible to humans, called "salad burnet" in Europe. It is best adapted to the 12 to 30 inch annual precipitation zone.

'Delar' is an improved variety, of European origin, released by the Aberdeen PMC.

General: 42,000 seeds/lb; 1 seed/sq ft/lb
Seed production: 11 lbs/ac in wide rows, direct combine
Conservation seeding rate: two-three lbs in mix

CLOVERS (Trifolium L.)

A herbaceous legume genus, annual and perennial species, with many introduced species, dozens of cultivars, in use for over 100 years. Clovers have been used for pasture and hayland plantings, nitrogen fixation, green manure, increased forage production, cover crops in rotation, and in mixtures with grasses. Species that are commonly used include:

- Alsike Clover (Trifolium hybridum L.)
- Crimson Clover (T. incarnatum)
- Kura Clover (Trifolium ambiguum M. Bieb)
- Red Clover (T. pratense L.)
- Strawberry Clover (T. fragiferum L.)
- Subterranean Clover (T. subterraneum L.)
- White Clover (T. repens L.)

For-additional information on clovers and pasture plants refer to pasture management guides or Forages textbook.:

Seeding rate: 2 to 4 lbs/ac in mix with other herbaceous plants.

Over 25 clover species are native to the Pacific Northwest. Some native clovers that may be locally important are:

- Largehead Clover (Trifolium macrocephalum (Pursh) Poir.)
- Thimble Clover (T. microdon Hook & Arn.)
- Douglas' Clover (T. douglasii House)
- Howell's Clover (T. howellii, S. Wats.)
- Longstalk Clover (T. longipes. Nutt.)

(WHEN PURCHASING COMMON NATIVE PLANTS OR SEED, REQUEST "SOURCE IDENTIFIED". This will give you information on where the plant was collected, and may help you decide if it is the ecotype you desire or is suitable for your location and purpose.)

CROWN VETCH (Coronilla L.)

A rhizomatous, introduced, perennial-legume; best adapted to wet drained calcareous soils west of the Cascades. Attractive, low, blooming pink flowers. Grows on mildly alkaline to mildly acidic soils, but not on poorly drained hydric soils. It has been used for erosion control for critical area plantings. May be slow to establish, but long lived, and can be aggressive on some sites. Minimum of 18 inches of annual precipitation is required.

'Chemung' crownvetch is a variety released by the Big Flats PMC, New York.

General: 120,000 seeds/lb; 2.8 seeds/sq ft/lb
Seeding rate: 2 to 4 lbs/ac in mixture with other herbaceous plants

FLAX

LEWIS FLAX **(Linum lewisii var. lewisii Pursh)**

A cold, hardy, perennial wildflower, native to the Western United States. Vigorous, attractive, and can usually compete with weeds. Deep blue flowers last for six weeks, mid to late spring. Requires at least ten inches of annual rainfall on well drained loamy soils. It is tolerant of partial shade; and intolerant of poor drainage and flooding. It may be used for improving plant diversity and control on rangeland, minespoil, and other critical areas. It may be slow to establish, reseeds itself well. Heavy livestock inhibits establishment. Limited amounts of common seed is available from few commercial dealers.

'Appar' is a released cultivar of blue flax (Linum perenne), introduced from Eurasia.

General: 285,000 seed/lb; 6.7 seeds/sq ft/lb
Conservation seeding rate: one-half to 2 lbs/ac in mix with other adapted species.

FLATPEA

PERENNIAL PEAVINE FLATPEA **(Lathyrus latifolius L.)**

Includes several species of perennial legumes, introduced from Europe, adapted to well drained sites west of the Cascades. Attractive pink-purplish flowers; have been used for erosion control in critical area plantings. 'Lathco' flatpea (L. sylvestris) is an adapted SCS variety from the New York PMC. Seed of 'Lancer' perennial peavine (L. latifolius) is also available from commercial dealers.

Purple beachpea (Lathyrus japonicus) and seashore peavine (L. littoralis) are native to the sandy coastal shore from British Columbia to Northern California. Many other peavine species are native to other ecological regions of the Pacific Northwest.

GLOBEMALLOW

SALMON GLOBEMALLOW

(Sphaeralcea munroana (Dougl. ex Lindl.) Spach ex Gray)

A perennial native wildflower, occurs on rangelands in the interior Pacific Northwest and the Great Basin. It has a branched taproot with several surface roots. Early spring to mid-summer herbaceous growth; often green up in the fall. It is moderately palatable to livestock, especially sheep; and for deer, elk and pronghorn antelope. Tolerant of mildly saline soils, but not sodic. Usually occurs in the eight to 12 inch annual precipitation zone; poor tolerance to fire. May be used in seeding mixtures for plant diversity. Gooseberry globemallow (S. grossulariifolia) may also occur naturally in Eastern Washington and Oregon.

LUPINE (Lupinus L.)

The Pacific Northwest has over 20 native lupine species that may be of local importance. Lupines are usually perennial herbaceous legumes, a few species are annual, and more than one species is a shrub. They often are short-lived, persisting for three-four years, but reseed readily. Some species may be toxic to domestic livestock when used as forage, but many lupines are valuable native species for erosion control and conservation purposes, and many are also very attractive plants.

‘Hederma’ pine lupine (L. albicaulis) is a variety of a Western Oregon native species released by the Corvallis PMC.

White lupine (L. albus), introduced from Europe, may have some potential for herbage production and cover crops; it has been used as livestock forage in Spain, Italy and China.

MEDICS/ALFALFA

MEDIC/ALFALFA

(Medicago L.)

Medics and alfalfa species are herbaceous perennial or annual legumes, introduced from Eurasia. They are usually cold tolerant and drought tolerant to about 12 inches mean annual precipitation. Conservation uses include pasture and hayland, cover crop in rotations, wildlife habitat, nitrogen fixation, green manure, and other grass-legume plantings. Medic species include:

- alfalfa** (Medicago sativa L.)
- Yellow-flowered alfalfa** (Medicago falcata L.)
- Black Medic** (Medicago lupulina L.)
- Annual alfalfa** (Medicago littoralis (Rhode ex Loisel.)
M. tornata, M. rugosa Desr.).

MILKVETCH

CICER MILKVETCH **(Astragalus cicer L.)**

A spreading, herbaceous, perennial legume, introduced from Europe. Creeping rhizomes and short taproot. It has been planted with grasses for pasture and hayland, and some wildlife use. Non bloating for livestock. It tolerates slightly acidic to moderately alkaline soils, and moderate soil salinity; and tolerates moist soils better than alfalfa. In general, it grows in the 16 to 35 inch precipitation zone. When seeding use scarified seed. It is slow to establish, seedling vigor is fair. Always use the special cicer milkvetch inoculant when seeding. Use high levels of phosphorous in soil during seedbed preparation to increase establishment (100 -200 lbs/acre). Well established stands are strongly competitive. 'Lutana' and 'Monarch,' are the two cultivars available from commercial dealers.

General: 130,000 seeds/lb; 3 seeds/sq ft/ lb

Seeding rate: 8 to 10 lbs/ac, seed in fall

Over 100 Astragalus species are native to Oregon and Washington, usually occurring on well-drained, moist to dry, silt loam to sandy loam soils, from near sea level to alpine elevations. Some species may be toxic as domestic livestock forage, but many species are valuable native legumes providing herbage for wildlife and livestock. All milkvetches are valuable for erosion control and improving plant community diversity. Some native milkvetches may have good potential as rangeland legumes for seeding mixtures.

(WHEN PURCHASING COMMON NATIVE PLANTS OR SEED, REQUEST "SOURCE IDENTIFIED")

PEAS

FIELD PEAS **(Pisum sativum L.)**

Introduced annual legume that has been used for winter cover in mild winter climates. It should be spring seeded in areas with cold winters; do not seed on soils with a high water table or any substantial flooding.

'Austrian Winter' is a commercial available cultivar.

PENSTEMON (Penstemon Schmdel)

Perennial wildflowers, with over 50 native species found on well-drained soils, from near sea level to alpine elevations, in the Pacific Northwest.

BLUE MOUNTAIN PENSTEMON

(Penstemon laetus Gray)

A native subshrub, 12 to 32 inches tall. Plants are glabrous except for lines of pubescence along stems. Very attractive, light violet to violet-purple flowers; leaves are regular, and finely serrulate or toothed, one to five inches long. Naturally occurs east of the Cascades in the Blue and Wallowa Mountains. This species, and others including P. eatonii, are currently in an Aberdeen PMC study. It may be an important species for erosion control on critical areas and for improving plant species diversity.

RYDBERG'S PENSTEMON

(Penstemon rydbergii A. Nels,)

A herbaceous, long-lived, native wildflower, six to 16 inches tall, with bright blue to purplish flowers. The leaves are deep green, thin, one and one-half to four inches in length. Naturally occurs on moist slopes of ponderosa pine and shrubs, open woodlands and meadows at middle elevations in Eastern Washington and Oregon. Several ecotypes have been included in the Penstemon study at the Aberdeen PMC.

EATON'S PENSTEMON

(Penstemon eatonii Gray)

Firecracker penstemon. Herbaceous, scarlet flowers that lack the flared lobes at the end of tube. Twelve to 30 inches tall with glabrous stems; leaves quite large, one-four inches long, on long petioles. Naturally occurs south of our region from California to Colorado in pinyon pine-juniper woodlands to desert shrub slopes. The Idaho Department of Transportation has successfully used Eaton's penstemon for roadside stabilization and wildflower plantings. It currently is a good performer in the Penstemon project at Aberdeen PMC. Excellent potential for critical areas and rangeland plant diversity plantings.

General: 600,000 seeds/lb; 13.8 seeds/sq ft/lb

Seeding rate: 0.5 to 2 lb/ac in mixture with other adapted species.

WHIPPLE'S PENSTEMON

(Penstemon whippleanus Gray)

A herbaceous perennial wildflower, native to the Rocky Mountains, occurs in Western Montana and Eastern Idaho. This species is also included in the Penstemon study at the Aberdeen PMC.

Varieties of penstemon species released by SCS:

'Bandera' Rocky Mountain penstemon (P. strictus) is a variety released by the Los Lunas PMC, New Mexico.

'Cedar' Palmer's penstemon (P. palmeri) is a variety of this Southwestern United States species released by the Los Lunas PMC.

SAINFOIN (<u>Onobrychis viciifolia</u> Scop.)
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A long-lived, cool season, deep rooted, herbaceous legume, introduced from Southern Europe, has pink flowers. It may be adapted to pasture and hayland plantings on well-drained sandy to loamy soils. Grows best where the mean annual rainfall exceeds ten inches.

'Eski' and 'Remont' are two commercially available varieties.

General: 18,000 seeds/lb; 4 seeds/sq ft/lb

Seeding rate: 20 lbs/ac

TREFOIL

BIRDSFOOT TREFOIL

(Lotus corniculatus var. corniculatus L.)

A perennial introduced legume used for pasture and hayland and conservation purposes in the Pacific Northwest. It is long-lived, but slow to establish. Requires a minimum of 18 inches annual precipitation.

Seeding rate: 2 to 3 lbs/ac in mix with other herbaceous plants

'Cascade' birdsfoot trefoil is a cultivar released by SCS.

Other trefoils released by SCS are 'Kalo' dwarf English trefoil (L. corniculatus var. arvensis) and 'Marshfield' big trefoil (L. pedunculatus). 'Marshfield' performs best on moist sites where the annual rainfall exceeds 40 inches.

Several species of trefoil or deervetch are native to the Pacific Northwest including: Big deervetch (Lotus crassifolius), well drained foothills, west of the Cascades; Meadow lotus (L. denticulatus), east of the Cascades; and Bog deervetch (L. pinnatus), moist soils, west of the Cascades.

VETCH (<u>Vicia</u> L.)

Winter active, introduced annual legumes used primarily for temporary cover and green manure crops. They are suited for silage, winter pasture and hay. Vetches may volunteer readily when allowed to set seed. Vetches used in the Pacific Northwest States include:

- **Common Vetch** (Vicia sativa L.)
- **Hairy Vetch** (V. villosa Roth)
- **Winter Vetch** (V. villosa ssp. varia (Host) Corb.)

'Lana' winter vetch is a varietal release from California.

- **Hungarian Vetch** (V. pannonica Crantz)

YARROW

WESTERN YARROW**(Achillea millefolium var. occidentalis DC.)**

A herbaceous, perennial wildflower, with aromatic leaves and stem. Fibrous roots and extensive slender rhizomes. Basal leaves in rosettes before stems elongate. The leaves are finely dissected. The inflorescence is a flat to round-topped panicle with numerous small composite-type flowerheads, color is usually whitish. It is a good conservation wildflower, may be planted in critical areas and wildlife uses. It is not a preferred livestock forage. It does best on loamy, well-drained soils. Western yarrow requires at least 12 inches annual rainfall. It commonly occurs on Pacific Northwest rangelands and usually grows in full sunlight. The 'Summer Paste' yarrow varieties are not native to North America.

General: 2,800,000 seeds/lb; 64 seeds/sq ft/lb

Seeding rate: < 1 lb/ac in a seeding mixture

NOTE: MANY COMMERCIAL WILDFLOWER MIXES CONTAIN SPECIES THAT ARE NOT NATIVE TO THE PACIFIC NORTHWEST. They may be pretty flowers but will be very aggressive or invasive onto other sites. Examples are cornflower, California poppy and Rudbeckia hirta.

PARTIAL LIST OF
CONSERVATION TREES AND
SHRUBS FOR OREGON AND
WASHINGTON

**PARTIAL LIST OF CONSERVATION TREES AND SHRUBS
FOR OREGON AND WASHINGTON**
(including brief descriptions of species)

ALDER

RED ALDER
(*Alnus rubra* Bong.)

A deciduous, native tree, 30 to 120 feet tall, one to three feet in diameter. Occurs along streams, moist bottomland, and moist mountain slopes; sea level to 3,500 feet elevation. Ranges from California to Alaska; west of the Cascades in Oregon and Washington. Forms pure stands, especially after soil disturbance – a pioneer species, nitrogen fixing; or grows with black cottonwood, bigleaf maple, vine maple, Oregon ash, willows, Douglas fir, and grand fir. Alders are easily propagated from fresh seed sown in the fall or from wild harvest pull-ups or saplings.

SITKA ALDER
(*Alnus viridis* ssp. *Sinuate* (Regel) A.&D. Love)

A deciduous, native shrub or tree, thicket forming, 12 to 40 feet tall. Naturally occurs in very moist valleys, swales or slopes in the mountains usually above 3,000 feet elevation; Northern California to Alaska and Yukon, east to Alberta, Montana, and the Willowa and Blue Mountains, Oregon. Often grows as a pioneer species on middle to high elevation moist, poorly drained sites; nitrogen-fixing shrub. Corvallis PMC has selected an accession, 9040484, for testing in SCS field plantings. This accession has performed well at several low elevation sites west of the Cascades. Another native species, thinleaf alder (*Alnus incana*) occurs along streambanks at low to mid elevations in the interior Pacific Northwest.

ASH

GREEN ASH
(*Fraxinus pennsylvanica* Marsh.)

A deciduous, long-lived tree, naturally occurs in central and Eastern United States. It is winter-hardy, drought resistant, moderate growth rate, easily transplanted, and moderate alkali tolerance. May be susceptible to herbicide and has loss of lower limbs with age. Potential uses are for windbreaks, shade tree, wildlife habitat, and firewood. ‘Cardan’ is a released cultivar from North Dakota.

OREGON ASH
(*Fraxinus latifolia* Benth.)

A deciduous, native tree 40 to 80 feet tall, one to three feet in diameter. Indigenous to moist, sandy, rocky, gravelly soils, usually near stream, on bottomlands or around the margins of wetlands; west of the Cascade and Sierra Nevada Mountains from British Columbia to Central California. Elevation: sea level to 2,500 feet. Minimum annual precipitation: 45 inches. Uses

include erosion control on hydric soils, plant community diversity, water quality and wildlife habitat, and excellent hardwood for furniture. Oregon ash is usually grown from fall sown seed or by grafting to rootstock.

EUROPEAN MOUNTAIN-ASH
(Sorbus aucuparia L.)

An introduced deciduous tree, 20 to 30 feet tall with 15 to 20 feet spread. Dense oval to round crown; orange berry-like fruit; winter-hardy. Primarily used as ornamental or food source for some birds. Requires 20 inches plus annual rainfall.

SITKA MOUNTAIN-ASH
(Sorbus sitchensis var. sitchensis M. Roemer)

An erect, much branched native shrub, to ten feet tall. Occurs on dry to moist, well-drained sites in the sun; usually on mountain slopes from California to Alaska, east to Idaho, Montana, and Nevada. Elevation range: 2,500 to 10,000 feet. It has conservation and ornamental value; fair browse for some wildlife; fruit provides food for many bird species.

WESTERN MOUNTAIN-ASH
(Sorbus sitchensis M. Roemer)

An erect, native deciduous shrub or small tree. Indigenous to moist mountain valleys of Western Canada and United States.

BARBERRY

OREGON GRAPE BARBERRY
(Berberis L.)

Deciduous and evergreen shrubs; winter-hardy; adapted to a wide range of soils; grows in full sun. Several species ornamental and conservation uses. Usually has yellow flowers and blue-black fruit; spiny stems. A number of species and varieties are used in landscaping and wildlife habitat. Oregon grape is a native species found in Washington and Oregon on dry to moist woodland sites.

BIRCH

WATER BIRCH
(Betula occidentalis Hook.)

It naturally occurs along streams and moist forests in the Pacific Northwest. Propagation recommendation: sow fresh seeds in the fall, or keep dry during the winter and sow in sandy soil, cover slightly, press seeds firmly into the soil, keep cool, moist and shaded, transplant seedlings at one year old.

BITTERBRUSH

ANTELOPE BITTERBRUSH
(Purshia tridentata (Pursh) DC.)

A low to medium sized shrub, intricately branched, two to ten feet high, may occasionally reach 15 feet or be prostrate. It is semi-evergreen with a new crop of leaves in the spring and another in the fall. Leaves are three toothed. Adapted to a wide variety of well-drained soils, elevations and annual precipitation of six to 25 inches. It is commonly found in the shrub-steppe regions of the Pacific Northwest and Intermountain West. Often invades or increases on coarse textures, disturbed soils. It is used by livestock and wildlife for forage and cover for wildlife. It is used for some critical areas and as a valuable shrub in restoration of winter game range. It is included as seed in mixture with other species, or plant as container or bareroot stock. It is usually only planted on known bitterbrush sites.

‘Lassen’ antelope bitterbrush is a released cultivar. It was selected for uniformity, seed and forage production from a native stand in Northern California. It is an erect form for granitic or coarse textured soils in Nevada and Northern California.

‘Fountain Green’ is a proposed release of an erect form from Meeker PMC in cooperation with USFS, Intermountain Shrub Lab. Adapted to loamy, bitterbrush sites in Intermountain area, origin is near Fountain Green in central Utah. ‘Maybell’ is a release from Meeker PMC. This is a layering form adapted to the Intermountain West. The origin of ‘Maybell’ is from a native population on a high elevation site in Northwestern Colorado.

BOXELDER (<u>Acer negundo</u> L.)
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Intermountain West native, but does not occur naturally in Oregon and Washington. Large, fast-growing hardy tree which can reach up to 50 feet in height; subject to insects and breakage; needs moderately deep to deep moist soils or regular deep irrigation. Some nursery people consider this a weedy species; readily suckers; in addition it is prone to breakage of branches and insect damage; a pioneer species. ‘Nova’ is a commercial variety.

BUCKWHEAT

SNOW BUCKWHEAT
(Eriogonum niveum Dougl. Ex Benth.)

A deciduous native half-shrub, up to 30 inches in height, rounded in form. Typically occurs on arid to semi-arid rangelands, below 4,500 feet elevation, from interior British Columbia to Eastern Oregon, and east to Southwest Idaho. Annual precipitation requirements: seven to 18 inches; best on well-drained sandy loams, does poorly on moist silt loam soils. Attractive white flowers that bloom in late summer; an excellent source of late season nectar for honeybees. Spreading, grayish-white branches and gray-green leaves. Important as late winter browse for wildlife, especially mule deer and elk.

Conservation uses include erosion control on droughty hillsides and rangelands, wildlife plantings, native plant species diversity, and landscape plantings. Snow buckwheat is usually propagated by fall or spring sown seed, or as bareroot stock.

Released cultivar: ‘Umatilla’ snow buckwheat was released by the Pullman PMC in 1991.

Snowbuckwheat is only one of over 35 species of *Eriogonum* native to Washington and Oregon.

BUFFALOBERRY

SILVER BUFFALOBERRY/SOAPBERRY

(Shepherdia argentea (Pursh) Nutt.) / (S. Canadensis (L.) Nutt.)

Native to Western United States; a thorny, deciduous shrub or small tree, often thicket-forming, dense growth ascending to erect thorny branches; silvery branches when young; up to 13 feet tall; leaves are silvery-scurfy; dioecious; flowers yellow; fruit is red. Roots shallow, extensive, well-branched, and capable of fixing nitrogen; it readily suckers. It does well on most soil textures, but is best on well-drained medium to coarse soils; slightly acid to mostly basic or saline. It is most common on moist to seasonally wet sites in semi-arid zones in Montana and Idaho at 12 to 20 inches annual precipitation. It has weak drought tolerance, generally winter hardy, mostly intolerant of shade, fair to good fire tolerance due to sprouting, grazing resistance to domestic livestock. It is usually planted as container or bareroot stock. Potential use for wildlife cover and food, diversity in rangeland and critical areas. ‘Sakakawea’, silver buffaloberry, is a recent release from the Bismark PMC, North Dakota.

CARAGANA or Siberian Peashrub, (Caragana arborescens Lam.)

A very hardy, introduced deciduous, leguminous shrub or small tree up to 30 feet in height. It has pinnate leaves with up to 18 small leaflets. It has been planted throughout the Northwest and Intermountain areas as a windbreak shrub; appears to be cold and drought tolerant. Potential use as a non-native shrub for windbreaks; fair to good value for wildlife food and/or cover. It is planted as container or bareroot stock, conservation grade. It requires at least 12 inches annual precipitation for establishment.

CEANOTHUS

HYBRID CEANOTHUS

(Ceanothus cuneatus (Hook.) Nutt.; C. prostrates Benth.)

‘Cuesta’ hybrid ceanothus was released by the Lockeford PMC in 1990. It is a naturally occurring hybrid of wedgeleaf ceanothus (C. cuneatus) and squawcarpet (C. prostrates) found in Northwest California; dry, sunny hillsides with well-drained sandy or gravelly soils. Has a rounded growth form, three to five in height; a vigorous and attractive low growing shrub; requires at least 16 inches of annual rainfall. Potential uses for erosion control on droughty soils, wildlife browse planting, and native plant community restoration. Planted as container or bareroot stock.

CHERRY

BITTERCHERRY**(Prunus emarginata Dougl. Ex Hook.) Walp.)**

This is a shrub that naturally occurs on moist, well-drained sites, usually west of the Cascades.

COMMON CHOKECHERRY**(Prunus virginiana L.)**

Deciduous, loose thicket-forming native shrub or small tree. Mature plants can be five to 30 feet tall, sometimes dwarfed or more treelike. Stems numerous, slender, reddish-brown, ascending to erect, loosely branching from base and from upright to spreading main branches. White flowers. Fruit red to purplish-black, round berry-like drupes in clusters. Rhizomatous with extensive shallow roots and few deep feeder roots. Sprouts readily. Forms thickets. Palatable browse for livestock and wildlife, good cover and food for wildlife. Use also for riparian improvement. Adapted to wide variety of moist, deep soils. Plant as container or bareroot stock in moist sites or where the precipitation zone is 18 inches or greater. It has been included in projects at Pullman, Aberdeen, and Meeker PMCs. *Prunus* species are usually grown as bareroot or container stock from seed, less often by grafting or cuttings.

MONGOLIAN CHERRY**(Prunus fruticosa Pallas)**

Small suckering shrub; glossy foliage; abundant cherrylike fruit; four to six feet in height; crown width ten to 15 feet; slender branches; white flowers; introduced from Mongolia. It does best on deep to moderately deep loamy and silty sites, well-drained to poorly drained; winter-hardy. Potential use in multi-row windbreaks. Plant two-year old stock in early spring. Requires at least 16 inches annual rainfall. ‘Scarlet’ is a released variety.

NANKING CHERRY**(Prunus tomentosa Thunb.)**

Winter-hardy, fast growing, attractive, short-lived shrub (eight to ten years), introduced from China, Japan, and the Himalayas; on favorable sites to heights up to 70 feet; 16 inch plus annual precipitation zones; potential for leese of multi-row windbreaks. It is a good ornamental shrub with showy flowers and edible fruit.

CINQUEFOIL

SHRUBBY CINQUEFOIL (Bush Cinquefoil) **(Pentaphylloides floribunda (Pursh) A. Love)**

Native to the Intermountain West region and Pacific Northwest; deciduous shrub one to three feet high; full sun, wide variety of soils, but performs best in full sun, well-drained soils, very hardy. Used for landscaping, possible value in some erosion control situations; 20 inch precipitation zones; drought tolerant. There are a number of varieties available at nurseries. Another shrub cinquefoil that naturally occurs on fens and bogs is Potentilla palustris, marsh cinquefoil.

CLEMATIS

WESTERN WHITE CLEMATIS **(Clematis ligusticifolia Nutt.)**

Native Intermountain West and Pacific Northwest vine mostly found along streams; abundant clusters of showy white flowers; fast growing; adapted to most well-drained soils in sun or partial shade; drought tolerant; 15 plus inch annual precipitation is required for establishment. Good cover for some wildlife species and for erosion control; good plant for the top of streambanks in riparian zones.

Also known as “virginsbower”. A vigorous, climbing, deciduous native vine with pinnate leaves and feathery or densely villous white seeds. It provides valuable wildlife habitat and ground cover in riparian areas and along fencelines in Northwest and Intermountain areas. Pullman PMC has released a variety, ‘Trailar’, for conservation plantings.

COTONEASTER

MANY-FLOWERED COTONEASTER **(Cotoneaster multiflora Medik.)**

Introduced from Western China; an upright, deciduous shrub with graceful arching or drooping, slender branches to ten feet high; twigs purplish; fruit ripens in August and is red; flowers in May, many, small, whitish. The leaves are three-quarters to two inches long. It was included in a windbreak planting at Aberdeen PMC.

PEKING COTONEASTER **(Cotoneaster acutifolius Turcz.)**

Introduced from Northern China. Upright, dense, deciduous, somewhat spreading, bushy shrub to 12 feet in height. Leaves three-quarters to two inches long, not shiny, narrow. Flowers small, pinkish. Fruit in September through October. Redbrown bark. Hardy. Spread to ten to 12 feet. Root system fibrous. A little hard to transplant. Sunny and airy site: to partial shade. Likes wind exposure. Growth rate is slow. Well-drained, dry soil. Leaves turn orange-red in fall.

Requires at least 18. inches of annual precipitation. It has some windbreak potential, included in windbreak planting at Aberdeen PMC.

COTTONWOOD

BLACK COTTONWOOD

(Populus balsamifera ssp. trichocarpa (T. & G. ex Hook.) Brayshaw)

A very large, deciduous native tree, exceeds 100 feet in height at maturity. It naturally occurs on moist sites along streams, bottomlands, river islands and benches in the Western United States and Canada. Elevation range: near sea level to 4,500 feet along mountain streams. Minimum annual rainfall or equivalent irrigation/runoff: 35 inches. It is very shade intolerant; grows rapidly and will sprout from the stump; associated with red alder, bigleaf maple, Oregon ash, Douglas fir, and grand fir. An important tree for streambank protection, and provides roosting and nesting sites for many species of birds. Black cottonwood is most easily grown by dormant hardwood cuttings, whips or poles planted in the spring.

HYBRID COTTONWOOD

(Populus trichocarpa T. & G. ex Hook. X P. deltoides Barter ex Marsh.)

A very large vigorous, deciduous tree, originated at the Washington State University Experiment Station. Very rapid growth, vigorous usually with one main trunk; heights up to 90 to 100 feet; adapted to hydric soils; some tolerance to salinity and alkalinity; requires minimum of about 30 inches annual precipitation or equivalent; primary use for pulp production; suitable for single and multi-row windbreaks; minimal value for wildlife. It should not be planted in riparian areas or adjacent to wetlands.

NARROWLEAF COTTONWOOD

(Populus angustifolia James)

It is known to occur from Southeast Oregon and Southern Idaho, east to the Great Plains.

PLAINS COTTONWOOD

(Populus deltoides ssp. monilifera (Ait.) Eckenwalder)

It usually occurs east of the Rocky Mountains.

QUAKING ASPEN

(Populus tremuloides Michx.)

Large, deciduous native tree, up to 60 feet in height. Found along streams and moist benches, and mountain slopes. Grows on a variety of soils, but does best on sandy loams. It is the most widely distributed North American native tree. A good conservation tree, and wildlife habitat, on moist, sandy sites. It is shade intolerant, grows rapidly, and sprouts when cut. Young plants must be protected from browsing animals until three to five years old. Quaking aspen may be grown from seed sown in the spring or by division of root suckers during the growing season.

CRABAPPLE

MANCHURIAN CRABAPPLE

(Malus baccata var. mandshurica (Maxim.) C.K. Schneid)

Manchurian crabapple is an extremely winter-hardy, drought tolerant, disease-resistant, small to medium tree. Introduced from Siberia and Northern China. Adapted to wide range of soils; fair tolerance to droughty, infertile or wet soils; heights to 20 feet; rapid, dense growth; some potential for single and multi-row windbreaks. It is suitable for screen and ornamental plantings. 'Midwest' is released cultivar for conservation work; 'Columnaris' is a release for landscaping; both are varieties from the Midwestern United States. Siberian crabapple (M. baccata (L.) Borkh.) is an introduced small to medium tree. Crabapples in general, require at least 20 inches of annual precipitation for establishment.

CURRENT

GOLDEN CURRENT

(Ribes aureum Pursh)

Deciduous shrub, erect growth, three to six feet tall; native to the Pacific Northwest; best in moist, deep loamy soils; 24 plus inches of annual precipitation; full to partial shade; good value for wildlife cover and food; fair to good ornamental shrub.

DOGWOOD

BUNCHBERRY DOGWOOD

(Cornus canadensis L.)

A low-growing, deciduous native shrub, up to one foot in height. Typically found as an understory plant in coniferous woodlands in the Pacific Northwest. It has attractive white flowers (actually the bracts, flowers are inconspicuous) in the spring. It is an important plant for soil protection in woodlands, the red berries provide food for some wildlife species. Bunchberry is usually grown from fall sown seed, transplanted, then planted as container stock at one to two year old.

PACIFIC DOGWOOD

(Cornus nutallii Audubon ex Torr. & Gray)

A medium-sized, deciduous tree native to Eastern Washington and Oregon. It is found on moist bottomlands and hillsides west of the Cascade Mountains. An attractive tree, up to 60 feet in height, with a round to conical crown. It has very small, greenish-white flowers in a compact head surrounded by four to six large creamy white bracts, very showy in the spring. It is shade tolerant, associated with bigleaf maple, red alder, vine maple, willows, Douglas fir, and western hemlock. Pacific dogwood is propagated from fall sown seed and planted as container or bare root stock.

WESTERN RED-OSIER DOGWOOD
(Cornus sericca ssp. sericea L.)

A medium-sized, deciduous native shrub with bright red twigs, brilliant red foliage in the fall, and a stoloniferous root system. Typically found on moist sites along some perennial streams. White flowers appear in clusters in May to June, followed by white berries in late summer. The berries are sought after by many species of birds, and an important browse plant for other wildlife. Potential uses include riparian restoration, streambank stabilization, wildlife habitat, ornamental and landscaping, and field shelterbelts. It is usually planted as container or bareroot stock.

Cultivar releases:

'Mason' red-osier dogwood was released in 1992 by the Corvallis PMC. It was the best accession of 60 tested in PMC evaluations in Western Oregon and Washington. An excellent ecotype from Eastern Washington, with good vigor, attractive foliage and spreading stems from six to 16 feet in height. It requires a minimum of 40 inches annual precipitation or equivalent irrigation.

'Ruby' red-osier dogwood was released by the Big Flats, NY PMC in 1991. This cultivar has been tested at Corvallis and Pullman PMCs and has not performed as well as the Pacific Northwest ecotypes in Oregon and Washington.

Other PMC studies: Pullman and Aberdeen PMCs have current projects including red-osier dogwood ecotypes with potential for use in the interior Pacific Northwest and Great Basin.

ELDERBERRY

BLUE ELDERBERRY
(Sambucus cerulea Raf.)

Large native shrub, common in riparian zones and thickets on alluvial valley soils; four to ten feet high; snowy clusters of small flowers and blue berries. Good food for birds; readily browsed. Eighteen plus inches of annual precipitation is required for establishment. Elderberries are propagated from softwood cuttings in June or July, or from clean seed sown in the fall.

RED ELDERBERRY,
(Sambucus racemosa ssp. pubens (Michx.) House)

Naturally occurs west of the Cascades, at low to mid elevations, usually within ten miles of the coast or ocean.

HACKBERRY (Celtis L.)

Hackberry is a deciduous tree with rounded, spreading crown, reaching heights of 50; feet native to Eastern United States; fast growing on moist, rich soils, but adapted to wide range; fair to good tolerance to salinity and alkalinity; drought resistant after establishment; 18" plus precipitation zones; suitable for single (however loss of lower limbs with age reduces effectiveness) and multi-row windbreaks; Hackberry fruits are popular with many species of birds during winter months. Deer browse on twigs and foliage. A native shrub hackberry (Celtis reticulata) occurs on coarse textured soils along the Snake River and its tributaries.

HAWTHORN

DOUGLAS HAWTHORN (Crataegus douglasii var. douglasii Lindl.)

Native shrubs or small trees to 35 feet in height; occurs on both sides of the Cascades. It is often associated with riparian areas, streambanks and along fences and borders of fields. It is useful for plant diversity, hedges, shelterbelts and wildlife habitat. Commercial varieties of European hawthorns are also available.

HEMLOCK

WESTERN HEMLOCK (Tsuga heterophylla (Raf.) Sarg.)

A native conifer growing to 150 feet high on the best sites which thrives in the humid climate of Western Washington and protected mountain valleys of Eastern Oregon, Washington and Northern Idaho. Important timber species, may be used in landscaping. Young seedlings are shade tolerant.

HONEYLOCUST (Gleditsia triacanthos L.)

A deciduous, medium to tall, introduced tree with spreading branches and a broad, graceful crown; heights from 40 to 70 feet; vigorous growth in moist soils, tolerance to droughty and alkaline soils; 16 inch plus precipitation zones; use only as central row in multi-row windbreaks, not recommended for single row windbreaks; limited value for wildlife except for some songbird cover; some value for recreational or ornamental planting.

HONEYSUCKLE (Lonicera L.)

Bush honeysuckles are introduced, large shrubs growing ten to 15 feet in height. The branches are spreading. Amur honeysuckle (Lonicera maackii) is a large spreading shrub with fragrant,

conspicuous white flowers. It bears fruit well into the winter. Tatarian honeysuckle (Lonicera tatarica) is a large shrub which bears pink flowers in the spring and a berry crop in summer, but does not hold fruit into the winter. Sixteen inches or greater annual precipitation is required for establishment. Honeysuckles may be suited for some conservation plantings and wildlife habitat; use with caution as they may be aggressive or spread to other sites. Planted as container or bareroot stock, conservation grade.

BLUELEAF HONEYSUCKLE
(Lonicera korolkowii Stapf)

Deciduous shrub, arching form to 12 feet, introduced from Turkestan; bluish green color, small flowers, very winter hardy; takes desert heat; best on moderately deep to deep soils; greater than 20 inches annual precipitation. Potential for a shrub row in multi-row windbreaks;. attractive as ornamental. 'Zabelii' is a released variety.

TWINBERRY HONEYSUCKLE
(Lonicera involucrata Banks ex Spreng.)

Twinberry is native to some forestlands of the Pacific Northwest; requires at least 20 inches of annual rainfall. It has excellent potential for conservation plantings.

HOPSAGE

SPINY HOPSAGE
(Grayia spinosa (Hook.) Moq.)

A shrub native to the Columbia Basin and Intermountain West. Spines cent, diffusely-branched, evergreen to deciduous shrub, spreading to erect Branches gray. The leaves are rather fleshy, scurly gray, mostly dioecious. Moderately deep, generalized root systems. Plants resume visible growth in late winter to early spring. Fair to good palatability. Adapted to sandy to clayey and shallow, rocky soils in Great Basin and Columbia River Basin desert sites. Tolerant of alkaline soils, less so to saline, strongly drought tolerant, variable cold tolerance; grows in full sunlight. Fair tolerance to grazing. Six to 12 inch annual precipitation is required. 402,000 dewinged seed/lb. In an evaluation planting at Aberdeen PMC. Spiny hopsage may be used for rangeland restoration, critical areas, and wildlife habitat.

HUCKLEBERRY

EVERGREEN HUCKLEBERRY
(Vaccinium ovatum Pursh)

An erect, evergreen broadleaved shrub, three to six feet tall. Leaves are bright green, thick, and leathery, which makes it a commercial crop for floral greenery. It is adapted to the coastal fog belt as an understory species. It prefers an acid soil with high organic matter and high moisture availability. Seedlings are very slow growing. Top pruning may be desirable at planting time to increase survival on exposed sites. Potential use for streambank restoration and montane

plantings. Another native huckleberry found west of the Cascades is Tall Blue huckleberry (Vaccinium ovalifolium Sm.). Black Mountain huckleberry, is a native, usually deciduous shrub that occurs on both sides of the Cascades, Olympic Mountains and Blue Mountains at mid to high elevations.

JUNIPERS (Juniperus L.)

Junipers are evergreen shrubs or small trees of introduced and native origin. The low-growing junipers are the most useful for erosion control. They are best adapted in hot, full-sun areas or partial shade. Junipers are hardy, drought-tolerant, and adapted to all soils except wet soils. Rocky Mountain juniper (J. scopulorum) is a valuable windbreak species native to Intermountain west area. Plant as container or bare root stock. Ten plus inches of annual precipitation is required. Western juniper (J. occidentalis) is a common shrub native to arid regions of the interior Pacific Northwest.

EASTERN REDCEDAR (Juniperus virginiana L.)

Eastern redcedar is a winter-hardy, drought tolerant alkali-tolerant, long-lived, evergreen, conifer; native to Eastern United States; small tree up to 15 feet in height; slow to moderate growth rate; dense branching. It is adapted to wide range of soils, except wet. Fifteen inches plus annual precipitation is required for establishment. It has some windbreak potential in Eastern Oregon.

ROCKY MOUNTAIN JUNIPER (Juniperus scopulorum Sarg.)

Small evergreen tree to 20 feet; very hardy; compact, narrow gray blue pyramid; medium growth rate; adapted to wide range of soils, fair tolerance to saline-alkaline soils; native to Intermountain West region; drought tolerant; 12 plus inches of annual precipitation. Use for windbreaks; good wildlife cover for a number of birds and mammals.

KINNIKINNIK (Arcostaphylos uva-ursi (L.) Spreng.)

An Intermountain West and Pacific Northwest native creeping herbaceous plant to about 12 inches high; small, shiny, leathery, deep green leaves, red stems, small pinkish flowers, red berries in fall, adapted to variety of soils, does well on sands and sandy loam, full sun or partial shade. Requires 18 plus inches of annual precipitation. Good potential use for ground cover and landscaping.

KOCHIA

FORAGE KOCHIA (Prostrate Kochia) **(Kochia prostrata (L.) Schrad.)**

A perennial, non-native, semi-evergreen subshrub (half shrub) with succulent branches stems, gray-green to green color. Oxalate levels lower than winterfat and fourwing saltbush. One to three feet high. Cool season-warm season. Introduced from Central Asia.

'Immigrant' is the only released cultivar. It has a fibrous root system with large deep tap root and can establish on harsh, disturbed soils. Adapted to basic soils, sandy loam to heavy clay. Eight to 14 inch precipitation zones. It is seeded in mixtures usually 395,000/lb in bracts, 13.6 lb/bushel; seed production: seed at 1 lb/ac in wide rows. Must be seeded very shallow.

MAPLE

BIGTOOTH MAPLE **(Acer grandidentatum Nutt.)**

A deciduous tree native to canyons and streambanks from Idaho to the Rocky Mountains; 30 to 40 feet tall, adapted to rich, deep, well-drained soils, moist but not wet; 20 plus inches of annual precipitation; can be shrubby or pruned; mostly used as ornamental, full sun or partial shade.

DOUGLAS' MAPLE **(Acer glabrum var. douglasii (Hook.) Dippel)**

This small native tree occurs along streams and in moist forests, usually east of the Cascade Mountains. It is usually grown from fresh seed sown in the fall, or from cuttings under greenhouse conditions.

VINE MAPLE **(Acer circinatum Pursh.)**

An erect, multistemmed, deciduous native shrub, up to 20 feet in height. Typically found as an understory shrub in Pacific Northwest woodlands, west of the Cascade Mountains, also in the Blue Mountains and Wallowa Mountains. Valuable browse for deer and elk. Occurs on moist sites, in sun or shade, along streams, hillsides, a pioneer species on cutover and burned-over lands. Elevation: from near sea level to 3,500 feet. Annual precipitation: at least 30 inches. The leaves, especially those in the sun, are an attractive bright red color. Potential uses include soil protection after fires or on cutover woodlands, streambank stabilization, landscaping and wildlife plantings. The Corvallis PMC is currently testing ecotypes in a study at the center. Douglas' maple (Acer glabrum) is a small native tree that occurs along streams and in moist forests, usually east of the Cascade Mountains. All maples are usually grown from fresh seed sown in the fall or from cuttings under greenhouse conditions.

MOCKORANGE (Philadelphus L.)

Mockorange is native to the Western United States erect and arching habit, six to 15 feet tall, showy flowers, somewhat drought tolerant. It is adapted to moderately deep to deep well-drained moist soils. It requires 18 plus inches of annual precipitation. Potential use for upper banks of riparian zones, diversity and landscaping. It is grown from seed sown into nursery beds in the fall, and transplanted at one to two year old.

MOUNTAIN MAHOGANY (Cercocarpus Kunth)

It is a native deciduous shrub to the Intermountain West, four to nine feet in height, dark green leaves, very drought tolerant, very cold hardy, requires full sun and well-drained soils, requires at least 12 inch annual precipitation, potential use for wildlife cover and food, and for conservation plantings

NINEBARK (Physocarpus Maxim.)

It is native deciduous shrub that occurs on moist sites in the Pacific Northwest. P. malvaceous is found east of the Cascades on moist talus slopes and forestlands. P. capitatus is common along streambanks west of the Cascades.

OAK

OREGON WHITE OAK (Quercus garryana Dougl. ex Hook.)

Deciduous native tree, 40 to 80 feet in height, two to three feet in diameter, with a broad compact crown. Naturally occurs on dry to moist, well-drained, gravelly or sandy soils in the valleys and lower foothills, Northern California to British Columbia. Usually found west of the Cascades, but also in Hood River, Sherman and Wasco counties, Oregon and Klickitat and Yakima counties, Washington. It is the only oak native to Washington. Elevation: from near sea level in the north to 4,000 feet in the south. Minimum annual rainfall required: 25 inches. Shade intolerant in Oregon and Washington. It forms pure stands or savanna grasslands, associated with Pacific madrone, Oregon Ash, bigleaf maple, Douglas fir, and ponderosa pine.

OCEANSPRAY (Holodiscus discolor (Pursh) Maxim.)

It is an erect, loosely branched, deciduous native shrub up to 15 feet tall. It is shade tolerant, found on moist, well-drained riparian sites. Naturally occurs from coastal California to British Columbia, eastward to Idaho at low to middle elevations. Minimum annual rainfall required is 20 inches. Potential for conservation plantings on riparian restoration projects, wildlife habitat, and landscaping.

The Corvallis PMC has established a comparative study of Pacific Northwest ecotypes of

oceanspray.

PINE

AUSTRIAN PINE
(Pinus nigra Arnold)

A long-lived, medium to tall, somewhat drought-resistant, winter-hardy, evergreen, conifer tree; native to Central Europe and Western Asia. Grows well on wide variety of soils. On favorable soils, can reach 40 to 60 feet. Fair adaptability to droughty and infertile soils. Requires 20 plus inches of precipitation. Slow to moderate growth rate. Suitable for single and multi-row windbreaks. Important cover and nesting for birds.

MUGHO PINE
(Pinus mugo-Turra)

An introduced evergreen from the Eastern Alps and Balkan region of Europe. It has slow growth to four feet; a shrubby, symmetrical pine, to six feet in height, dense and very cold hardy. It is adapted to a wide variety of well-drained soils, full sun. It requires at least 18 inches annual precipitation. It is mostly used as an ornamental plant, but can be used as shrub row in multi-row windbreaks protecting buildings.

PONDEROSA PINE
(Pinus ponderosa P. & C. Lawson)

It is a very cold hardy, deep-rooted, drought-resistant, long-lived, small to tall native evergreen tree; adapted to wide range of well-drained soils. It is a valuable timber resource on favorable sites; heights can reach over 75 feet; initial growth rate slows for three to four years. It requires at least 16 inches of annual precipitation. It may be used as central rows in multi-row windbreaks; highly recommended for single row windbreaks. It has good value as cover for some birds and wildlife. Ponderosa pine may also be used for conservation, ornamental and landscape plantings.

SCOTCH PINE
(Pinus sylvestris L.)

It is a long-lived, medium tall evergreen tree; up to 50 feet in height, somewhat drought-resistant, winter-hardy. It is introduced from Europe and Siberia; prefers deep, moist well-drained soils; often develops crooked trunk in early years; requires at least 20 inches annual precipitation. Potential use for single and multi-row windbreaks, bird cover, and nesting; suitable for ornamental and landscape plantings.

WESTERN WHITE PINE
(Pinus monticola Dougl. ex D. Don)

An evergreen tree up to 150 feet in height and two to four feet in diameter. It is native to the mountains of Southern British Columbia south to Central California and Western Nevada; it is

commonly found in forests of Eastern Washington, Oregon, and Northern Idaho. Some strains of western white pine are attacked by white pine blister rust. It is an important timber species and for conservation planting.

PLUM

AMERICAN PLUM

(Prunus americana Marsh.)

American plum is deciduous, large shrub, occurring in the eastern United States, with broad crown, reaching heights of 15 feet. Moderately dense, moderate growth rate, long-lived, many-stemmed, winter-hardy, intolerant of shade and drought; readily sprouts to form dense thickets. Grows best on deep, moist soils but is adapted to wide range of soils. Twigs can be somewhat spiny. It requires at least 22 inches annual precipitation. Potential use as outer row in multi-row windbreaks. Not recommended for single row windbreaks. May be valuable shrub for songbird habitat and as animal shelter. The fruit may serve as emergency food; twigs and foliage are excellent browse for deer.

ROSE

WOODS' ROSE

(Rosa woodsii Lindl.)

Native to Intermountain area, fast growing shrub three to five feet, numerous flowers, adapted to wide range of well-drained moist soils, drought tolerant, 15 plus inches of annual precipitation. Possibly good for shrub row in multi-row windbreaks; good cover and food for some species of wildlife, particularly birds; fair ornamental value (good for low maintenance situations). Other native species that may occur, west of the Cascades or in the Blue Mountains are: Nootka rose (R. nutkana) and baldhip rose (R. gymnocarpa). Roses are grown by clean seed sown in the fall to nursery beds, cuttings or grafted to rootstock.

SAGEBRUSH

BIG SAGEBRUSH

(Artemisia tridentata Nutt.)

A small to medium, cool season, evergreen shrub. Three main subspecies exist: Wyoming big sagebrush is found on arid sites with shallow soil. Basin big sagebrush is usually found on overflow sites with deep soil. Mountain big sagebrush naturally occurs on frigid sites with deep soil. An erect native shrub with gray-green foliage. Some leaves remain on the plant year round. It is one of the most widespread plants in the dry areas of the Western United States. The height can vary from two to 15 feet. Most new leaves occur in spring, but it will initiate growth anytime conditions permit. Value high for wildlife cover, but mountain and Wyoming big sagebrush have some winter feed value for animals. It grows from 1,000 to 9,000 feet on wide range of semi-arid

sites; best on well-drained soils; fire intolerant; seedling vigor is weak. It may be directly seeded (very shallow), container, and bareroot stock. Usually seeded in mixture at .1 lbs/ac; 2,520,000 seeds/lb for basin; 1,760,000 seeds/lb for mountain; and 1,215,000 seeds/lb for Wyoming. A variety of mountain big sagebrush 'Hobble Creek' has been released by the US Forest Service in Utah. Great genetic diversity is found within big sagebrush populations. It hybridizes easily and prolifically between subspecies.

SAGEWORT

FRINGED SAGEWORT **(Artemisia frigida Willd.)**

Native to Intermountain West region; grayish evergreen ground cover to one foot; forms a mass when pruned; pruning will keep soft, silvery appearance; adapted to wide range of soils, best on sand or sandy loam, drought tolerant, full sun; 15 plus inches of annual precipitation. Potential use for ground cover and plant diversity. It has very limited habitat in Eastern Washington.

LOUISIANA SAFEWORT or Prairie Sage **(Artemisia ludoviciana Nutt.)**

Small herbaceous half-shrub, short-lived, native to the western United States, rhizomatous; moderately deep to deep well-drained soils; 15 plus inches of precipitation annually; normally seed in mixture; use for ground cover, erosion control. 'Summit' is a released cultivar from the Meeker PMS, Colorado.

SALTBUSH

FOURWING SALTBUSH **(Atriplex canescens (Pursh) Nutt.)**

A low to medium sized native shrub on dry rangelands in Eastern Oregon and Southern Idaho. It is adapted to most soil textures. It is a warm season shrub; deciduous to persistent-leaved or evergreen foliage. The stems are stout, loosely branched, whitish; gray-scurfy leaves; extensive root system. It does best in weak to strongly basic and moderate to strongly saline, calcareous soils. It is intolerant of high water tables or flooding. Eight to 15 inches of annual precipitation is required for establishment. Drought tolerant, good cold tolerance, seedlings are often frost sensitive. Direct seed, container or bareroot stock. Most often direct seeded in late fall.

General: 52,000 dewinged seeds/lb; 1.2 seeds/sq ft/lb.

Seeding rate: 1-5 lbs/ac in mixture of dewinged seed.

4-8 lbs/ac for pure stands (double if not dewinged).

Released cultivars: 'Rincon' (Los Lunas PMC, New Mexico) adapted to the Intermountain West, tolerates salinity. It is taller than 'Wytana'. 'Wytana' was released by the Bridger PMC; it possibly has better cold tolerance than 'Rincon' and better seedling vigor. 'Santa Rita' is a variety

released by Tucson PMC, Arizona. There currently are fourwing saltbush studies at Aberdeen PMC and other PMCs.

NUTTALL'S SALT BUSH
(Atriplex nuttallii S. Wats.)

A saltbush native to Idaho, Utah and the Great Plains; low-growing, usually does not exceed three feet in height. An accession, PI478830, has been selected from studies at the Bridger PMC: it is from East Central Montana. A good browse species from some wildlife and livestock, may be good on saline soils; annual precipitation from six to 15 inches. It is currently in a study at the Bridger PMC.

SERVICEBERRY

WESTERN SERVICEBERRY
(Amelanchier alnifolia (Nutt.) Nutt. Ex M. Roemer)

It is native to portions of Oregon, Washington, Idaho and Intermountain West; cool season, clump-forming, deciduous shrub or small tree, three to 15 feet in height. The stems are numerous, branching, ascending to erect. It grows from root crowns or short rootstocks, sprouts suckers moderately vigorously; the flowers are showy and white; red to purple-black fruit; fair to good palatability to livestock. It is important habitat for wildlife. It does best on deep fertile, well-drained, medium textured soils, and weakly acid to neutral soils, it is not tolerant to saline or high water table. Sixteen to 24 inches annual precipitation is required (less on moist sites). Moderately drought tolerant, cold tolerant, good tolerance to fire. Under evaluation at Meeker PMC, Colorado. Utah serviceberry (Amelanchier utahensis) is a shrub similar to A. alnifolia; occurs on the drier ridges and slopes within big sagebrush, pinyon-juniper and aspen sites mostly in the Great Basin; has been direct seeded successfully on some sites in Utah. Utah serviceberry is under evaluation at Aberdeen and Meeker PMCs.

Other native serviceberries include: Pacific serviceberry (A. alnifolia var. semiintegrifolia) naturally occurs west of the Cascade Mountains. Cusick's serviceberry (A. alnifolia var. cusickii) is indigenous to Eastern Washington and Northern Idaho. Serviceberry is propagated by clean seed sown in the fall to nursery beds or by softwood cuttings, transplanted as container or bareroot stock at one to two years old. These native serviceberries are currently in studies at the Corvallis and Pullman PMCs.

CUSICK'S SERVICEBERRY
(Amelanchier alnifolia var. cusickii (Fern.) C.L. Hitchc.)

A deciduous shrub that naturally occurs on moist to dry, well-drained benches and streambanks in Eastern Washington, Northern Idaho, and Eastern Oregon. Pacific serviceberry (Amelanchier alnifolia var. semiintegrifolia) is an indigenous shrub found on moist, well-drained sites, west of the Cascades. Utah serviceberry (Amelanchier utahensis) is native to moist slopes and riparian areas in Southeastern Oregon, Southern Idaho, Nevada and Utah. Serviceberry is grown by clean seed sown in the fall or by softwood cuttings.

SNOWBERRY

COMMON SNOWBERRY

(Symphoricarpos albus (L.) Blake)

Native to Intermountain West and Pacific Northwest; deciduous shrub three to six feet; medium to rapid growth; small white flowers, showy white berries; wide range of soils; tolerates full sun, but prefers partial shade; 20 plus inches of annual precipitation; use for ground cover, possible conservation uses on the upper terraces in riparian zones and woodland understory.

SPIREA

DOUGLAS' SPIREA

(Spiraea douglasii. Hook.)

An erect, freely branching, deciduous native shrub, three to seven feet in height. Naturally occurs on moist soils along streams, bogs, and marshes, in swales and around seeps on mountain slopes; from Northern California to British Columbia, west of the Cascades, infrequently in Eastern Washington. An aggressive, spreading or suckering habit, especially suited to moist peat, clay and clay loam soils. The minimum annual rainfall or equivalent should be 45 to 60 inches. Large, pyramidal-shaped panicles with bright pink flowers appear from June to early August; plants; have reddish-brown twigs. Spireas are grown from fall sown seed, less often from hardwood cuttings.

Released cultivar: 'Bashaw' Douglas spirea was released in 1990 by the Corvallis PMC.

Other native species found in the Pacific Northwest are: Spiraea pyramidata and S. betulifolia.

SPRUCE

BLUE SPRUCE

(Picea pungens Engelm.)

An attractive, hardy, long-lived, medium to tall evergreen; conifer tree reaching heights of at least 40 feet. It naturally occurs in the Central Rockies region of the United States; dense; slow growth first five years, moderate, after; attractive conical shape; prefers deep, moist, well-drained soils but will grow on other soils if sufficient moisture is available. Twenty plus inches of annual precipitation is required for establishment. Suitable for single and multi-row windbreaks. Excellent nesting, roosting and winter cover for numerous bird species.

NORWAY SPRUCE
(Picea abies (L.) Karst.)

Evergreen, conifer tall tree, sometimes to 100 feet. plus in height (caution: there are a number of dwarf varieties available in nurseries that only get three to five feet high after 20 years); from Northern Europe; extremely hardy; with age, branches tend to grow horizontally and droop, with branches at base dying off. Moderately deep to deep soil; 18 plus inches of precipitation; use for windbreaks, good value as bird cover and ornamental.

WHITE SPRUCE
(Picea glauca (Moench) Voss)

Long-lived, medium to tall evergreen, conifer tree. It naturally occurs in Alaska, Canada, the Lake States, and Northeastern United States. Prefers moist, well-drained soils; growth rates are quite slow during establishment years, then moderate to rapid; heights to 50 feet plus; 24 inches plus of precipitation annually. Used for single and multi-row windbreaks (avoid possible overtopping by deciduous trees); excellent cover, roosting and nesting for numerous birds; little food value; good ornamental.

SITKA SPRUCE
(Picea sitchensis (Bong.) Carr.)

A tall, long-lived evergreen coniferous tree. Its native range is from Southern Alaska along the coast to Northern California. It is a tidewater, fogbelt species.

SUMAC

SKUNKBUSH SUMAC
(Rhus trilobata Nutt.)

It naturally occurs in the Great Plains, Intermountain West, and Southwestern United States. Deciduous, thicket-forming shrubs, two to six feet high. Stems are ill-scented, erect to spreading from loosely spreading woody branches; small yellow flowers. Deep and extensive roots with somewhat shallow, spreading woody rhizomes, readily sprouts, particularly following fire. Tolerant of most soil textures; thrives in well-drained soils, intolerant of flooding and high water tables. Adapted to 12 to 20 inch precipitation areas, but probably best above 15 inches in winter precipitation areas.

Moderately strong drought tolerance, full sunlight to some partial shade. It is competitive after establishment. It is usually planted as container or bareroot stock, but has been direct seeded with some success.

'Bighorn' is a recent release from Bridger PMC. Skunkbush sumac is included in Aberdeen PMC's Windbreak study.

SMOOTH SUMAC
(Rhus glabra L.)

A deciduous shrub up to 15 feet in height. It naturally occurs east of the Cascades on dry to moist, well-drained sites; very common along the Columbia and Snake Rivers; shade intolerant. It is useful as wildlife habitat, conservation and landscape plantings.

THUJA

NORTHERN WHITECEDAR
(Thuja occidentalis L.)

An evergreen tree that naturally occurs in Eastern United States.

WESTERN REDCEDAR
(Thuja plicata Donn ex D. Don)

A native, long-lived evergreen tree that is found on both sides of the Cascades, east to Montana, on moist, poorly drained lowlands and bottomlands. Western redcedar is used in reforestation, plant diversity, and for riparian restoration. Other Thuja species are often used as ornamentals or for landscaping. The minimum annual rainfall required is 25 inches. Valuable for winter cover for wildlife, especially birds.

All Thuja species are hardy evergreen trees or shrubs. Some are also known as “arborvitae”.

WILLOW

ARROYO WILLOW
(Salix lasiolepis Benth.)

A deciduous native shrub or tree, to 35 feet tall. Naturally occurs on moist; riparian soils from California to British Columbia, east to Utah and Texas. This fast growing species is dense, branches are upright to spreading. Uses may include: windbreak and shade trees, riparian restoration, water quality and fish/wildlife habitat enhancement. Propagation is from dormant hardwood stock.

Corvallis PMC released a variety, 'Rogue' in 1990, origin near the Rogue River, Curry County, Oregon. This variety may be suitable for planting on moist riparian soil. Willows are easily propagated from hardwood cuttings taken in late winter, planted in the spring; it also grows from seed or root cuttings.

BEBB WILLOW
(Salix bebbiana Sarg.)

It occurs on wet soils east of the Cascades and in Idaho and Montana at low to high elevations; 'mid seral.

COLUMBIA RIVER WILLOW
(Salix X fluviatilis Nutt.)

A deciduous native shrub, six to 18 feet tall. A narrow, upright form and a suckering habit. The leaves are narrow and lance-shaped. The natural range is limited to sandbars and banks along the lower Columbia River and tributaries; thicket forming. Uses include erosion control along streambanks, water quality enhancement, and revegetation of coastal or riverine dredge spoils.

Corvallis PMC released a variety, 'Multnomah', in 1988. The original source along the Columbia River east of Portland, Oregon.

COYOTE WILLOW
(Salix exigua var. exigua Nutt.)

A native, spreading deciduous shrub found east of the Cascades to Idaho, south from California to Colorado. Six to ten feet tall, with grayish-green foliage, slender leaves two to six inches long. Found on well-drained, moist coarse textured soils along streams, often on point bars or instream sandbars. Sometimes called "sandbar willow". Grows in full sun at low to middle elevations. Potential for riparian restoration, streambank stabilization, water quality and fish/wildlife habitat enhancement.

Pullman PMC selected 'Silvar' coyote willow for release in 1993. 'Silvar' origin is near Starbuck, Columbia County, Washington.

Aberdeen PMC has some accessions of coyote willow in initial evaluation plantings and windbreak project.

Corvallis PMC has studied this species but did not select any accession for further testing or release.

Willows are usually propagated by hardwood cuttings or whips, direct planted on moist sites in early spring.

DRUMMOND WILLOW
(Salix drummondiana Barratt ex Hook.)

A deciduous native shrub, five to 12 feet tall. Multistemmed, with yellow to yellow-orange stems, older branches are reddish brown. Occurs east of the Cascades, north to British Columbia, east through Southern Canada and Northern United States to the Atlantic Ocean. Grows in full sun, on coarse-textured, moist soils along streambanks and meadows at middle elevations. Uses include: conservation plantings for riparian restoration, erosion control, water quality and wildlife habitat enhancement and landscaping.

Pullman PMC selected a variety from Ferry County, Washington, 'Curlew' drummond willow, for release in 1993.

ERECT WILLOW

(Salix ligulifolia (Ball) Ball ex Schneid.)

A multistemmed, deciduous native shrub, five to 16 feet tall. Upright, rounded form, usually open at base. Occurs from California to the Puget Sound in Washington, west of the Cascade Mountains, low to middle elevation. Minimum annual precipitation: 30 inches. It grows on moist, well-drained sands to poorly-drained silt loam and clay loam. Potential uses include shelterbelts, wildlife habitat, water quality enhancement, riparian site restoration and landscaping.

Corvallis PMC released a variety, 'Placer' in 1988. Commercial stock is available.

GEYER'S WILLOW

(Salix geeyeriana Anderss.)

It occurs on moist soils at mid to high elevations, east of the Cascades; late seral.

GOLDEN WILLOW

(Salix alba var. vitellina (L.) Stokes)

Deciduous, spreading non-native tree, medium-sized. May be used for windbreaks where the minimum annual precipitation or equivalent irrigation and runoff moisture is at least 30 inches. Cold hardy and adapted to silt loam to sandy soils. Establishes easily, typical of willows, from hardwood cuttings.

HOOKER WILLOW, COAST WILLOW

(Salix hookeriana Barratt ex Hook.)

A deciduous native shrub or tree, six to 25 feet tall. Multistemmed, with stout branches and a dense, upright to spreading form. The leaves are thick and leathery, pubescent on the underside. Naturally occurs on the Pacific Coast, seldom more than five miles from the ocean, from California to British Columbia. Rapid growth, usually found on moist, sandy soils. Potential for streambank and coast stabilization, restoration of coastal deflation plains, marsh banks and erosion control on moist, sandy areas in Western Oregon and Washington.

Corvallis PMC released a variety, 'Clatsop' in 1988. Origin is the Clatsop Dunes, Oregon. Commercial stock is available.

LAUREL WILLOW
(Salix pentandra L.)

Introduced from Europe. A deciduous tree, 20 to 60 feet tall. Dense round topped, symmetrical crown with a short bole. Dark green leaves with yellow midrib, very shiny above, paler and always glabrous beneath. The twigs are brownish-green. Hardy, spread 12 to 15 feet. The roots are fibrous and spreading. Growth rate is slow to moderate.

LEMMON'S WILLOW
(Salix lemmonii Bebb)

A deciduous native shrub, with low growing branches. The younger stems have greenish-yellow bark, older branches are brownish-black. The leaves are deep green, shiny above. Naturally occurs along streams at middle to high elevations, from Eastern Oregon and California east to Idaho, Montana and Nevada. Minimum annual precipitation: 30 inches. Lemmon's willow is adapted to a wide range of moist soils on well-drained benches and bottomlands. Uses include: riparian restoration, water quality and wildlife habitat enhancement, streambank stabilization and landscaping.

Pullman PMC selected a variety, 'Palouse', for release in 1993. Origin of 'Palouse' is North-central Oregon.

MACKENZIE WILLOW
(Salix prolixa Anderss.)

A deciduous native shrub or small tree, to 20 feet in height. Native range is from Eastern Washington and Oregon east into north and North-central Idaho and Western Montana. It occurs along streambanks, lowlands and foothills, to lower inter-mountain valleys. It occupies riparian sites from rocky river banks to moist benches with deep sandy or silty soils. Requires at least 25 inches annual moisture.

Pullman PMC has selected a variety, 'Rivar', for release in 1993. Origin is near the Snake River in Columbia County, Washington. Mackenzie willow is easily propagated from dormant hardwood stock, cuttings or whips.

PACIFIC WILLOW
(Salix lucida ssp. lasiandra (Benth.) E. Murr.)

A deciduous native shrub or tree, ten to 40 feet tall, up to one to two feet in diameter, often multistemmed. Very common along streams, near sea level to moderate elevations in the mountains. Two varieties are found in Washington and Oregon: var. lasiandra, with glaucous beneath, naturally occurs west of the Cascade summit; var. caudata, with concolorous leaves, green beneath as well above, native range is California to British Columbia, east of the Cascades, to Nevada, Utah, Colorado, and the Black Hills of South Dakota. Uses include streambank stabilization and lake drawdown zone revegetation, restoration of areas subject to long-term flooding, wildlife habitat enhancement, and water quality improvement.

Corvallis PMC released a cultivar, 'Nehalem' S. lasiandra var. lasiandra in 1988. It is adapted to

moist, coarse textured soils, west of the Cascades. 'Nehalem'. origin is adjacent to the Nehalem River on the north coast of Oregon.

PURPLE-OSIER WILLOW
(Salix purpurea L.)

A deciduous, non-native shrub, six to eight feet in height. It is usually long-lived, with dense foliage and stems. The leaves are greenish, the younger twigs are purple-green. Rapid growth; shade intolerant; fair tolerance to saline and alkaline conditions; minimum annual precipitation of 25 inches. It grows best on moist, well-drained soils west of the Cascades, and low elevation valleys east of the mountains. Primarily used in landscaping as an ornamental or screen, also for streambank stabilization.

Big Flats PMC, New York released a cultivar, 'Streamco', that is commercially available. 'Nana' S. purpurea var. nana is a commonly planted ornamental cultivar.

SCOULER'S WILLOW, MOUNTAIN WILLOW
(Salix scouleriana Barratt ex Hook.)

A deciduous, native large shrub or tree, eight to 35 feet tall. Naturally occurs on streambanks, lowlands to middle elevations in the mountains; California to Alaska, east to Arizona, Black Hills of South Dakota, and Manitoba. May be found on moist, wooded sites. Grows in full sun or shade. Minimum annual precipitation required: 25 inches.

No cultivars are commercially available, common stock is available from nurseries. Propagated from hardwood cuttings or whips.

SITKA WILLOW
(Salix sitchensis Sanson ex Bong.)

A deciduous, native shrub or small tree, six to 20 feet in height. The leaves are gray-green, dense pubescence beneath; young twigs are gray-brown with dense pubescence. Naturally occurs on streambanks and moist woodlands, lowlands to middle elevations in the mountains; California to Alaska, common in Western Oregon and Washington, Wallowa and Blue Mountains, and Northern Idaho. As with all willows, may be susceptible to herbicides, especially in the spring. Uses include streambank restoration and stabilization, wildlife habitat enhancement, water quality improvement, and shelterbelts.

Corvallis PMC released a cultivar, 'Plumas', in 1988; origin Plumas County, California. Hardwood cuttings and whips are commercially available.

WHITE WILLOW
(Salix alba L.)

A large, vigorous, hardy, fast growing, deciduous tree. Introduced from Europe, North Africa, and Central Asia. On good sites with abundant moisture, height may exceed 40 feet. Requires greater than 30 inches annual precipitation. Used for single or multi-row windbreaks and shade tree.

WILLOW HYBRID
(Salix alba L. X S. matsudana Koidzumi)

A deciduous, fast growing, non-native hybrid willow. Commercial cultivar, 'Austree' is usually a medium tree, to 40 feet tall. Developed in Australia from Eurasian stock; extensively planted in California as windbreaks, less commonly used in the Pacific Northwest. Caution: may be short-lived, not cold hardy and requires at least 35 inches annual precipitation.

WINTERFAT (<u>Ceratoides</u> Gagnebin)

A low-growing, densely branched half-shrub, with woody lower stems and annual herbaceous upper stems. It naturally occurs on Intermountain West rangelands, often on low moderate saline or alkaline areas, found in Eastern Oregon and infrequently in the Columbia Basin of Eastern Washington. Best suited to silty loam and fine textured soils. It is one to three feet in height; matted, wooly, hairy, branched stems; fibrous roots and taproot. It is a highly nutritious winter browse for species of deer, elk, rabbits, and livestock. It is intolerant of flooding. Winterfat has good cold tolerance when mature and good tolerance to fire when dormant. Requires from six to 16 inches annual precipitation. 'Hatch' is a cultivar released by the US Forest Service and SCS, adapted for use in the Intermountain West.

General: 112,000 seeds/ID; it should be seeded shallow.

Conservation seeding rate: < 1 lb/ac in a seeding mixture; or transplant seedlings on three foot spacing in random clumps.

YEW

PACIFIC YEW
(Tams brevifolia Nutt.)

Native, coniferous shrub or tree, usually 30 to 50 feet tall at maturity. Usually a moist site understory evergreen. Naturally occurs on moist, well-drained soils in sun or shade, from Alaska to Northern California, Blue Mountains in Eastern Washington to Northern Idaho and Western Montana. Very hard, durable wood; source for "taxol".

YUCCA (<u>Yucca</u> L.)

Evergreen perennial, woody base with clusters of tough sword shaped leaves and large clusters of white flowers. It naturally occurs on prairies and open woodlands into the lower mountains of

the Rocky Mountains. It does best in well-drained moderately deep to deep loamy soils; drought tolerant after establishment. This species of Yucca and others, like Y. baccata, Y. filamentosa, Y. flaccida (most cold hardy), and Y. harrimaniae, have been used for landscaping in Oregon and Washington, and erosion control on urban sites and critical area stabilization.

EFFECTIVE PRECIPITATION
ADAPTABILITY FOR
CONSERVATION PLANTS
(TABLE 1)

TABLE 1: APPROXIMATE ADAPTABILITY FOR MOST CONSERVATION AND FORAGE PLANTS IN WASHINGTON EFFECTIVE PRECIPITATION

	4-9 in.	9-12 in.	12-15 in.	15-18 in.	18-25 in.	25-40 in.	40-60 in.	Over 60 in.
<u>Grasses</u>								
Siberian wheatgrass								
Indian ricegrass								
Crested wheatgrass								
Mammoth wildrye								
Annual fescue								
Canby bluegrass								
Thickspike wheatgrass								
Bluebunch wheatgrass								
Beardless wheatgrass								
Sheep fescue								
Big bluegrass								
Tall wheatgrass								
Annual ryegrass								
Pubescent wheatgrass								
Streambank wheatgrass								
Perennial ryegrass								
Intermediate wheatgrass								
Smooth brome								
Hard fescue								
Creeping red fescue								
Tall fescue								
Orchardgrass								
Timothy								
Slender wheatgrass								
Mountain brome								
Bentgrass								
Redtop								
Barnyardgrass								
Foxtail millet								
Proso millet								
Blue wildrye								
Basin wildrye								
Idaho fescue								
American dunegrass								

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	4-9 in.	9-12 in.	12-15 in.	15-18 in.	18-25 in.	25-40 in.	40-60 in.	Over 60 in.
<u>FORBS AND LEGUMES</u>								
Alfalfa								
Burnet								
Sweetclover								
Sunflower								
Whiteclover								
sub clover								
Alsike clover								
Common vetch								
Hairy vetch								
Hungarian vetch								
Birdsfoot trefoil								
Field peas								
Strawberry clover								
Rose clover								
Red clover								
Native lupines								
Smartweed								
Native milkvetches								
Alkali bulrush								
Hardstem bulrush								
Geyer sedge								
Elk sedge								
Nebraska sedge								

TABLE 1: APPROXIMATE ADAPTABILITY FOR MOST CONSERVATION AND FORAGE PLANTS IN WASHINGTON EFFECTIVE PRECIPITATION




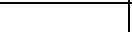
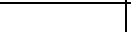
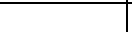
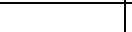
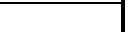








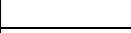




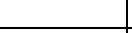
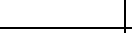
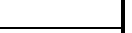
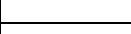
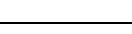

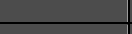
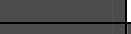

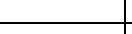
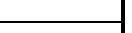
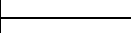
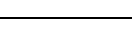
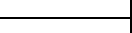
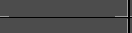
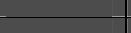
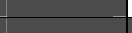

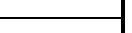
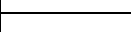
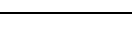
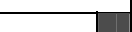
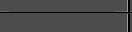
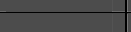
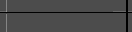

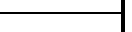
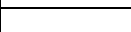
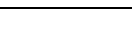
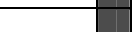
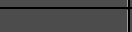
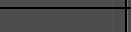
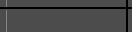

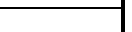



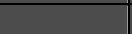
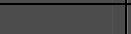
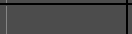






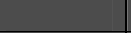
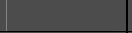
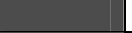









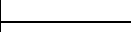
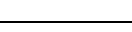
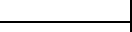

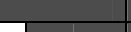
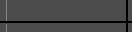
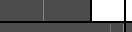

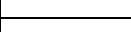
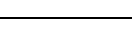
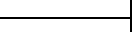


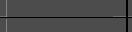

	4-9 in.	9-12 in.	12-15 in.	15-18 in.	18-25 in.	25-40 in.	40-60 in.	Over 60 in.
WOODY PLANTS								
Fourwing-saltbush								
Big sagebrush								
Bitterbrush								
Caragana								
Lilac								
Austrian pine								
Scotch pine								
Ponderosa pine								
Western clematis								
Rocky Mountain juniper								
Bitter cherry								
Douglas hawthorn								

TABLE 1: APPROXIMATE ADAPTABILITY FOR MOST CONSERVATION AND FORAGE PLANTS IN WASHINGTON EFFECTIVE PRECIPITATION

	4-9 IN.	9-12 IN.	12-15 IN.	15-18 IN.	18-25 IN.	25-40 IN.	40-60 IN.	Over 60 in.
<u>GRAIN AND ROOT CROPS</u>								
Cereal rye (do not use east of the Cascades)								
Wheat								
Barley								
Oats								
Corn								
Potatoes								

SEED CHARACTERISTICS (TABLE 2)

TABLE 2: SEED CHARACTERISTICS FOR GRASSES AND LEGUMES ^{3/ 4/}
USED FOR
CONSERVATION AND FORAGE SEEDINGS

Common Name	Scientific Name	Seeds Per Pound	PLS Seeds/sq. Ft ^{1/}	PLS Seeds/lin. ft 6 in. spacing ^{2/}
Grasses				
Barnyard grass	Echinochloa crusgalli	115,000	2.6	1.3
Bentgrass, colonial	Agrostis tenuis	8,720,000	200	100
Bentgrass, creeping	Agrostis palustris	7,800,000	179	90
Bentgrass, redtop	Agrostis gigantea	4,990,000	115	58
Bluegrass, big	Poa secunda	917,000	21	11
Brome, mountain	Bromus carinatus	140,000	3.2	1.6
Brome, smooth	Bromus inermis	125,000	2.9	1.5
Dunegrass, American	Mollis Leymus	-vegetative-	-vegetative-	-vegetative-
Fescue, creeping red	Festuca rubra	615,000	14.1	7.1
Fescue, hard	Festuca trachyphylla	565,000	13.0	6.5
Fescue, Idaho	Festuca idahoensis	450,000	10.3	5.1
Fescue, sheep	Festuca ovina	680,000	15.6	7.8
Fescue, tall	Festuca arundinacea	225,000	5.2	2.6
Fescue, western	Festuca occidentalis	350,000	8.0	4.0
Junegrass, prairie	Koeleria macrantha	2,200,000	50.5	25.2
Millet, Foxtail	Setaria italica	220,000	5.0	2.5
Millet, Japanese	Echinochloa crusgallis frumentacea	115,000	2.6	1.3
Millet, Proso	Panicum miliaceum	82,000	1.9	1.0
Orchardgrass	Dactylis glomerata	540,000	12.4	6.2
Ricegrass, Indian	Oryzopsis hymenoides	240,000	5.5	2.8
Ryegrass, annual	Lolium multiflorum	190,000	4.4	2.2
Ryegrass, perennial	Lolium perenne	225,000	5.2	2.6
Timothy	Phleum pratense	1,300,000	30	15
Wheatgrass, beardless	Pseudoroegneria spicata ssp. inermis	135,000	3.1	1.6
Wheatgrass, bluebunch	Pseudoroegneria spicata ssp. spicata	140,000	3.2	1.6
Wheatgrass, crested	Agropyron cristatum	200,000	4.5	2.3
Wheatgrass, intermediate	Elytrigia intermedia	100,000	2.3	1.2
Wheatgrass, pubescent	Elytrigia intermedia	91,000	2.1	1.1
Wheatgrass, siberian	Agropyron fragile ssp. sibericum	250,000	5.7	2.9
Wheatgrass, slender	Elymus trachycaulus	160,000	3.7	1.8
Wheatgrass, streambank	Elymus lanceolatus	170,000	3.9	2.0
Wheatgrass, tall	Elongatum Elytria	79,000	1.8	0.9
Wheatgrass, thickspike	Elymus lanceolatus	156,000	3.6	1.8
Wildrye, basin	Cinereus Leymus	165,000	3.8	1.9
Wildrye, blue	Elymus glaucus	130,000	3.0	1.5
Wildrye, mammoth	Giganteus Leymus	95,000	1.3	0.7

^{1/} 1 lb/ac seeding rate

^{2/} 1 lb/ac seeding rate with 6 inch drill width

^{3/} For woody plants, see reference list, Ag. Handbook 250

^{4/} Seed data for some species contained in this guide are unavailable and not included in this table

TABLE 2: (cont.) SEED CHARACTERISTICS FOR GRASSES AND LEGUMES
USED FOR
CONSERVATION AND FORAGE SEEDING

Common Name	Scientific Name	Seeds per Pound	PLS Seeds sq. ft. _{1/}	PLS Seeds/lin. ft. _{2/} 6 in. spacing
Cereals				
Oats	<i>Avena sativa</i>	16,000	0.4	0.2
Barley	<i>Hordeum vulgare</i>	13,600	0.3	0.15
Wheat	<i>Triticum aestivum</i>	11,400	0.3	0.15
Legumes				
Alfalfa	<i>Medicago sativa</i>	255,000	5.2	2.6
Beachpea, purple	<i>Lathyrus japonicus</i>	12,000	0.3	0.15
Clover, alsike	<i>Trifolium hybridum</i>	682,000	15.7	7.9
Clover, crimson	<i>Trifolium incarnatum</i>	179,000	4.1	2.1
Clover, red	<i>Trifolium pratense</i>	281,000	6.5	3.3
Clover, rose	<i>Trifolium hirtum</i>	140,000	3.2	1.6
Clover, strawberry	<i>Trifolium fragiferum</i>	288,000	6.6	3.3
Clover, subterranean	<i>Trifolium subterranean</i>	60,000	1.4	0.7
Clover, white	<i>Trifolium repens</i>	800,000	18.4	9.2
Flatpea	<i>Lathyrus sylvestius</i>	15,000	0.3	0.15
Peas, field	<i>Pisum sativum</i>	18,000	0.4	0.2
Sweetclover, yellow	<i>Melilotus officinalis</i>	230,000	5.3	2.7
Trefoil, birdsfoot	<i>Lotus corniculatus</i>	470,000	10.8	5.4
Vetch, common	<i>Vicia sativa</i>	8,300	0.2	0.1
Vetch, hairy	<i>Vicia villosa</i>	17,000	0.4	0.2
Vetch, Hungarian	<i>Vicia pannonica</i>	11,000	0.3	0.15
Vetch, winter	<i>Vicia villosa varia</i>	11,000	0.3	0.15
Lupine, silky	<i>Lupinus sericeus</i>	20,000	0.5	0.25
Lupine, pine	<i>Lupinus albicaulus</i>	25,000	0.6	0.3
Lupine, broadleaf	<i>Lupinus latifolius</i>	18,000	0.4	0.2
Sweetvetch, northern	<i>Hedysarim boreale</i>	90,000	2.1	1.0
Wildflowers				
Buckwheat	<i>Fagopyrum esculentum</i>	20,400	0.5	0.25
Burnet, small	<i>Sanguisorba minor</i>	53,000	1.2	0.6
Smartweed, nodding	<i>Polygonum lapathifolium</i>	189,000	4.1	2.1
Smartweed, pink ladysthumb	<i>Polygonum persicaria</i>	180,000	4.1	2.1
Arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>	55,000	1.3	0.6
Perennial flax	<i>Linum perenne</i>	300,000	7.0	3.5
Western yarrow	<i>Achillea millefolium</i> var. <i>occidentalis</i>	2,300,000	52.8	26.4

1/ @ 1 lb/ac seeding rate

2/ 22@ 1 lb/ac seeding rate with 6 inch drill width

SINGLE SPECIES SEEDING RATE PLS/SQ FT

**WASHINGTON GUIDE FOR CONSERVATION
SEEDING/PLANTINGS - SINGLE SPECIES SEEDING RATE**

GRASSES

<u>Common Name</u>	<u>Single Species Rate</u>	<u>Pure Live Seed (PLS)/Square Foot</u>
bluegrass, big (N)	4	82
bluegrass, Canby (N)	4	84
bluegrass, Sandberg (N)	4	80
bromegrass, smooth (I)	8	23
bromegrass, meadow (I)	12	22
bromegrass, mountain (N)	12	24
fescue, creeping red (I)	6	84
fescue, hard (I)	6	78
fescue, Idaho (N)	6	62
fescue, red (I)	6	84
fescue, sheep (I)	5	78
fescue, tall (I)	7	36
foxtail, meadow (I)	5	58
orchardgrass (I)	5	62
ricegrass, indian (N)	5	28
ryegrass, annual (I)	8	35
ryegrass, perennial (I)	7	36
wheatgrass, beardless (N)	7	22
wheatgrass, bluebunch (N)	7	22
wheatgrass, crested (I)	6	27
wheatgrass, intermediate (I)	10	23
wheatgrass, pubescent (I)	10	21
wheatgrass, Siberian (I)	5	28
wheatgrass, slender (N)	6	22
wheatgrass, streambank (N)	6	23
wheatgrass, tall (I)	12	22
wheatgrass, thickspike (N)	6	22
wildrye, basin (N)	6	23
wildrye, blue (N)	8	24
wildrye, mammoth (I)	15	20

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CONSERVATION NURSERIES - WASHINGTON
(A partial list of sources for native plants and acceptable introduced plants)

- | | |
|--|---|
| - Aldrich Nursery
190 Aldrich Road
Mossyrock, WA 98564
(360) 983-3138 | - Dutch Tuch Acres
LaCenter, WA 98629
(360) 263-1505 |
| - Bitterroot Restoration, Inc.
45 Quast Lane
Corvallis, MT 59828
(406) 961-4991 | - Fancy Fronds
Gold Bar, WA 98251
(360) 793-1472 |
| - Botanica
Seattle, WA 98103
(206) 634-1370 | - Forest Flor Recovery
Lummi Island, WA 98262
(360) 758-7778 |
| - Briggs Nursery
Olympia, WA 98501
(800) 999-9972 | - Fourth Corner Nursery
Bellingham, WA 98226
(360) 592-2250 |
| - Buffalo Berry Farm
51 East Lake Fork Road
Lake Fork, IL 83635
(208) 634-3062 | - Frosty Hollow
Langley, WA 98260
(360) 579-2332 |
| - Burnt Ridge Nursery
Onalaska, WA 98570
(360) 985-2873 | - Inland NW Native Plants
Spokane, WA 99223-3008
(509) 448-7992 |
| - Clifty View Nursery
Route 1, Box 509
Bonners Ferry, IL 83805
(208) 267-7129 | - Kinder Garden Nursery
1137 South Hwy 17
Othello, WA 99344
(509) 488-5017 |
| - Cloud Mountain Farm
Everson, WA 98247
(360) 966-5859 | - Lawyer Nursery
Plains, MT 59859
406) 826-3881 |
| - Daniels Nursery
Kettle Falls, WA 99141
(509) 738-2633 | - Moses Lake Cons. District Nursery
Moses Lake, WA 98837
(509) 765-5333 |
| - Heronswood Nursery
Kingston, WA 98346
(360) 297-4172 | - Judd Creek Nursery
Vashon, WA 98070
(206) 463-9641 |
| - J & J Landscape Co.
Bothell, WA 98011
(206) 486-3677 | - Milestone Nursery
Lyle, WA 98635
(509) 365-5222 |

- Mt. Tahoma Nursery
28111 - 112 Ave E
Graham, WA 98338
(206) 847-9827

- Plants of the Wild
P.O. Box 866
Tekoa, WA 99033
(509) 284-2848

- Natives Northwest
Mossyrock, WA 98564
(360) 983-3138

- Peninsula Gardens
Gig Harbor, WA 98335
(360) 851-8115

- Nothing But NW Natives
Battle Ground, WA 98604
(360) 666-3023

- Shore Road Nursery
Port Angeles, WA 98362
(206) 457-1536

- Silver Springs Nursery
Moyie Springs, IL 83845
(208) 267-5733

- Soos Creek Gardens
Renton, WA 98058
(425) 226-9308

- Storm Lake Growers
Deer Park, WA 99006
(509) 276-8278

- Sound Native Plants
Olympia, WA 98507
(360) 352-4122

- Spring Creek Nursery
Snohomish, WA 98290
(425) 794-4842

- Wash. Assoc. Cons. Distr.s Plant Center
Bow, WA 98232
(360) 757-1094

- Sunbreak Nursery
Bellingham, WA 98226
(360) 384-3763

- Western Forest Systems
1590 Ripon Avenue
Lewiston, IL
(208) 743-0147

- Weyerhaeuser Co.
Rochester, WA 98579
(800) 732-4769
(253) 924-2547

- Wildlands, Inc.
1941 Saint Street
Richland, WA 99352
(509) 375-4177

- Wildlife Habitat Inst.
Rte 1, Box 102-A
Princeton, IL 83857
(208) 875-1246

- Wilkins Nursery
Vashon, WA 98070
(206) 463-3050

- Willapa Hills Nursery
981 State Street
Raymond, WA 98577
(360) 942-3409

- Woodbrook Nursery
1620 - 59th Ave NW
Gig Harbor, WA 98335
(253) 265-6271

Viewcrest Nurseries
Battle Ground, WA 98604
(360) 687-5167

IF A Nursery
Toledo, WA 98591
(360) 864-2828

Silvaseed Company
Roy, WA 98580
(360) 843-2246

Conservation Nurseries - Oregon (Partial list)

Althouse Gardens
Cave Junction, OR 97523
(541) 592-2395

Arrowhead, Ornamentals
St Paul, OR 97137
(503) 633-2375

Balance Restoration Nursery
Lorane, OR 97451
(541) 942-5530

Blooming Nursery
Cornelius, OR 97113
(503) 357-0719

Richard Bush's Nursery
Canby, OR 97013
(503) 266-9251

Curry Native Plants
Port Oxford, OR 97465
(541) 332-5635

Doak Creek Native Plants
Eugene, OR 97405
(541) 484-9206

Forest Farm
Williams, OR 97544
(541) 846-7269

Hansen Nursery
North Bend, OR 97459
(541) 756-1156

Holden Wholesale Growers
Silverton, OR 97381
(503) 873-5940

Hughes, Water Gardens
Tualatin, OR 97062
(503) 638-1709

Log House Plants
Cottage Grove, OR 97424
(541) 942-2288

Mar-Lyn Farms
Canby, OR 97013
(503) 266-2112
Harold Miller Nursery

Down to Earth
Eugene, OR 97401
(541) 342-6820

Ferris Nursery
Newport, OR 97365
(541) 867-4806

Fruit of the Bloom
Springfield, OR 97478
(541) 726-8997

Garden Gate Nursery
Colton, OR 97017
(503) 824-2532

Goodwin Creek Gardens
Williams, OR 97544
(541) 846-7357

Russell Graham
Salem, OR 97304
(541) 332-5635

Green Hills Nursery
Beaver, OR 97108
(503) 398-5965

Greer Gardens
Eugene, OR 97401
(800) 548-0 III

Wallace Hansen
Salem, OR 97301
(503) 581-2638

Huckleberry Lane Nursery
North Bend, OR 97459
(541) 756-7328

Klamath Bio-restoration
Ashland, OR 97520
(541)

Mahonia Vineyards Nursery
Salem, OR 97302
(503) 363-9654

Mary's Peak Nursery
Philomath, OR 97370
(541) 929-3448
Mineral Springs

Jefferson, OR 97352
(503) 399-1599

Mo's Nursery
Mulino, OR 97042
(503) 829-7643

Nature's Garden
Scio, OR 97374
(541) 459-1361

Oakhill Farms
Oakland, OR 97462
(541) 459-1361

P & D Nursery
Tualatin, OR 97062
(503) 638-6366

Portland Nursery
Portland, OR 97206
(503) 231-5050

Rare Plant Research
Portland, OR 97236
(503) 762-0288

Sage Creek Gardens
Bend, OR 97701
(541) 385-3336

Serendipity Nursery
Canby, OR 97013
(503) 651-2122

Siskiyou Rare Plant Nursery
Medford, OR 97501
(541) 772-6846

Westlake Nursery
Westlake, OR 97493
(541) 997-3383

Mt Jefferson Farms
Salem, OR 97302
(503) 363-0467

Drakes Crossing Nursery
Silverton, OR 97381
(503) 873-4932

C.L. Danner Nursery
Gresham, OR 97030
(503) 667-9843

Carlton, OR 97111
(503) 852- 6129

Native Pride Gardens
Lafayette, OR 97127
(503) 434-2828

Ninebark Nursery
Newberg, OR 97132
(503) 537-0689

Oregon Native Plant Farms
Canby, OR 97013
(503) 263-6388

Pleasant Hill Nursery
Pleasant Hill, OR 97455
(541) 746-7178

Quail Ridge Nursery
Molalla, OR 97038
(503) 829-3105

Samuel Rich Nursery
Aurora, OR 97002
(503) 678-2828

J. Frank Schmidt & Son
Boring, OR 97009
(503) 825-8202

Sevenoaks Nursery
Albany, OR 97321
(541) 757-6520

Wells Farms
Hubbard, OR 97032
(503) 982-1012

Whitman Farms
Salem, OR 97304
(503) 585-8728

Teufel Nursery
Portland, OR 97229
(503) 646-1111

Brooks Tree Farm
Salem, OR 97305
(503) 393-6300

Douglas Nursery
Canby, OR 97013
(503) 266-9419

December, 1999

Certified Seed Vendors - Oregon (Partial list of commercial seed sources)

Pacific NW Natives
Albany, OR 97321
(541) 928-8239

Agri-Seed Testing
Salem, OR 97302
(503) 585-1440

Callahan Seed
Central Point, OR 97502
(541) 855-1164

Martin Miller (blue wildrye grower)
Salem, OR 97305
(503) 792-3731

Emerald Seed and Supply
Portland, OR 97220
(503) 254-8414

Landmark Seeds
Albany, OR 97321
(800) 268-2379

International Seeds
Halsey, OR
(541)

Pendleton Grain Growers
Pendleton, OR
(541) 687-8000

Round Butte Seed
Culver, OR
(541) 546-5222

SEED VENDORS FOR GRASSES, LEGUMES, AND FORBS WASHINGTON

(A partial list of commercial seed sources)

Abundant Life Seeds
Port Townsend, WA 98368
(360) 385-5660

Grasslands West
Clarkston, WA
(509) 758-9100

Firstline Seeds
Moses Lake, WA
(509) 765-1772

Frosty Hollow
Langley, WA 98260
(360) 579-2332

Full Circle Inc
Moses Lake, WA
(509) 765-5617

Inside Passage
Port Townsend, WA 98368
(360) 385-6144

L & H Seeds, Inc.
Connell, WA 99326
(509) 234-4433

J. L. McLean Seed
Coulee City, WA
(509) 632-8709

Landmark Seeds
Spokane, WA
IL
(800) 268-0180

Pendleton Grain Growers
Pasco, WA (509) 786-7469
Pendleton, OR (541) 687-8000

Plantas Nativa
Bellingham, WA 98225
(360) 715-9655

Rainier Seed
Davenport, WA 99122
(800) 828-8873

Seeds Inc.
Tekoa, WA 99033
(509) 284-2848

Silvaseed Company
Roy, WA 98580
(253) 843-2246

Syverson Seed Inc.
Ridgefield, WA 98642
(360) 887-4094

Connell Grain Growers
Connell, WA 99326
(509) 572-5932

Golden Seed Co
Zillah, WA 98953
(509) 962-0789

Dye Seed Co.
Pomeroy, WA

(509) 843-3591

Seed Specialists
Hayden Lake,

(208) 762-8308

NOTE: **This partial list of seed and plant vendors is not intended to be a recommendation for anyone vendor of conservation plants.** Certified seed of conservation grasses, legumes and forbs may also be obtained from local feed & grain store, Cenex, OR Western Farm Service. Also consult *"Hortus West - a native plant directory and journal"* for additional information on native seed and plant vendors.

NATIVE RIPARIAN PLANTS FOR EASTERN WASHINGTON & OREGON

- TREE/SHRUBS
- HERBACEOUS PLANTS

Native Riparian Trees/Shrubs for Eastern Washington and Oregon, (Partial List)

Rocky Mountain maple	<i>Acer glabrum</i>	MLRA: E43, E44
thinleaf alder	<i>Alnus incana</i>	MLRA: B9, B10, E43, E44
Sitka alder	<i>Alnus sinuata</i>	MLRA: E43
serviceberry	<i>Amelanchier alnifolia</i> ssp. <i>cusickii</i>	MLRA: B8, 9, 10, E43, E44
Utah serviceberry	<i>Alnus alnifolia</i>	MLRA: B8, 9, 10, E43, E44
water birch	<i>Betula occidentalis</i>	MLRA: E43, E44
red-osier dogwood	<i>Cornus sericea</i>	MLRA: B6, B8, B9, B10, E43, E44
Douglas' hawthorn	<i>Crataegus douglasii</i>	MLRA: B8, B9, B10, E44
mockorange	<i>Philadelphus lewisii</i>	MLRA: B9, B10, E43, E44
ponderosa pine	<i>Pinus ponderosa</i>	MLRA: B9, B10, E43, E44
ninebark	<i>Physocarpus malvaceus</i>	MLRA: B6, B9, B10, E43, E44
quaking aspen	<i>Populus tremuloides</i>	MLRA: B6, B8, B9, E43, E44
black cottonwood	<i>Populus trichocarpa</i>	MLRA: B8, B9, B10, E43, E44
chokecherry	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	MLRA: B6, B9, B10, E44
baldhip rose	<i>Rosa gymnocarpa</i>	MLRA: B8, B9
Nootka rose	<i>Rosa nutkana</i> var. <i>hispida</i>	MLRA: B6, B8, B9, B10, E44
Woods' rose	<i>Rosa woodsii</i> var. <i>ultramontana</i>	MLRA: B6, 9, 10, 11, E44
thimbleberry	<i>Rubus parviflorus</i>	MLRA: E43, E44
blue elderberry	<i>Sambucus cerulea</i>	MLRA: B6, B8, B9, B10, E44
birchleaf spirea	<i>Spiraea betulafolia</i>	MLRA: B9, B10, E43, E44
common snowberry	<i>Symphoricarpos albus</i>	MLRA: B9, 10, 11, E43, E44
peachleaf willow	<i>Salix amygdaloides</i>	MLRA: B8, B9, B10
Drummond's willow	<i>Salix drummondiana</i>	MLRA: E43, E44
coyote willow	<i>Salix exigua</i>	MLRA: B7, B8, B9, B10, B11, E44
Pacific willow	<i>Salix lasiandra</i>	MLRA: B9, E44
Mackenzie's willow	<i>Salix prolixa</i>	MLRA: B8, B9, E44
Sitka willow	<i>Salix sitchensis</i>	MLRA: B6, B8, B9, E43, E44
western redcedar	<i>Thuja plicata</i>	MLRA: B9, E44, E43

Additional Oregon plant references include: “Manual of Oregon Trees and Shrubs” Randall, Keniston, Bever and Jensen, OSU Press, Corvallis, Oregon, 1981; Washington NRCS Plant Materials Technical Note #28 “Native plants recommended for wetland/riparian plantings in the Pacific Northwest”, 1995; and “Washington and Oregon Conservation Grasses, Wildflowers, Legumes, Trees, and Shrubs”, USDA NRCS, Spokane WA, 1995, in reference section (Sec. I) of the field office technical guide (FOTG).

Eastside - Additional woody vegetation for riparian or upland sites

- golden currant (*Ribes aureum*)
- deerbrush (*Ceanothus integerriumus*)
- Rocky Mountain juniper (*Juniperus scopulorum*)
- hawthorn, Douglas' or black (*Crataegus douglasii*)
- kinnikinnik or bearberry (*Arctostaphylos uva-ursa*)
- mockorange (*Philadelphus lewisii*)
- western clematis (*Clematis ligusticifolia*)
- Lemmon's willow (*Salix lemmonii*)
- oceanspray (*Holodiscus discolor*)

Eastern Washington and Oregon list of native herbaceous vegetation (for riparian sites)

Eastside grasses and grass-like include:

- bluejoint reedgrass (*Calamagrostis canadensis*)
- Mountain brome (*Bromus marginatus*)
- water sedge (*Carex aquatilis*)
- Nebraska sedge (*Carex rostrata*, *Carex nebrascensis*)
- bog bluegrass (*Poa leptochloa*)
- tufted hairgrass (*Deschampsia cespitosa*)
- creeping spikerush (*Eleocharis palustris*)
- slender wheatgrass (*Elymus lanceolatus*)
- sweetgrass (*Hierachloa odorata*)
- oniongrass (*Melica subulata*)
- threesquare bulrush (*Scirpus pungens*)
- nodding trisetum (*Trisetum cernuum*)

Eastside forbs and legumes include:

- American milkvetch (*Astragalus americanus*)
- pulse milkvetch (*Astragalus tenellus*)
- white clematis (*Clematis ligusticifolia*)
- cutleaf daisy (*Erigeron compositus*)
- northern sweetvetch (*Hedysarum borealis*)
- cow parsnip (*Heracleum lanatum*)
- mountain hollyhock (*Iliamna rivularis*)
- pink-flower monkey flower (*Mimulus lewisii*)
- self heal (*Prunella vulgaris*)
- little buttercup (*Ranunculus uncinatus*)
- streambank butterweed (*Senecio pseud aureus*)
- native goldenrod (*Solidago gigantea*)
- globeflower (*Trollius laxus*)
- Sitka valerian (*Valeriana sitchensis*)
- stream violet (*Viola glabrella*)
- Douglas' aster (*Aster subspicatus*)
- brook cinquefoil (*Potentilla rivalis*)
- Douglas' clover (*Trifolium douglasii*)
- riverbank lupine (*Lupinus rivalaris*)
- bog violet (*Viola nephrophylla*)

NATIVE WETLAND PLANTS FOR EASTERN WASHINGTON AND OREGON

Native Wetland Plants for Eastern Washington and Oregon
(Partial List)

Trees/Shrubs

- Pacific willow (*Salix lucida*)
- sandbar (coyote) willow (*Salix exigua*)
- Peachleaf willow (*Salix amygdaloides*)
- Lemmon's willow (*Salix lemmonii*)
- Drummond's willow (*Salix drummondiana*)
- Mackenzie's willow (*Salix proluxa*)
- Geyer's willow (*Salix geyeri*)
- black cottonwood (*Populus trichocarpa*)
- red-osier dogwood (*Cornus sericea*)
- birchleaf spirea (*Spirea betuloides*)
- bog birch (*Betula nana*)
- sitka alder (*Alnus viridis*)
- western red cedar (*Thuja plicata*)
- interior ninebark (*Physocarpus malvaceous*)
- Douglas' hawthorn (*Crataegus douglasii*)
- spring birch (*Betula occidentalis*)
- mountain alder (*Alnus incana*)
- quaking aspen (*Populus tremuloides*)
- blue elderberry (*Sambucus cerulea*)

Marshy shore herbaceous plants (Eastern Washington and Oregon)

- three-square bulrush (*Scirpus pungens*)
- cattail (*Typha latifolia*)
- softstem bulrush (*Scirpus tabernaemontani*)
- hardstem bulrush (*Scirpus acutus*)
- Wapato (*Sagittaria latifolia*)
- American speedwell (*Veronica americana*)
- Marsh speedwell (*Veronica scutellata*)
- creeping spearwort (*Ranunculus flammula*)
- water starwort (*Callitriche* spp.)
- small burreed (*Sparganium minimum*)
- water parsley (*Oenanthe sarmentosa*)
- mud plantain (*Alisma gramineum*)
- American water plantain (*Alisma plantago-aquatica*)
- water smartweed (*Polygonum amphibium*)
- bog trefoil (*Lotus pinnatus*)
- tufted hairgrass (*Deschampsia cespitosa*)
- western mannagrass (*Glyceria occidentalis*)
- Columbia sedge (*Carex aperta*)
- inflated sedge (*Carex vesicaria*)

- beaked sedge (*Carex utriculata*) or (*Carex rostrata*)
- fox sedge (*Carex vulpinoidea*)
- Nebraska sedge (*Carex nebraskensis*)
- needle spikerush (*Eleocharis acicularis*)
- creeping spikerush (*Eleocharis palustris*)
- Woolgrass (*Scirpus cyperinus*)
- taper tipped rush (*Juncus acuminatus*)
- Baltic rush (*Juncus balticus*)

Aquatic and Emergent herbaceous plants (Eastern Washington and Oregon)

- common duckweed (*Lemna minor*)
- yellow waterlily (*Nuphar lutea*)
- marsh pennywort (*Hydrocotyle ranunculoides*)
- pondweed (*Potamogeton natans*)
- howellia (*Howellia aquatilis*)
- waterweed (*Elodea canadensis*)
- bladderwort (*Utricularia macrorhiza*)
- water crowfoot (*Ranunculus aquatilis*)
- water moss (*Fontinalis antipyretica*)
- arrowgrass (*Triglochin maritima*)
- widgeon grass (*Ruppia maritima*)
- quillwort (*Lilaea scilloides*)

Wetland Prairie herbaceous plants (Eastern Washington and Oregon)

- common camas (*Camassia quamash*)
- hyacinth brodiaea (*Triteleia hyacinthina*)
- blue-eyed grass (*Sisyrinchium idahoense*)
- northwest cinquefoil (*Potentilla gracilis*)
- large-leaf avens (*Geum macrophyllum*)
- willow-herb (*Epilobium* spp.)
- owls-clover (*Orthocarpus* spp.)
- monkeyflower (*Mimulus guttatus*)
- downingia (*Downingia elegans*)
- willow aster (*Aster hesperius*)
- mulesears (*Wyethia angustifolia*)
- gumweed (*Grindelia squarrosa*)
- water foxtail (*Alopecurus geniculatus*)
- meadow barley (*Hordeum brachyantherum*)
- California oatgrass (*Danthonia californica*)
- tufted hairgrass (*Deschampsia cespitosa*)
- elk sedge (*Carex geyeri*)
- one-sided sedge (*Carex unilateralis*)
- creeping spikerush (*Eleocharis palustris*)
- slender rush (*Juncus tenuis*)

- soft rush (*Juncus effusus*)
- yellow lady's slipper (*Cypripedium calceolus*)
- false solomon's seal (*Smilacina stellata*)

NATIVE RIPARIAN PLANTS FOR WESTERN WASHINGTON & OREGON

- TREES/SHRUBS
- HERBACEOUS PLANTS

Native Riparian Trees/Shrubs for Western Washington and Oregon
(a partial list)

- osoberry (*Oemleria cerasiformis*)
- black hawthorn (*Crataegusa douglasii*)
- Pacific crabapple (*Pyrus fusca*)
- Douglas spirea (*Spirea douglasii*)
- red-osier dogwood (*Cornus sericea*)
- Nootka rose (*Rosa nutkana*)
- Coast willow (*Salix hookeriana*)
- Sitka willow (*Salix sitchensis*)
- Pacific willow (*Salix lucida*)
- northwest willow *Salix sessifolia*)
- Oregon ash (*Fraxinus latifolia*)
- black cottonwood (*Populus trichocarpa*)
- red alder (*Alnus rubra*)
- western red cedar (*Thuja plicata*)
- Sitka spruce (*Picea sitchensis*)
- snowberry (*Symphoricarpos albus*)
- pacific ninebark (*Physocarpus capitatus*)
- salmonberry (*Rubus spectabilis*)
- water birch (*Betula pumila*)
- sitka alder (*Alnus viridis*)
- western hazelnut (*Corylus cornuta* var. *californica*)
- labrador tea (*Ledum glandulosum*)
- bog laural (*Kalmia microphylla*)
- arroyo willow (*Salix lasiolepis*)
- mountain alder (*Alnus incana*)
- bitter cherry (*Prunus emarginata*)
- western chokecherry (*Prunus virginiana*)
- red currant (*Ribes sanguineum*)
- western hazel (*Corylus cornuta* var. *californica*)
- cascara (*Rhamnus purshiana*)
- blue elderberry (*Sambucus cerulea*)
- oceanspray (*Holodiscus discolor*)
- Oregon-grape (*Mahonia nervosa*)
- osoberry (*Oelmeria cerasiformis*)
- western serviceberry (*Amelanchier alnifolia* var. *semiintergrifolia*)
- twinberry (*Lonicera involucrata*)

Western Washington and Oregon list of native herbaceous vegetation (for riparian sites)

Westside grasses and grass-like include:

- native bentgrasses (*Agrostis borealis*, *Agrostis exarata*, *Agrostis scarba*)
- shortawn foxtail (*Alopecurus aequalis*)
- Sitka brome (*Bromus sitchensis*)
- bluejoint (*Calamagrostis canadensis*)
- native sedges (*Carex* sp)
- wood reedgrass (*Cinna latifolia*)
- tufted hairgrass (*Deschampsia cespitosa*)
- red fescue (*Festuca rubra*)
- northern mannagrass (*Glyceria borealis*)
- tall mannagrass (*Glyceria elata*)
- sweetgrass (*Hierachloa odorata*)
- meadow barley (*Hordeum brachyantherum*)
- oniongrass (*Melica geyeri*, *Melica harfordii*, *Melica subulata*)
- semaphore grass (*Pleuropogon refractus*)
- nodding trisetum (*Trisetum cernuum*)

Westside forbs and legumes include:

- native (*Angelica* sp.)
- leafy aster (*Aster foliaceus*)
- small flowered paintbrush (*Castilleja parviflora*)
- northern rice root (*Fritillaria camschatcensus*)
- cow parsnip (*Heracleum lanatum*)
- small flowered alumroot (*Heuchera micrantha*)
- leatherleaf saxifrage (*Leptarrhena pyrolifolia*)
- big deervetch (*Lotus crassifolius*)
- *Lupinus polyphyllus*
- tall bluebells (*Mertensia paniculata*)
- muskflower (*Mimulus moschatus*)
- streambank spring beauty (*Montia parvifolia*)
- little buttercup (*Ranunculus uncinatus*)
- marsh skullcap (*Scutellaria galericulata*)
- California figwort (*Scrophularia californica*)
- water parsnip (*Sium suave*)
- false solomon's seal (*Smilacina racemosa*)
- northern starwort (*Stellaria calycantha*)
- western trillium (*Trillium ovatum*)
- globeflower (*Trollius taxus*)
- nettle (*Urtica dioica*), a useful native riparian plant, but may not be appropriate for nursery production
- thyme leaved speedwell (*Veronica serpyllifolia*)
- stream violet (*Viola glabella*)
- marsh violet (*Viola palustris*)

NATIVE WETLAND PLANTS FOR
WESTERN WASHINGTON &
OREGON

NATIVE WETLAND PLANTS FOR WESTERN WASHINGTON AND OREGON (A Partial List)

TREES/SHRUBS

red alder (*Alnus rubra*)
Sitka alder (*Alnus viridis*)
Oregon ash (*Fraxinus latifolia*)
bog blueberry (*Vaccinium uliginosum*)
bog birch (*Betula glandulosa*)
white birch (*Betula papyrifera*)
western red cedar (*Thuja plicata*)
black cottonwood (*Populus trichocarpa*)
Pacific crabapple (*Pyrus fusca*)
bog cranberry (*Vaccinium oxycoccus*)
red-osier dogwood (*Cornus sericea*)
vine maple (*Acer circinatum*)
Pacific ninebark (*Physocarpus capitatus*)
oceanspray (*Holodiscus discolor*)
osoberry (*Oemleria cerasiformis*)
Nootka rose (*Rosa nutkana*)
salmonberry (*Rubus spectabilis*)
Douglas spirea (*Spirea douglasii*)
Sitka spruce (*Picea sitchensis*)
labrador tea (*Ledum glandulosum*)
black twinberry (*Lonicera involucrata*)
oval-leaf viburnum (*Viburnum ellipticum*)
Hooker's willow (*Salix hookeriana*)
Piper's willow (*Salix piperi*)
Sitka willow (*Salix sitchensis*)

HERBACEOUS PLANTS, SHORELINE

small-fruited bulrush (*Scirpus microparpus*)
softstem bulrush (*Scirpus tabernaemontani*)
Bur-reed (*Sparganium emersum*)
creeping buttercup (*Ranunculus flammula*)
cattail (*Typha latifolia*)
rice cutgrass (*Leersia oryzoides*)
tall mannagrass (*Glyceria elata*)
western mannagrass (*Glyceria occidentalis*)
mudwort (*Limosella aquatica*)
water parsley (*Oenanthe samentosa*)
dagger-leaf rush (*Juncus ensifolius*)
pointed rush (*Juncus oxymersis*)

taper-tipped rush (*Juncus acuminatus*)
beaked sedge (*Carex utriculata*)
inflated sedge (*Carex vesicaria*)
Lyngbye's sedge (*Carex lyngbyei*)
saw-beaked sedge (*Carex stipata*)
slough sedge (*Carex obnupta*)
water smartweed (*Polgoynum amphibium*)
American speedwell (*Veronica americana*)
creeping spikerush (*Eleocharis macrostachya* or *E. palustris*)
needle spikerush (*Eleocharis acicularis*)
ovate spikerush (*Eleocharis ovata*)
bog trefoil (*Lotus pinnatus*)
wapato (*Sagittaria latifolia*)
wool-grass (*Scirpus cyperinus*)

AQUATIC AND EMERGENT HERBACEOUS PLANTS

bulrush (*Scirpus* sp.)
water buttercup (*Ranunculus aquatilis*)
coontail (*Ceratophyllum demersum*)
common duckweed (*Lemna minor*)
marsh pennywort (*Hydrocotyle ranunculoides*)
yellow pondlily (*Nuphar lutea*)
pondweed (*Potamogeton* sp.)
tape-grass (*Vallisneria americana*)
watershield (*Brasenia schreberi*)
waterweed (*Elodea canadensis*)

WETLAND PRAIRIE HERBACEOUS PLANTS

Hall's aster (*Aster hallii*)
white-top aster (*Aster curtus*)
meadow barley (*Hordeum brachyantherum*)
Willamette Valley daisy (*Erigeron decumbens*)
Cascade downingia (*Downingia yina*)
short-awned foxtail (*Alopecurus aequalis*)
water foxtail (*Alopecurus geniculatus*)
gumweed (*Grindelia integrifolia*)
tufted hairgrass (*Deschampsia cespitosa*)
Bradshaw's lomatium (*Lomatium bradshawii*)
large-leaf lupine (*Lupinus polyphyllus*)
monkeyflower (*Mimulus guttatus*)
California oatgrass (*Danthonia californica*)
popcornflower (*Plagiobothrys figuratus*)

slender rush (*Juncus tenuis*)
soft rush (*Juncus effusus*)
toad rush (*Juncus bufonius*)
Cusick's sedge (*Carex cusickii*)
slough sedge (*Carex obnupta*)
American sloughgrass (*Beckmannia syzigachne*)
dense willow-herb (*Epilobium densiflorum*)
wooly sunflower (*Eriophyllum lanatum*)

NOXIOUS, INVASIVE, AND ALIEN PLANT SPECIES WASHINGTON & OREGON

Invasive and Noxious alien plants to avoid using in federal conservation and restoration projects, (a partial list) for Washington and Oregon. Some alien plants may still be acceptable for use in specific conservation practices.

SHRUBS/TREES

- butterfly bush (*Buddleja davidii*) (Invasive)
- black locust (*Robinia pseudoacacia*) (I)
- European blackberry (*Rubus vestitus*) (I)
- evergreen blackberry (*Rubus laciniatus*) (I)
- Himalayan blackberry (*Rubus discolor*) (I)
- false indigobush (*Amorpha fruticosa*) (I)
- Russian olive (*Elaeagnus angustifolia*) (I)
- autumn olive (*Elaeagnus commutata*) (I)
- English holly (*Ilex aquifolium*) (I)
- Amur maple (*Acer ginnala*) (I)
- English hawthorn (*Crataegus oxyacantha*) (I)
- European mountain ash (*Sorbus aucuparia*) (I)
- Mediterranean sage (*Salvia aethiopis*) (I)
- tamarisk (*Tamarix pentandra*, *Tamarix chinensis*) (I)
- Scotch broom (*Cytisus scoparius*) (I)
- green ash (*Fraxinus pennsylvanica*) (Alien)
- French broom (*Genista monspessulana*) (I)
- English ivy (*Hedera helix*) (I)
- Tatarian honeysuckle (*Lonicera tatarica*) (I)
- Amur honeysuckle (*Lonicera maackii*) (I)
- mulberry (*Morus alba*) (A)
- white poplar (*Populus alba*) (I)
- hybrid poplars, hybrid cottonwoods (*Populus X*) (A or I)
- weeping willow, golden willow or European white willow (*Salix alba*) (I)
- dogrose, sweetbriar rose, or multiflora rose (*Rosa canina* and *Rosa eglanteria*) (I)
- gorse (*Ulex europaeus*) (Noxious)
- Siberian elm (*Ulmus pumila*) (I)

GRASSES

- European beachgrass (*Ammophila arenaria*) (I)
- Kentucky bluegrass (*Poa pratensis*) (I)
- smooth brome grass (*Bromus inermis*) (I)
- Johnson grass (*Sorghum halepense*) (N)
- giant reed (*Arundo donax*) (I)
- reed canarygrass (*Phalaris arundinacea*) (I)
- timothy (*Phleum pratense*) (A)
- orchardgrass (*Dactylis glomerata*) (A)

tall fescue (*Festuca arundinacea*) (I)
crested wheatgrass (*Agropyron cristatum*) (A)
intermediate wheatgrass (*Elytrigia intermedia*) (A)
quackgrass (*Elytrigia repens*) (I)
perennial ryegrass (*Lolium perenne*) (A)
cheatgrass (*Bromus tectorum*) (N)
medusahead (*Taeniatherum caput-medusae*) (N)
common reed (*Phragmites australis*) (I)
smooth cordgrass (*Spartina alterniflora*) (I)

FORBS/LEGUMES

white bryony (*Bryonia alba*) (N)
cornflower (*Centaurea cyanus*) (N)
knapweeds (*Centaurea spp.*) (N)
ox-eye daisy (*Leucanthemum vulgare*) (N)
yellow iris (*Iris pseudacorus*) (I)
Japanese knotweed (*Polygonum cuspidatum*) (I)
periwinkle (*Vinca minor*) (I)
purple loosestrife (*Lythrum salicaria*) (N)
perennial peavine (*Lathyrus latifolius*) (I)
birdsfoot trefoil (*Lotus corniculatus*) (I)
yellow sweetclover (*Melilotus officinalis*) (A)
red clover (*Trifolium pratense*) (A)
white clover (*Trifolium repens*) (A)

(A) = Alien species

(I) = Invasive species

(N) = Noxious species

DEFINITIONS

(A) ALIEN SPECIES: A species introduced and occurring in locations beyond its known historical range. An alien species means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (E.O. Invasive Species). Synonyms for alien species include exotic, non-native, non-indigenous, and introduced species.

(I) INVASIVE SPECIES: An alien species that demonstrates rapid growth and spread, invades habitats, and displaces other species. Species that are prolific seed producers, have high seed germination rates, easily propagated asexually by root or stem fragments, and/or rapidly mature predispose a plant to being an invasive species.

(N) NOXIOUS SPECIES: Any living stage (including but not limited to seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health (Federal Noxious Weed Act of 1974). Undesirable plants encompasses plants that are classified as undesirable, noxious, harmful, exotic, injurious, or poisonous, pursuant to a State or Federal Law. Endangered species and plants indigenous to an area are excluded (FNWA, as amended 1990).

NATIVE SPECIES: An indigenous species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem. Accordingly, a species can not be considered native to geographic region or habitat merely because it occurs natively somewhere within the continental United States.

NOTE: Any species on the State noxious weed list is also considered and “invasive species”, and highly undesirable. In this partial list, some alien species are more invasive than other species depending on the local site conditions such as soil, precipitation, aspect, elevation, and status of the natural plant community.

REFERENCES:

“Non-native pest plants of the greatest concern in Oregon and Washington, as of August, 1997” PNW Exotic Pest Council, University of Washington, Seattle, Washington. Invasive Species, Executive Order, February 3, 1999.

“Noxious, invasive, and alien plant species: a challenge in wetland restoration and enhancement” February 23, 1999; USDA NRCS; Wetland Science Institute; Laurel, Maryland.

Executive Order 11877 (1976) directs federal agencies to restrict the introduction of exotic species into natural ecosystems on federal lands.