

# TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE  
SERVICE

NATURAL RESOURCES CONSERVATION

PLANT MATERIALS - 1

SPOKANE, WASHINGTON  
OCTOBER, 2005

## CONSERVATION SEEDING AND PLANTING GUIDE FOR WASHINGTON STATE

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# WASHINGTON GUIDE FOR CONSERVATION SEEDINGS AND PLANTINGS



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## How to Use the Guide

This guide is intended to be used as a tool to select suitable plant species for conservation plantings for erosion control, forage production, forestry uses, habitat improvement or restoration, and filtration.

The guide is partitioned into separate Excel spreadsheets and tables. The Master Species Adaptation and Characteristics spreadsheet contains a state-wide list of species. This master spreadsheet lists several species characteristics and adaptability criteria. In addition, a drop-down table is included which can be printed out, showing characteristics and adaptation information for the selected species (see page 7).

For specific species selection and seeding rates for Western and Eastern Washington separate references are used.

**Western Washington:** The publication *Pasture and Hayland Renovation for Western Washington and Oregon* can be accessed and downloaded via the following web site:

<http://cru.cahe.wsu.edu/CEPublications/eb1870.pdf>

Also, a more general guide for calculating seeding rates for grasses and forbs in western Washington is available (see page 7).

**Eastern Washington:** A series of tables respective of precipitation zones have been developed (see page 8). Each precipitation zone has suitable species and seeding rates listed for forage production, erosion control, habitat improvement/restoration, and filtration.

## Conservation Planning

The principles of conservation planning should be used in conjunction with this seeding guide. Identifying resource concerns, landowner objectives, inventorying resources, alternatives development, landowner decision, implementation, and evaluation are the foundation for effective conservation plantings. Determining on-site factors (soil, climate, existing vegetation), resource concerns, planned management and landowner objectives are essential before developing seeding or planting alternatives. Proper site preparation, planting technique, and maintenance are critical for stand establishment.

## **Reclamation versus Restoration**

The terms reclamation and restoration can have completely different meanings, which will lead to different seeding/planting and management recommendations. It is important to understand the on-site factors and landowner objectives to determine an appropriate planting plan.

Reclamation is the process of using conservation practices to restore a site from a deteriorated condition (invasive/noxious weeds, erosion). In reclamation, both native and/or non-invasive introduced species can be used when they would be the most suitable to compete against invasive weeds or to stabilize a severely eroded site.

Restoration is the process of restoring a site to a pre-determined natural ecological condition. In restoration, only native species, which are identified to originally exist on the site, would be used.

NRCS, through the Plant Materials Program, has developed grass, tree, shrub, and forb cultivars and they are the preferable choices to use in reclamation or restoration projects. Recently, there has been an extensive effort to use “source identified” seed or cutting stock. Native seed or cutting stock is collected near the site to be restored. This stock is grown by a contract nursery and put back on the site. In all cases, it is important to know where the seed or stock came from, and their site adaptability ranges.

## Technical References and Resource Links

Washington Major Land Resource Areas (MLRAs) –  
<http://soils.usda.gov/survey/geography/mlra/index.html>

NRCS Technical Notes in EFOTG Sec. I – Forestry, Range, Agronomy, and Plant  
Materials – <http://www.wa.nrcs.usda.gov> Item B. Technical Notes by Discipline

USDA Plants Website – <http://plants.usda.gov>

USDA NRCS Plant Materials Website - <http://plant-materials.nrcs.usda.gov>

USDA WA NRCS Plant Materials Website – <http://plant-materials.nrcs.usda.gov/wapmc/>  
(for Idaho, Oregon, and Montana PMC websites insert idpmc, orpmc, or mtpmc  
respectively)

Washington State Noxious Weed Control Board – current list of noxious weeds, weed  
brochures, laws, control, etc. <http://www.nwcb.wa.gov>

PNW Insect Control Handbook – <http://pnwpest.org/pnw/insects>

PNW Weed Control Handbook – <http://pnwpest.org/pnw/weeds>

Landowner's Guide for Restoring and Managing Oregon White Oak Habitats – order  
<http://www.or.blm.gov/salem> download electronically – <http://www.oregonoaks.org>

## Master Species Characteristics, Adaptation and Attributes Spreadsheet

The Excel spreadsheet file **Master\_Species\_2005.xls** is available on the Pullman PMC website:

[http://www.wsu.edu/pmc\\_nrcs/Technology.html](http://www.wsu.edu/pmc_nrcs/Technology.html)

The master species spreadsheet alphabetically lists trees, shrubs, grasses, forbs, and wetland species found in Washington. Plant characteristics, adaptation, and attribute information is tabulated and can be printed when using the dropdown table. It contains a MLRA table identifying key native plants per MLRA, which is also included in as Tables 1 and 2 on pages 10 and 11 of this document.

(Note: Enable macros in Excel for full functionality of **Master\_Species\_2005.xls**)

## Western Washington Seeding and Planting Recommendations

Use the web site below to access and print the following publication:

“Pasture and Hayland Renovation for Western Washington and Oregon”, EB1870, Steven C. Fransen and Marty Chaney.

<http://cru.cahe.wsu.edu/CEPublications/eb1870.pdf>

*Seed Rate Calculator* - Excel spreadsheet, **Seeding\_Rate\_Calculator\_2005.xls**, aids in planning seeding mixtures and determining seeding rates for different conservation uses. The Seed Rate Calculator is available to download on the Pullman PMC website:

[http://www.wsu.edu/pmc\\_nrcs/Technology.html](http://www.wsu.edu/pmc_nrcs/Technology.html)

*Western Washington Native Woody Plants for Wildlife* – Table 33 on pages 49-53 describes soil/climate suitability and wildlife attributes of native trees and shrubs in Western Washington.

## Eastern Washington Seeding and Planting Recommendations Tables

A series of tables respective of precipitation zone gives seeding recommendations relative to forage production, erosion control, habitat improvement/restoration, and filtration. Seeding rates are given for sites with no limitations, rocky or shallow, sandy, wetland/riparian and saline.

<b>Precipitation Zone Tables</b>	<b>Page</b>
Irrigated	13-15
6-9" Precipitation Zone	16-19
9-12" Precipitation Zone	20-23
12-15" Precipitation Zone	24-29
15-18" Precipitation Zone	30-34
18-25" Precipitation Zone	35-40
25"+ Precipitation Zone	41-45

Seeding rates are for drilled rates using Pure Live Seed (seed purity x seed germination)/100. **When seed is broadcast, double the listed seeding rate.** Using certified seed is recommended to assure purity and germination standards.



**Table 1. Western Washington MLRA's**

CHARACTERISTICS	1	2	3
Precipitation Range (Inches)	55-125	15-100	60-100
Elevation Range (Feet)	0-2800	0-1550	600-5200
Frost Free Days	60-270	120-140	0-200
<b>Landform</b>	<b>Northern Pacific Coast Range Foothills</b>	<b>Puget Sound and Willamette Valleys</b>	<b>Olympic and Cascade Mountains</b>
Predominant Vegetation	<p>Trees</p> <ul style="list-style-type: none"> <li>western hemlock</li> <li>western redcedar</li> <li>Douglas-fir</li> <li>Sitka spruce</li> </ul> <p>In some places</p> <ul style="list-style-type: none"> <li>grand fir</li> </ul> <p>On disturbed sites</p> <ul style="list-style-type: none"> <li>red alder</li> </ul> <p>Along coastal dunes</p> <ul style="list-style-type: none"> <li>lodgepole pine</li> </ul> <p>Southern part of the MLRA</p> <ul style="list-style-type: none"> <li>Port-Orford-cedar</li> <li>California bay madrone</li> <li>tanoak</li> <li>golden chinkapin</li> </ul> <p>Understory</p> <ul style="list-style-type: none"> <li>salmonberry</li> <li>ladyfern</li> <li>swordfern</li> <li>rhododendron</li> <li>Pacific waxmyrtle</li> <li>willow</li> <li>vine maple</li> <li>evergreen huckleberry</li> <li>salal</li> <li>oxalis</li> <li>violet</li> </ul>	<p>Trees</p> <ul style="list-style-type: none"> <li>Douglas-fir</li> <li>bigleaf maple</li> <li>western redcedar</li> <li>grand fir</li> <li>western hemlock</li> </ul> <p>Also common</p> <ul style="list-style-type: none"> <li>red alder</li> </ul> <p>On disturbed sites</p> <ul style="list-style-type: none"> <li>red alder</li> </ul> <p>On overflow channels, streambanks and islands</p> <ul style="list-style-type: none"> <li>black cottonwood</li> <li>willow</li> </ul> <p>Common on savannas</p> <ul style="list-style-type: none"> <li>Oregon white oak</li> </ul> <p>Common on prairies and savannas</p> <ul style="list-style-type: none"> <li>Red fescues</li> <li>western fescues</li> <li>bromes</li> <li>sedges</li> </ul> <p>Forest and savanna understory</p> <ul style="list-style-type: none"> <li>tall Oregon-grape</li> <li>Indian plum</li> <li>Common snowberry</li> <li>hazel</li> <li>oceanspray</li> <li>western serviceberry</li> <li>rose</li> <li>poison-oak</li> <li>swordfern</li> <li>dwarf Oregon-grape</li> <li>salal</li> <li>vine maple</li> <li>red huckleberry</li> <li>thimbleberry</li> <li>oxalis</li> </ul>	<p>Trees</p> <ul style="list-style-type: none"> <li>Douglas-fir</li> <li>Pacific silver fir</li> <li>western hemlock</li> </ul> <p>Also common</p> <ul style="list-style-type: none"> <li>western redcedar</li> <li>noble fir</li> <li>western white pine</li> </ul> <p>At higher elevations</p> <ul style="list-style-type: none"> <li>mountain hemlock</li> </ul> <p>Grow near timberlines</p> <ul style="list-style-type: none"> <li>subalpine fir</li> <li>whitebark pine</li> </ul> <p>Understory</p> <ul style="list-style-type: none"> <li>huckleberry</li> <li>salal</li> <li>blackberry</li> <li>twinflower</li> <li>vine maple</li> <li>Pacific yew</li> <li>thimbleberry</li> <li>violet</li> <li>trillium</li> <li>swordfern</li> <li>insideout flower</li> <li>oxalis</li> <li>beargrass</li> <li>false-azalea</li> </ul>

**Table 2: Eastern Washington MLRA's**

CHARACTERISTICS	6	7	8	
Precipitation Range (Inches)	20-70	6-12	9-18	
Elevation Range (Feet)	900-7400	600-1550	1200-3400	
Frost Free Days	60-120	120-200	140-175	
<b>Landform</b>	<b>Cascade Mountains, Eastern Slopes</b>	<b>Columbia Basin</b>	<b>Columbia Plateau</b>	
Predominant Vegetation	Grasslands bluebunch wheatgrass Sandberg bluegrass big sagebrush bitterbrush Idaho fescue Cusick bluegrass Trees Ponderosa pine Understory bluebunch wheatgrass Idaho fescue Trees Douglas-fir Understory pinegrass bearberry currant Trees grand fir western larch lodgepole pine Understory vacciniums menziesia At the highest elevations Pacific silver fir mountain hemock subalpine fir whitebark pine	Shrub-Grass Associations on medium textured soils Shrub-Grass Associations on sandy soils Very shallow soils Saline-Alkali soils	big sagebrush bluebunch wheatgrass bitterbrush needleandthread stiff sagebrush Sandberg bluegrass inland saltgrass basin wildrye greasewood	Moderately deep to very deep, gently sloping to moderately sloping soils and on soils that have steep and very steep north exposures Moist sites and on moderately steep to very steep north Dominant on shallow and very shallow, stony soils. Small stands along the Columbia River Understory On warmer sites on north slopes Understory Canyons & draws big sagebrush bluebunch wheatgrass stiff sagebrush low sagebrush Sandberg bluegrass ponderosa pine common snowberry Oregon white oak poison-oak hackberry maple

**Table 2: Eastern Washington MLRA's (continued)**

CHARACTERISTICS	9	43	44
Precipitation Range (Inches)	15-22	25-60	12-16
Elevation Range (Feet)	1850-3700	1250-4400	1850-6500
Frost Free Days	100-170	45-145	100-120
<b>Landform</b>	<b>Palouse and Nez Perce Prairies</b>	<b>Northern Rocky Mountains</b>	<b>Northern Rocky Mountain Valleys</b>
Predominant Vegetation	Low elevation grassland bluebunch wheatgrass Idaho fescue Sandberg bluegrass needleandthread grass Higher elevation shrub/grassland common snowberry Idaho fescue or big sagebrush Idaho fescue bluebunch wheatgrass Other important species Wood's rose common cowparsnip black hawthorn arrowleaf balsamroot Woodlands on south and west slopes ponderosa pine Understory bluebunch wheatgrass Idaho fescue common snowberry ninebark Woodlands on north and east slopes Douglas-fir Understory pinegrass	Conifer forests western white pine ponderosa pine lodgepole pine western redcedar western larch western hemlock Douglar-fir subalpine fir spruce Understory alpine grasses alpine forbs alpine shrubs Scattered stands on high mountains of Montana and Wyoming subalpine fir spruce whitebark pine	Grassland vegetation of valleys and foothills bluebunch wheatgrass rough fescue Idaho fescue bearded wheatgrass Forest vegetation of the valleys and foothills Douglas-fir ponderosa pine grand fir western redcedar western hemlock Forest vegetation of the valleys and foothills understory pinegrass common snowberry mallow ninebark white spirea

**Table 3. Eastside – Erosion Attribute Irrigated**

		No Soil Limitation (deep)		Soil Limited (seeding rate doubled for critical area plantings)		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline				seeds per lb
Species		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs per ac	seeds sq ft	lbs. /ac	seeds sq.ft.	
<b>Overstory</b>	annual ryegrass (I)		0.0		0		0		0		0			247000
	perennial ryegrass (I)	4	24.0			2	12	2	12					247000
	hard fescue (I)		0.0	2	25.7117	2	25.71		0		0			560000
	blue wildrye (N)		0.0		0.0		0		0		0			145000
	tall fescue (I)		0.0	4	56.4		0.0		0.0		0	6	30	614000
	mountain brome (N)		0.0	1	1.8		0.0		0.0		0			80000
	slender wheatgrass (N)		0.0		0.0		0.0		0.0		0			135000
	intermediate wheatgrass	10	18.4		0.0		0.0		0.0		0			80000
	tall wheatgrass		0.0		0.0		0.0		0.0	10	17.91			78000
	thickspike wheatgrass (N)		0.0		0.0		0.0		0.0		0			
orchardgrass		0.0		0.0	4	49.6		49.6	4	49.6			540000	
			0.0		0		0.0		0.0		0.0			
<b>Forbs</b>	white clover (I)		0.0		0		0.0		0.0		0.0			800000
	native legume		0.0		0		0.0		0.0		0.0			
			0.0		0		0.0		0.0		0.0			
			0.0		0		0.0		0.0		0.0			
<b>Mix Total</b>		42.4	7.0	83.9	0.0	8.0	87.3	0.0	6.0	61.6	0.0	10.0	17.9	6 30
<b>Shrubs</b>	redosier dogwood		5											
	shrub willows		6											
<b>Trees</b>	hybrid poplars		10											
	tree willows		12											
	blue spruce		10											
	Austrian pine		10											
	Scots pine		10											
	ponderosa pine		10											

- a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West
- b. from plants web site
- c. from plants web site

**Table 4. Eastside – Forage Attribute Irrigated**

Species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation				seeds per pound	
	Seeding Rate		lbs/ac (seeds/ sq ft)		Sandy		Wet		Sandy		Wet			
	a	seeds sq ft	(N) b	seeds sq ft	a	seeds sq ft	b	seeds sq ft	a	seeds sq ft	b	seeds sq.ft.		seeds sq ft
intermediate wheatgrass (I)		0		0		0		0		0		0	0	80000
tall fescue (I)		0		0		0		0		0		0	0	205000
orchardgrass (I)		0	4	49.59	4	49.59		0	4	49.59		0	0	540000
timothy (I)		0		0		0		0		0	4	112	4	112.94766
meadow brome (I)	8	17.08		0		0		0		0		0	0	93000
Garrison creeping foxtail (I)		0		0		0		0		0		0	0	750000
beardless wildrye (N)		0		0		0		0		0		0	0	150000
slender wheatgrass (N)		0		0		0		0		0		0	0	135000
big bluegrass (N)		0		0		0		0		0		0	0	917000
pubescent wheatgrass (I)		0		0		0		0		0		0	0	80000
tall wheatgrass		0		0		0		0		0		0	0	
<b>Crops</b>														
cereal barley (annual)		0		0		0		0		0		0	0	
<b>Forbs</b>														
alfalfa (I)	2	9.18	2	9.18		0		0	2	9.18	1	5	1	0
ladino clover (I)		0		0	1	10		0		0		0	1	10
birdsfoot trefoil (I)														375000
strawberry clover (I)														300000
alsike clover (I)														700000
<b>Shrubs</b>														
		0		0		0		0		0		0	0	
		0		0		0		0		0		0	0	
		0		0		0		0		0		0	0	
<b>Mix total seeds/sq ft</b>	10	26	6	59	5	60	0	0	6	59	5	117	5	123

/1 Use 1 species in mix  
 /2 may be hard to establish below 12" pcp

I Introduced  
 N Native

**Table 5. Eastside – Filtration Attribute Irrigated**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation				
		(deep)				(shallow and/or rocky)		Sandy		Saline				
		Seeding Rate												
		lbs	seeds	lbs/	seeds	lbs	seeds	lbs	seeds	lbs	seeds	lbs	seeds	seeds
<b>Species</b>		ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq.ft.	/lb
<b>Overstory</b>	tall wheatgrass (I)		0		0		0		0	10	17.91			78000
	tall fescue (I)	5	23.53		0		0		0		0	6	30	205000
	intermediate wheatgrass (I)		0	8	14.69		0		0		0			80000
	orchardgrass		0		0		0	4	4.96		0			54000
	timothy		0		0	4	112.9		0		0			1230000
			0	0		0		0		0		0		
<b>Understory</b>	native sedges		0		0		0		0		0			
	native bulrush		0		0		0		0		0			
	cattails		0		0		0		0		0			
			0		0		0		0		0			
			5	24	8	15	4	113	4	5	10	18	6	30
<b>Mix total</b>														
		Plant Spacing (ft)												
<b>Shrubs</b>	shrub-type willows	6							5					
	redosier dogwood	6							5					
<b>Trees</b>	tree-type willows	10							8					
	black cottonwood (N)	10							8					
	hybrid cottonwood (poplars)	8							8					

**Table 6. Eastside – Erosion Attribute 6-9” Precipitation Zone**

	Species	No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		seeds per lb					
		Seeding Rate															
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs per ac	seeds sq ft						
<b>Overstory</b>	crested wheatgrass	3	13.8		0		0		0		0	200000					
	Siberian wheatgrass		0.0		0		0	2	11.4784		0	250000					
	Snake River wheatgrass	3	9.6	3	9.6		0		0		0	139000					
	Indian ricegrass		0.0		0.0	3	16.5		16.5		0	240000					
	thickspike wheatgrass		0.0		0.0		0.0	3	10.7		0	156000					
	Needle and thread		0.0	5	20.7	3	12.4	3	12.4		0	180000					
	Mammoth wildrye		0.0		0.0		0.0	4	5.1		0	55000					
	Basin wildrye		0.0		0.0		0.0		0.0		0						
<b>Understory</b>	sand dropseed							0.25	30.5								
	Sandberg bluegrass	2	42.5		0.0	3	63.7		0.0		0	925000					
	bottlebrush squirreltail	1	4.4	3	13.2		0.0		0.0	4	17.6	192000					
	Canby bluegrass		0.0		0		0.0		0.0		0.0						
<b>Forbs</b>	western yarrow	0.1	9.5		0	0.1	9.5		0.0		0.0	4124000 <sup>a</sup>					
	scarlet globemallow		0.0		0	0.25	2.9	0.25	2.9		0.0	500000 <sup>b</sup>					
			0.0		0		0.0		0.0		0.0						
<b>Shrubs</b>	spiny hopsage		0.0		0		0.0		0.0		0.0	347000 <sup>c</sup>					
	4-wing saltbush		0.0		0		0.0		0.0	4	4.8	52000 <sup>d</sup>					
	snow buckwheat		0.0		0	1	6.9	1	6.9		0	300000					
	forage kochia									1	9						
<b>Mix Total</b>		9.1		79.8		11.0	43.5		10.4		111.9	0.0	16.5	96.5		9.0	31.4

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

b. from PLANTS web site

c. from PLANTS web site

d. from PLANTS web site

**Table 7. Eastside – Forage Attribute 6-9” Precipitation Zone**

	Species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation				Seeds per pound	
		Seeding Rate lbs/ac		(seeds/ sq ft)		Sandy		Saline							
		a	seeds sq ft	(N)	seeds sq ft	a	seeds sq ft	b	seeds sq ft	a	seeds sq ft	b	seeds sq ft		seeds sq ft
<b>Overstory</b>	Siberian wheatgrass (I)	7	40	0	0					6	34	0	0	250000 <sup>a</sup>	
	Snake River wheatgrass (N)		0	10	32		0	10	32		0	0	0	139000 <sup>b</sup>	
	Indian ricegrass (N)		0	0	0		0	0	0	4	22	0	0	240000 <sup>c</sup>	
	thickspike wheatgrass (N)		0	0	0		0	0	0		10	35.813	0	156000 <sup>c</sup>	
	Needle and thread (N)		0	0	0	6	25	0	0	5	21	5	20.661	0	180000 <sup>c</sup>
	big bluegrass (N) /1	2	42	2	42		0	0	0		0	0	0	917000	
	sand dropseed (N) /2		0	0	0	0.2	24	0	0		0	0.25	30.418	0	5300000
	bottlebrush squirreltail (N)		0	0	0		0	0	0		0	0	4	18	192000 <sup>d</sup>
	Basin wildrye /3 (N)		0	0	0		0	0	0		0	0	0	0	
			0	0	0		0	0	0		0	0	0	0	
			0	0	0		0	0	0		0	0	0	0	
<b>Understory</b>	Sandberg bluegrass (N) /1	1	21	1	21	1	21	1	21		0	0	0	925000	
	Canby bluegrass		0	0	0		0	0	0		0	0	0		
<b>Forbs</b>	forage kochia (I)	0.75	7	0	0		0	0	0		0	0	0.75	7	395000 <sup>e</sup>
	globemallow (N)		0	1	11		0	0	0		0	0	0	0	500000 <sup>f</sup>
	western yarrow (N)		0	0	0		0	0	0		0	0	0		
	firecracker penstemon (N)		0	0	0		0	0	0		0	0	0		
			0	0	0		0	0	0		0	0	0	0	
<b>Shrubs</b>	winterfat (N)		0	0	0	7	18	7	18		0	0	0	0	113000
	antelope bitterbrush (N)		0	0	0		0	0	0	20	9	20	9.1827	0	20000
	4-wing saltbush (N)		0	0	0		0	0	0		0	0	0		
	snow buckwheat (N)		0	0	0		0	0	0		0	0	0		
<b>Mix total</b>		10.75	110	14	106	14	89	18	71	35	86	35	96	4.75	24

/1 Use 1 species in mix  
 /2 may be hard to establish below 12” pcp  
 /3 seed in moist draws  
 I Introduced  
 N Native

- a. more drought tolerant than crested
- b. more drought tolerant, more grazing tolerant than bluebunch
- c. sandy sites
- d. short-lived, perennial, adapted to saline/alkaline sites
- e. Long-lived semi-evergreen half shrub. Has a fibrous root system with a deep taproot. Tolerates saline soils. 6-16 in pcp zone
- f. Naturally found on dry rocky or sandy soils, open flats and roadsides in 8 in or more pcp (UT Plt. Guide)

**Table 8. Eastside – Habitat Improvement / Restoration Attribute 6-9” Precipitation Zone**

		No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		Other soil limitation Wetland/Riparian			
		Seeding Rate													
<b>Species</b>		lbs/ac	seeds sq ft	lbs/ ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	N/A	seeds /lb
<b>Overstory</b>			0		0		0		0		0		0		
	big bluegrass	2	42.102847		0	3	63		0		0		0		917000
	Snake River wheatgrass	3	9.5730028	4	12.76		0		0		0		0		139000
	Indian ricegrass		0		0		0	3	16.529		0		0		240000
	thickspike wheatgrass	1	3.5812672	2	7.163	2	6	4	14.325		0		0		156000
	Needle and thread		0		0		0	2	8.2645		0		0		180000
	Basin wildrye	1	3.7878788		0		0		0		0		0		165000
			0		0		0		0		0		0		
<b>Understory</b>	Canby bluegrass		0		0		0		0		0		0		926000
	Sandberg bluegrass		0	2	42.47	1	21		0		0		0		925000
	bottlebrush squirreltail		0		0		0		0	4	17.631		0		192000
			0		0		0		0		0		0		
<b>Forbs</b>	western yarrow		0		0		0		0		0		0		4124000
			0		0		0		0		0		0		
			0		0		0		0		0		0		
<b>shrubs</b>	snow buckwheat	1	6.8870523		0		0		0		0		0		300000
	antelope bitterbrush		0		0		0		0		0		0		20000
	gray rabbitbrush		0		0		0		0		0		0		652500
	big sagebrush		0		0		0		0		0		0		2466000
	4 wing saltbush		0		0		0		0	4	4.775		0		52000
<b>Mix Total</b>		8	65.932048	8	62.4	0	6	90	0	9	39.118	0	8	22.4	

**Table 9. Eastside – Filtration Attribute 6-9” Precipitation Zone**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		Saline		
		Seeding Rate										
	Species	lbs ac	seeds sq ft	lbs/ ac	seeds sq ft	lbs ac	seeds sq ft	lbs ac	seeds sq ft	lbs ac	seeds sq ft	seeds /lb
<b>Overstory</b>	crested wheatgrass		0	5	20		0		0		0	
	Siberian wheatgrass	5	20		0		0	4	16		0	
	Snake River wheatgrass		0	5	15		0		0		0	
	Indian ricegrass		0		0	2	10	4	20		0	
	thickspike wheatgrass		0		0		0		0		0	
	Needle and thread		0		0	3	9	2	6		0	
	Basin wildrye		0		0		0		0		0	
	Mammoth wildrye		0		0		0	2	2		0	
	Slender Wheatgrass		0		0		0		0	10	30	
<b>Understory</b>	Sandberg bluegrass	2	42		0	3	63		0		0	
	Bottlebrush squirreltail		0		0		0		0		0	
	Canby bluegrass		0		0		0		0		0	
			0		0		0		0		0	
<b>Forbs</b>	western yarrow		0		0		0		0		0	
	scarlet globemallow		0		0		0		0		0	
<b>Mix Total</b>		7	62	10	35	8	82	12	48	10	30	

**Table 10. Eastside – Erosion Attribute 9-12” Precipitation Zone**

	Species	No Soil Limitation		Soil Limited		Soil severely limited		Other soil limitation				Other soil limitation		seeds per lb	
		(deep)				(shallow and/or rocky)		Sandy		Saline					
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs ac	seeds sq.ft.	lbs per ac	seeds sq ft		
		<b>Seeding Rate</b>													
<b>Overstory</b>	crested wheatgrass	6	27.5		0		0		0				0		200000
	Siberian wheatgrass				0		0		0	6	24		0		250000
	bluebunch wheatgrass 'Anatone', 'P-7'					6	18								139000
	Snake River wheatgrass		0.0	6	19.1		0		0				0		139000
	Indian ricegrass		0.0		0.0		0.0		3		16.5		0		240000
	thickspike wheatgrass		0.0		0.0		0.0		3		10.7		0		156000
	Needle and thread		0.0		0.0	3	12.4		3		12.4		0		180000
	Mammoth wildrye	0	0.0		0.0		0.0				0.0		0		55000
	Basin wildrye		0.0	2	6.0		0.0				0.0		0		
	slender wheatgrass												7	21	
<b>Understory</b>	Sandberg bluegrass		0.0		0.0	3	63.7				0.0			0	925000
	bottlebrush squirreltail		0.0		0.0		0.0				0.0		4	17.6	192000
	big bluegrass	2	42.0	2	42		0.0				0.0			0.0	
<b>Forbs</b>	western yarrow		0.0		0		0.0				0.0			0.0	4124000 <sup>a</sup>
			0.0		0		0.0				0.0			0.0	500000 <sup>b</sup>
			0.0		0		0.0				0.0			0.0	
<b>Shrubs</b>	spiny hopsage		0.0		0		0.0				0.0			0.0	347000 <sup>c</sup>
	4-wing saltbush		0.0		0		0.0				0.0		4	4.8	52000 <sup>d</sup>
	snow buckwheat		0.0		0		0.0				0.0			0	300000
<b>Mix Total</b>		8	69.5	10.0	67.1	0.0	12.0	94.1	0.0	9.0	39.7	6.0	24.0	15.0	43.4

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

b. from PLANTS web site

c. from PLANTS web site

d. from PLANTS web site

**Table 11. Eastside – Forage Attribute 9-12” Precipitation Zone**

Species	late lbs/ac	seeds sq.ft.	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation				Other soil limitation		seeds per pound	
			Seeding Rate lbs/ac (seeds/ sq ft)								Sandy		Saline					
			early	seeds sq ft	(N) b	seeds sq ft	a	seeds sq ft	b	seeds sq ft	a	seeds sq ft	b	seeds sq ft	seeds sq ft	seeds sq ft		
<b>Overstory</b>			7	40		0			0	0			6	34	7	40.174	0	250000
Siberian wheatgrass (I)																		139000
bluebunch wheatgrass 'Anatone'																		139000
Snake River wheatgrass (N)				0	7	22			0	10	32		0		0		0	180000
Indian ricegrass (N)				0		0			0		0		4	22		0	0	240000
thickspike wheatgrass (N)				0		0			0		0		0		0		0	156000
Needle and thread (N)				0		0		6	25		0		5	21	5	20.661		180000
big bluegrass (N) /1	2	42	2	42	2	42			0		0		0		0		0	917000
sand dropseed (N) /2				0		0		0.2	24		0		0	0.25	30.418		0	5300000
bottlebrush squirreltail (N)				0		0			0		0					4	18	192000
Basin wildrye				0		0			0		0		0		0		0	0
Intermediate or pubescent wheatgrass	10	20		0		0			0		0		0		0		0	0
slender wheatgrass																7	21	0
<b>Understory</b>			1	21	1	21	1	21	1	21			0	0			0	925000
Sandberg bluegrass (N) /1				0		0		0	0	0			0	0			0	0
Canby bluegrass				0		0		0	0	0			0	0			0	0
<b>Forbs</b>			0.75	7		0		0	0	0			0			0.75	7	395000
forage kochia (I)				0	1	11		0	0	0			0	0		0	0	500000
globemallow (N)				0		0		0	0	0			0	0		0	0	0
western yarrow (N)				0		0		0	0	0			0	0		0	0	0
lewis flax				0		0		0	0	0			0	0		0	0	0
firecracker penstemon				0		0		0	0	0			0	0		0	0	0
alfalfa (I)			0.5	3		0		0	0	0			0	0		0	0	0
<b>Shrubs</b>				0		0		7	18	7	18		0	0		0	0	113000
winterfat (N)				0		0		0	0	0			20	9	12.25	91.25	0	20000
antelope bitterbrush (N)				0		0		0	0	0			0	0		0	0	0
4-wing saltbush (N)				0		0		0	0	0			0	0		0	0	0
snow buckwheat				0		0		0	0	0			0	0		0	0	0
<b>Mix total</b>	12	62	11.25	113	11	96	14	89	18	71	35	86	25	183	11.75	46		

/2 may be hard to establish below 12” pcp

I Introduced  
N Native

**Table 12. Eastside – Habitat Improvement / Restoration Attribute 9-12” Precipitation Zone**

	Species	No Soil Limitation		Soil Limited		Soil severely limited		Other soil limitation		Other soil limitation		seeds /lb		
		(deep)				(shallow and/or rocky)		Sandy		Saline			Wetland/Riparian	
		Seeding Rate												
		lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	
<b>Overstory</b>	bluebunch wheatgrass			5	16									139000
	Snake River wheatgrass	2	6.382002		0	3	15		0		0			139000
	Indian ricegrass		0		0		0	3	16.529		0			240000
	thickspike wheatgrass		0		0		0		0		0			156000
	Needle and thread		0		0		0	3	12.397		0			180000
	slender wheatgrass									5	15			
	Basin wildrye	1	2.984389		0		0		0		0			130000
<b>Understory</b>	big bluegrass	2	42.10285	2	42.1		0		0		0			917000
	Canby bluegrass		0		0		0		0		0			926000
	Sandberg bluegrass		0		0	2	42	1	21.235		0			925000
	bottlebrush squirreltail		0		0		0		0	2	8.8154			192000
			0		0		0		0		0			
<b>Forbs</b>	western yarrow	0.1	10		0	0.1	9.5	0.1	9.5		0			
			0		0		0		0		0			
<b>Shrubs</b>	snow buckwheat	1	6.887052		0		0		0		0			300000
	antelope bitterbrush		0		0		0		0		0			20000
	gray rabbitbrush		0		0		0		0		0			652000
	big sagebrush		0		0		0		0		0			2466000
	4 wing saltbush		0		0		0		0		0			52000
<b>Mix Total</b>		6.1	58.4	7	58.1	0	5.1	66.5	0	7.1	59.661	0	7	23.815

**Table 13. Eastside – Filtration Attribute 9-12” Precipitation Zone**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		Saline		
		Seeding Rate										
<b>Species</b>		lbs	seeds	lbs/	seeds	lbs	seeds	lbs	seeds	lbs	seeds	seeds
		ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	/lb
<b>Overstory</b>	crested wheatgrass	4	18.365		0		0		0		0	200000
	Siberian wheatgrass		0	2	11.5	2	11.478	2	11.48		0	250000
	bluebunch wheatgrass			3	9							139000
	Snake River wheatgrass	4	12.764		0		0		0		0	139000
	Indian ricegrass		0		0		0	2	11.02		0	240000
	thickspike wheatgrass		0		0		0		0		0	156000
	Needle and thread		0		0	2	8.2645	2	8.264		0	180000
	Basin wildrye	1	3.7879		0		0		0		0	165000
	Mammoth wildrye		0		0		0		0		0	55000
	big bluegrass	2	42.47	2	42		0	2	42.47		0	925000
slender wheatgrass										7	21	
<b>Understory</b>	Sandberg bluegrass		0	1	21.2	2	42.47		0		0	925000
	Bottlebrush squirreltail		0		0		0		0	2	8.815	192000
	Canby bluegrass		0		0		0		0		0	9260000
<b>Forbs</b>	western yarrow		0		0		0		0		0	4124000
	scarlet globemallow		0		0		0		0		0	500000

**Table 14. Eastside – Erosion Attribute 12-15” Precipitation Zone**

	Species	No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		seeds per lb
		Seeding Rate										
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs per ac	seeds sq ft	
<b>Overstory</b>	crested wheatgrass	3	13.8		0		0		0			200000
	Siberian wheatgrass		0.0		0		0	5	28.6961		0	250000
	beardless wheatgrass 'Whitmar'											
	bluebunch wheatgrass 'Anatone' 'Goldar' 'P-7'											
	Snake River wheatgrass 'Secar'	3	9.6	3	9.6		0		0		0	139000
	Indian ricegrass		0.0		0.0		0.0	3	16.5		0	240000
	thickspike wheatgrass		0.0		0.0		0.0		0.0		0	156000
	Needle and thread		0.0		0.0	3	12.4	3	12.4		0	180000
	Mammoth wildrye		0.0		0.0		0.0		0.0		0	55000
	Basin wildrye		0.0	4	12.0		0.0		0.0	2	6	
	big bluegrass (N)											
	pubescent wheatgrass	6	12.0									
	sheep fescue					2	32.0					
	slender wheatgrass									7	21	
<b>Understory</b>	Sandberg bluegrass		0.0	2	42.5	3	63.7	2	42.5		0	925000
	bottlebrush squirreltail		0.0		0.0		0.0		0.0	4	17.6	192000
	Canby bluegrass		0.0		0		0.0		0.0		0.0	

**Table 14. Eastside – Erosion Attribute 12-15” Precipitation Zone (continued)**

	Species	No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)			Other soil limitation Sandy		Other soil limitation Saline		seeds per lb		
		Seeding Rate													
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs per ac	seeds sq ft	lbs per ac			seeds sq ft
<b>Forbs</b>	western yarrow	0.1	9.5		0	0.1	9.467							4124000	a
			0.0		0		0								
<b>Shrubs</b>	spiny hopsage		0.0		0		0							347000	b
	4-wing saltbush		0.0		0		0			4	4.775			52000	c
	snow buckwheat		0.0		0.0	1	6.887		1	6.88705		0		300000	
<b>Mix Total</b>		12.1	44.9	9	64.1	0	9.1	124.5	0	14	107.0	0	17	49.41	
Plant Spacing															
<b>Shrubs</b>	caragana		5												
	skunkbush sumac		5												
	silver buffaloberry		5												
<b>Trees</b>	Rocky Mountain juniper		6												
	ponderosa pine		12												

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

b. from PLANTS web site

c. from PLANTS web site

**Table 15. Eastside – Forage Attribute 12-15” Precipitation Zone**

species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation				Other soil limitation		seeds per pound
	Seeding Rate lbs/ac (seeds/ sq ft)								Sandy		Saline				
	a	seeds sq ft	(N) b	seeds sq ft	late /3	a	seeds sq ft	b	seeds sq ft	a	seeds sq ft	b	seeds sq ft	seeds sq ft	
<b>Overstory</b> Siberian wheatgrass (I)	7	40								6	34	6	34.435	0	250000 <sup>a</sup>
beardless wheatgrass (N) 'Whitmar'															145000
bluebunch wheatgrass (N) 'Anatone' 'Goldar' 'P-7'															139000
Snake River wheatgrass (N) 'Secar'			10	32			8	26		0	0		0	0	139000 <sup>b</sup>
Indian ricegrass (N)									4	22		0	0	0	240000 <sup>c</sup>
thickspike wheatgrass (N)										0			0	0	156000 <sup>c</sup>
Needle and thread (N)						6	25	0	5	21	5	21		0	180000 <sup>c</sup>
big bluegrass (N) /1	2	42	2	42	2	42		0		0		0		0	917000
sand dropseed (N) /2						0.2	4	0		0	0.25	30		0	5300000 <sup>d</sup>
bottlebrush squirreltail (N)							0	0		0		0	4	17.6	192000
Basin wildrye							0	0		0		0		0	165000
pubescent wheatgrass (I)							0	0		0		0		0	80000
intermediate wheatgrass (I)					10	20		0		0		0		0	80000
slender wheatgrass (N)													7	21	
<b>Understory</b> Sandberg bluegrass (N) /1	1	21	1	21			1	21	2	42		0	0	0	925000
Canby bluegrass								0		0		0		0	926000
sheep fescue (I)								0		0		0		0	680000
								0		0		0		0	

a. more drought tolerant than crested

b. more drought tolerant, more grazing tolerant than bluebunch

c. sandy sites

d. short-lived, perennial, adapted to saline/alkaline sites

**Table 15. Eastside – Forage Attribute 12-15” Precipitation Zone (continued)**

species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation				Other soil limitation		seeds per pound	
	Seeding Rate lbs/ac (seeds/ sq ft)								Sandy		Saline		seeds per pound			
	seeds (N)	seeds late /3			seeds	seeds	seeds	seeds	seeds	seeds	seeds	seeds				
a	b	a	b	a	b	a	b	a	b	a	b	sq ft				
<b>Forbs</b>																
forage kochia (I)	0				0	0			0	0			0.75	6.801		395000 °
alfalfa	0.5	3			0	0			0	0				0		20000
<b>Shrubs</b>																
winterfat (N)					7	18.159	7	18	0	0				0		113000
antelope bitterbrush (N)						0		0	20	9	20	9.1827		0		20000
4-wing saltbush (N)						0		0	0					0		52000
<b>Mix total seeds/sq ft</b>	10.5	106	13	95	12	62	14.2	68	17	86	35	86	31.25	94.4	11.75	45.432

/1 Use 1 species in mix

/2 may be hard to establish below 12" pcp

/3 late pasture

I Introduced

N Native

e. Long-lived semi-evergreen half shrub. Has a fibrous root system with a deep taproot. Tolerates saline soils. 6-16 in pcp zone

**Table 16. Eastside – Habitat Improvement / Restoration Attribute 12-15” Precipitation Zone**

		No Soil Limitation		Soil Limited		Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		Saline		Wetland/Riparian
		Seeding Rate										
<b>Species</b>		seeds		seeds		seeds		seeds		seeds		seeds
<b>Overstory</b>		lbs/ac	sq ft	lbs/ac	sq.ft.	lbs/ac	sq ft	lbs/ac	sq ft	lbs/ac	sq ft	/lb
	beardless wheatgrass 'Whitmar'			4	12							145000
	bluebunch wheatgrass 'Anatone', 'Goldar', 'P-7'	7	21									139000
	Snake River wheatgrass 'Secar'		0			5	15.955		0		0	139000
	Indian ricegrass		0				0	3	16.529		0	240000
	thickspike wheatgrass		0				0		0		0	156000
	Needle and thread		0				0	3	12		0	180000
	big bluegrass	1	21.051423	1	21	2	42.103	1	21.051		0	917000
	Basin wildrye	3	11.363636	3	9		0		0	6	22.727	165000
			0				0		0		0	
<b>Understory</b>	Canby bluegrass		0				0		0		0	926000
	Sandberg bluegrass		0			1	21.235		0		0	925000
	bottlebrush squirreltail		0				0		0	3	13.223	192000
			0				0		0		0	
<b>Forbs</b>	western yarrow		0			0.1	9.5	0.1	9.5		0	4124000
			0				0		0		0	
			0				0		0		0	
<b>Shrubs</b>	snow buckwheat		0			1	6.8871		0		0	300000
	antelope bitterbrush		0				0		0		0	20000
	gray rabbitbrush		0				0		0		0	652500
	big sagebrush		0				0		0		0	2466000
	4 wing saltbush		0				0		0	1	1.1938	52000
<b>Mix Total</b>		11	53.5	8	42	9.1	95.7	7.1	59.1	10	37.1	

**Table 17. Eastside – Filtration Attribute 12-15” Precipitation Zone**

	Species	No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		seeds /lb		
		water (deep)		wind		(shallow and/or rocky)		Sandy		Saline				
		lbs ac	seeds sq ft	lbs/ ac	seeds sq ft	lbs ac	seeds sq ft	lbs ac	seeds sq ft	lbs ac	seeds sq ft			
<b>Overstory</b>	crested wheatgrass		0	2	8		0		0		0			
	Siberian wheatgrass		0		0		0	6	24		0			
	beardless wheatgrass 'Whitmar'													
	bluebunch wheatgrass 'Anatone', 'Goldar', 'P-7'													
	Snake River wheatgrass 'Secar'		0		0	4	12		0		0			
	bluebunch wheatgrass											139000		
	beardless wheatgrass 'Whitmar'											145000		
	Indian ricegrass		0		0		0	2	11.02		0	240000		
	thickspike wheatgrass		0		0		0		0		0	156000		
	Basin wildrye	3	11.364		0		0		0		0	165000		
	Mammoth wildrye		0		0		0		0		0	55000		
	big bluegrass (N) 'Sherman'		0		0		0		0		0	917000		
	streambank wheatgrass (N)		0		0	4	12.397		0		0	135000		
	pubescent wheatgrass (I)	8	14.692	6	11		0		0	4	7.346	80000		
	sheep fescue 'Covar'		0	2	31.2	2	31.221		0		0	680000		
	slender wheatgrass		0		0		0		0	4	21			
<b>Understory</b>	Sandberg bluegrass		0		0	1	21.235	1	21.24		0	925000		
	Bottlebrush squirreltail		0		0		0		0	4	17.63	192000		
	Canby bluegrass		0		0		0		0		0	926000		
			0		0		0		0		0			
<b>Forbs</b>	western yarrow		0		0		0		0		0	4124000		
	scarlet globemallow		0		0		0		0		0	500000		
<b>Mix Total</b>		11	27	10	50	0	11	76.853	0	9	56.25	0	12	45.98

**Table 18. Eastside – Erosion Attribute 15-18” Precipitation Zone**

	Species	No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		seeds per lb		
		Seeding Rate												
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs per ac	seeds sq ft			
<b>Overstory</b>	Snake River wheatgrass beardless or bluebunch wheatgrass	3	11.6		0.0	3	11.57		5	19.2837		0	168000	
	Indian ricegrass		0.0		0.0		0.0			0.0		0	240000	
	intermediate wheatgrass (I)			7	14.0								80000	
	pubescent wheatgrass (I)												80000	
	hard or sheep fescue (I)					3	42.0						600000	
	big bluegrass	2	42.0						2	42.0			917000	
	Idaho fescue												450000	
	thickspike wheatgrass		0.0		0.0		0.0			0.0		0	156000	
	Needle and thread		0.0		0.0		0.0			0.0		0	180000	
	Basin wildrye		0.0		0.0		0.0			0.0		0	165000	
	tall wheatgrass (I)										12	24		
<b>Understory</b>	Sandberg bluegrass	2	42.5		0.0	3	63.7			0.0		0	925000	
	bottlebrush squirreltail		0.0		0.0		0.0			0.0		0.0	192000	
	Canby bluegrass		0.0		0		0.0			0.0		0.0	926000	
<b>Forbs</b>	western yarrow	0.1	9.5		0		0.0			0.0		0.0	4124000 <sup>a</sup>	
	alfalfa	2	20.0	2	10		0.0		1	5.0		0.0		
<b>Shrubs</b>	spiny hopsage		0.0		0		0.0			0.0		0.0	347000 <sup>b</sup>	
	4-wing saltbush		0.0		0		0.0			0.0		0.0	52000 <sup>c</sup>	
	snow buckwheat		0.0		0	1	6.9		1	6.9		0	300000	
	snow berry		0		0							0	76000	
<b>Mix Total</b>		9.1	125.6	9.0	24.0	0.0	10.0	124.2	0.0	9.0	73.2	0.0	12.0	24.0

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

b. from PLANTS web site

c. from PLANTS web site

**Table 18. Eastside – Erosion Attribute 15-18” Precipitation Zone (continued)**

			Plant Spacing (ft)	
<b>Shrubs</b>	caragana	5	6	6
	skunbush sumac	5	6	6
	silver buffaloberry	5	6	6
<b>Trees</b>	Rocky Mt. juniper	6	8	8
	ponderosa pine	10	12	12

**Table 19. Eastside – Forage Attribute 15-18” Precipitation Zone**

Species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation Sandy				Other soil limitation Saline				seeds per pound			
	Seeding Rate lbs/ac (seeds/ sq ft)																			
	mixtures		(N)	seeds	late	mixtures		seeds	mixtures		seeds	mixtures		seeds	seeds	seeds				
	a	sq ft	b	sq ft	pasture	sq.ft.	a	sq ft	b	sq ft	a	sq ft	b	sq ft	a	sq ft	b	sq. ft		
<b>Overstory</b> Snake River wheatgrass (N)				0					10	32									139000	a
bluebunch wheatgrass			10	30															139000	
Indian ricegrass (N)																			240000	b
thickspike wheatgrass (N)																			156000	b
Needle and thread (N)							6	25		0		0	5	21				0	180000	b
big bluegrass (N) /1	2	42	2	42				0		0		0		0				0	917000	
sand dropseed (N) /2							0.2	4		0		0		0				0	5300000	
bottlebrush squirreltail (N)								0		0		0		0	4	18			192000	c
Basin wildrye (N)								0		0		0	6	22.727				0	165000	
Idaho fescue (N)								0		0		0		0				0	450000	
tall wheatgrass (I)								0		0		0		0			10	20	78000	
intermediate wheatgrass (I)					8	16				0		8	15		0				80000	
beardless wheatgrass (N)																			145000	
slender wheatgrass (N)															7	21				
<b>Understory</b> Sandberg bluegrass (N) /1	1	21	1	21			1	21	1	21		0		0				0	925000	
Canby bluegrass								0		0		0		0				0	926000	
								0		0		0		0				0		
<b>Forbs</b> alfalfa	0.5	2.5	0.5	2.5	1	5		0		0		0.5	3		0			0		
<b>Shrubs</b> winterfat (N)							7	18	7	18		0		0				0	113000	
antelope bitterbrush (N)								0		0		0		0				0	20000	
4-wing saltbush								0		0		0		0				0	52000	
								0		0		0		0				0		
								0		0		0		0				0		
<b>Mix total seeds/sq ft</b>	3.5	66	14	96	9	21	14	64	18	71	9	18	11	44	11	39	10	20		

/1 Use 1 species in mix  
 /2 may be hard to establish below 12" pcp

I Introduced  
 N Native

- a. more drought tolerant, more grazing tolerant than bluebunch
- b. sandy sites
- c. short-lived, perennial, adapted to saline/alkaline sites

**Table 20. Eastside – Habitat Improvement / Restoration Attribute 15-18” Precipitation Zone**

		No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		Other soil limitation Wetland/Riparian			
		Seeding Rate													
<b>Species</b>		lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	seeds /lb	
<b>Overstory</b>	Snake River wheatgrass beardless or blueblunch wheatgrass	3	9			4	12							140000	
	Idaho fescue	2	20	2	20	1	10							450000	
	big bluegrass	1	21	1	21			2	42					917000	
	Indian ricegrass													240000	
	thickspike wheatgrass			5	15									156000	
	Needle and thread													180000	
	Basin wildrye							6	18					165000	
	Slender wheatgrass									7	21				
	<b>Understory</b>	Canby bluegrass													926000
		Sandberg bluegrass					1	21							925000
bottlebrush squirreltail										2	8			192000	
<b>Forbs</b>	western yarrow	0.1	10	0.1	10	0.1	10	0.1	10					4124000	
<b>shrubs</b>	snow buckwheat													300000	
	antelope bitterbrush													20000	
	gray rabbitbrush													652500	
	big sagebrush													2466000	
	4 wing saltbush													52000	
<b>Mix total</b>		6.1	70	8.1	66	6.1	43	8.1	61	70	9	29			
		Plant Spacing (ft)													
<b>Trees</b>	service berry	6				6		6							
	snowberry	3													
	chokecherry	6						6							
	Douglas hawthorne	8													
	mockorange	4				6		6							
	redosier dogwood												6		
	ponderosa pine	12						12							
quaking aspen	8											8			

**Table 21. Eastside – Filtration Attribute 15-18” Precipitation Zone**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		Saline		
		Seeding Rate										
		lbs	seeds	lbs/	seeds	lbs	seeds	lbs	seeds	lbs	seeds	seeds
<b>Species</b>		ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	/lb
<b>Overstory</b>	crested wheatgrass	2	8			5	20					200000
	Siberian wheatgrass											250000
	Snake River wheatgrass					3	9					139000
	pubescent wheatgrass (I)											80000
	streambank wheatgrass (I)							5	15			135000
	tall wheatgrass									10	20	78000
	intermediate wheatgrass			10	20							80000
	hard or sheep fescue	3	39	3	32							600000
	Indian ricegrass											240000
	thickspike wheatgrass											156000
	Needle and thread											180000
	Basin wildrye	3	9					5	15			165000
	Mammoth wildrye											55000
<b>Understory</b>	Sandberg bluegrass					1	21					925000
												192000
												926000
<b>Forbs</b>	alfalfa	1	5	1	5							4124000
												500000
<b>Mix Total</b>		9	61	14	57	9	50	10	30	10	20	

**Table 22. Eastside – Erosion Attribute 18-25” Precipitation Zone**

	Species	No Soil Limitation		Soil Limited		Soil severely limited			Other soil limitation		Other soil limitation		seeds per lb	
		(deep)				(shallow and/or rocky)			Sandy		Saline			
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq. ft.	lbs ac	seeds sq ft	lbs per ac		seeds sq ft
<b>Overstory</b>	streambank wheatgrass (N)		0.0		0.0					4	12.4		0	135000
	slender wheatgrass (N)													
	blue wildrye (N)		0.0	4	12.0		0.0				0.0		0.0	145000
	mountain brome (N)	2	3.7		0		0.0	2.0	4		0.0		0.0	80000
	Idaho fescue (N)							3.0	30					450000
	hard fescue (I)	1	12.9	2	25.7117		0.0				0.0		0.0	560000 <sup>a</sup>
	sheep fescue (I)		0.0		0	2	36.0				0.0		0.0	<sup>b</sup>
	bluebunch wheatgrass (N)				0	8	21.0				0.0		0.0	
	big bluegrass (N)				0	1	21.0	3.0	61		0.0		0.0	<sup>c</sup>
	thickspike wheatgrass (N)									8	24			
	pubescent wheatgrass (I)	7	14	4	8									
	tall fescue (I)									6	30			
<b>Forbs</b>	tall wheatgrass (I)										10	20		
	white dutch clover/red clover (I)													130000
	native lupines (N)			2	12									
	northern sweetvetch (N)					2	4							
	navtive clover spp. (N)	2	20											
	milkvetch spp. (N)													
	Mix seeds/sq.ft.	12	51	12	58	13	78	8	95	18	66	10	20	

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

b. from PLANTS web site

c. from PLANTS web site

**Table 22. Eastside – Erosion Attribute 18-25” Precipitation Zone (continued)**

				Plant Spacing (ft)
<b>Shrubs</b>	snowberry (N)	4		5
	native willows	8		10
	mockorange (N)	5	5	6
	redosier dogwood (N)	5		6
	caragana (I)	5		6
	silver buffaloberry	5		6
<b>Trees</b>	ponderosa pine (N)	10		12
	black cottonwood (N)	10		12
	Douglas-fir (N)	10		
	Rocky Mt. juniper (I)	6	8	8

**Table 23. Eastside – Forage Attribute 18-25” Precipitation Zone**

Species	No Soil Limitation (deep)		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation Saline		seeds per lb		
	Seeding Rate lbs/ac (seeds/ sq ft)				a	seeds sq ft	b	seeds sq ft		seeds sq ft	seeds sq ft
	a	seeds sq ft	(N) b	seeds sq ft							
intermediate wheatgrass (I)		0		0		0		0		80000	
tall fescue (I)		0		0		0		0	7 35	205000	
orchardgrass (I)	6	74.38		0		0		0	7 84	540000	
Mountain brome (N)	3	5.5096		0		0		0		80000	
meadow brome (N)		0		0		0		7 14.945		93000	
basin wildrye (N)		0	6	18.595		0		0		135000	
timothy (I)		0		0		0		0		1230000	
blue wildrye (N)		0	6	19.972		0		0		145000	
beardless wheatgrass (N)		0		0		0		0		145000	
bluebunch wheatgrass (N)					5	15	10	30			
big bluegrass (N)		0		0	2	42		0	2 42		
thickspike wheatgrass (N)											
tall wheatgrass (I)									10 20		
<b>Forbs</b>											
alfalfa		0		0		0		0		200000	
red clover (I) or native clover (N)	1	6.8871	1	6.8871		0		0		300000	
		0		0		0		0			
<b>Shrubs</b>		0		0		0		0			
		0		0		0		0			
		0		0		0		0			
<b>Mix total seeds/sq ft</b>	10	87	13	45	7	57	10	30	9 57 7 84	10.00 20 7 35	

/2 may be hard to establish below 12" pcp

I Introduced  
N Native

**Table 24. Eastside – Habitat Improvement / Restoration Attribute 18-25” Precipitation Zone**

		No Soil Limitation		Soil Limited		Soil severely limited		Other soil limitation		Other soil limitation			
		(deep)		(shallow and/or rocky)		Sandy		Saline		Wetland/Riparian			
		Seeding Rate											
<b>Species</b>		lbs/ac	seeds sq ft	seeds sq. ft.	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq ft	lbs/ac	seeds sq. ft	seeds /lb
<b>Overstory</b>	beardless wheatgrass	6	19.9725			0		0		0			145000
	blue wildrye	3	9.98623	1	3	0		0		0			145000
	mountain brome	1	1.83655			0		0		0			80000
	Idaho fescue		0	5	50	2	20.661	5	51.653		0		450000
	thickspike wheatgrass		0			2	7.1625		0		0		156000
	bluebunch wheatgrass		0	2	6	6	19.146	2	6.382		0		139000
				0			0		0		0		
<b>Understory</b>	Sanberg bluegrass		0	1	21		0	1	21		0		
			0				0		0		0		
			0				0		0		0		
			0				0		0		0		
<b>Forbs</b>	native clover spp	0.5	3.44353	1	6		0		0		0		300000
	native milkvetch spp		0				0		0		0		130000
			0				0		0		0		
	Mix total seeds/sq. ft.	10.5	35.27	10	86	10	47	8	58				

**Table 24. Eastside – Habitat Improvement / Restoration Attribute 18-25” Precipitation Zone (continued)**

		Plant Spacing (ft)			
<b>Shrubs</b>	snowberry	4			
	oceanspray	4			
	ninebark	4			
	serviceberry	6	6		
	mockorange	6	6	5	
	redosier dogwood				6
	chokecherry				
	ceanothus spp.			5	
	Douglas hawthorn	8			
	native rose spp.		6		
	blue elderberry	6			
	native shrub willows				6
	spirea	3			
<b>Trees</b>	ponderosa pine	10		12	
	Douglas-fir				
	Quaking aspen				8
	black cottonwood				10
	water birch				10
	thinleaf alder				

**Table 25. Eastside – Filtration Attribute 18-25” Precipitation Zone**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		Saline		
		Seeding Rate										
		lbs	seeds	lbs/	seeds	lbs	seeds	lbs	seeds	lbs	seeds	seeds
<b>Species</b>		ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	/lb
<b>Overstory</b>	intermediate wheatgrass (I)	10	20		0		0		0		0	
	meadow brome (N)		0	8	14.7		0		0		0	80000
	tall wheatgrass (I)		0		0		0		0		0	78000
	hard fescue (I)		0	2	25.7	2	25.712	2	25.71		0	560000
	perennial ryegrass (I)	4	22.681		0		0		0		0	247000
	beardless wheatgrass (N)		0		0	6	19.972		0		0	145000
	timothy (I)		0		0		0		0		0	
	orchard grass (I)		0		0		0	4	48		0	
<b>Understory</b>		0		0		0		0		0		
<b>Forbs</b>	alfalfa	1	5		0	2	10	1	5		0	
			0		0		0		0		0	
			0		0		0		0		0	
<b>Mix total</b>	15	48	10	40	10	56	6	79				
		Plant Spacing (ft)										
<b>Shrubs</b>	redosier dogwood	5										
	native currants	5										
	shrub willows	6								6		
<b>Trees</b>	black cottonwood	10										
	water birch	10										
	quaking aspen	8										

**Table 26. Eastside – Erosion Attribute 25’’+ Precipitation Zone**

	Species	No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy				seeds per lb		
		Seeding Rate												
		lb per ac	seeds sq ft	lb per ac	seeds sq ft	lb per ac	seeds sq ft	lbs ac	seeds sq ft	lbs per ac	seeds sq ft			
<b>Overstory</b>	intermediate wheatgrass		0	10	20		0		8	14.6924		0	80000	
	mountain brome	1	2		0	1	2		1	2		0	80000	
	annual or perennial ryegrass	4	24	4	24	4	23			0		0	247000	
	hard fescue	3	39		0	3	39			0		0	560000	
	tall wheatgrass		0		0		0			0		0		
			0		0		0			0		0		
			0		0		0			0		0		
			0		0		0			0		0		
<b>Understory</b>			0		0		0			0		0		
			0		0		0			0		0		
			0		0		0			0		0		
<b>Forbs</b>	clover	1	10	1	10	1	10		1	10		0	a	
			0		0		0			0		0	b	
			0		0		0			0		0		
	Mix seeds per sq. ft.	9	74.6	15.0	54.0	0.0	9.0	73.2	0.0	10.0	26.7	0.0	0.0	0.0

a. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West  
b. from PLANTS web site

**Table 26. Eastside – Erosion Attribute 25'+ Precipitation Zone (continued)**

			Plant Spacing (ft)	
<b>Shrubs</b>	red osier dogwood	5		6.0
	shrub willows	6		8.0
<b>Trees</b>	Douglas-fir	10		
	ponderosa pine	10	12	12
	western white pine	10		
	western larch	10		
	tree willows	10		
	black cottonwood	10		12
	hybrid poplars	10		
	thinleaf alder	8		
	sitka alder			

**Table 27. Eastside – Forage Attribute 25’’+ Precipitation Zone**

Species	No Soil Limitation (deep)				Soil severely limited (shallow and/or rocky)				Other soil limitation Sandy				Other soil limitation		seeds per lb	
	Seeding Rate lbs/ac (seeds/ sq ft)															
	a	seeds sq ft	(N) b	seeds sq ft	c	seeds sq.ft.	a	seeds sq ft	b	seeds sq ft	seeds sq ft			seeds sq ft		
intermediate wheatgrass		0		0			5	9.1827		0			0		0	80000
tall fescue		0		0			0		0				0		0	205000
orchardgrass		0		0	4	48		0	0		4	49,587		0	0	540000
blue wildrye		0	6	19.972			5	16.644		0			0		0	145000
meadow brome		0		0				0	0			6	12		0	93000
timothy	3	84.711		0				0	3	84.711			0		0	1230000
redtop bentgrasses		0	1	114.78				0	0				0		0	5000000
		0		0				0	0				0		0	
		0		0				0	0				0		0	
		0		0				0	0				0		0	
		0		0				0	0				0		0	
<b>Forbs</b> alfalfa		0		0				0	0				0		0	200000
white clover or native clover	1	18.365	1	18.365	1	18.365		0	1	18.365	1	18.365	1	18.37	0	800000
		0		0				0	0				0		0	
		0		0				0	0				0		0	18500
		0		0				0	0				0		0	
Mix-seeds sq. ft.	4	103	8	153	5	66	10	26	4	103	5	68	7	30	0.00	0

/1 Use 1 species in mix

/2 may be hard to establish below 12" pcp

I Introduced

N Native

**Table 28. Eastside – Habitat Improvement / Restoration Attribute 25’’+ Precipitation Zone**

		No Soil Limitation (deep)		Soil Limited		Soil severely limited (shallow and/or rocky)		Other soil limitation Sandy		Other soil limitation WetlandRiparian		
		Seeding Rate										
<b>Species</b>		seeds		seeds		seeds		seeds		seeds		seeds
<b>Overstory</b>		lbs/ac	sq ft	lbs/ac	sq.ft.	lbs/ac	sq ft	lbs/ac	sq ft	lbs/ac	sq ft	/lb
	blue wildrye	3	9.98623			3	9.9862	3	9.9862		0	145000
	pine grass		0	1	60.7	1	60.744		0		0	2646000
	Mountain brome	2	3.67309	1	2		0	1	1.8365	0.5	0.9183	80000
	Idaho fescue	2	20	4	40	3	30	3	30		0	
	native bentgrass		0				0		0	2	229.11	4990000
	tufted hairgrass		0				0		0	2	114.78	2500000
<b>Understory</b>			0				0		0		0	
<b>Forbs</b>	native lupine	6	3.38154	6	3.38		0	6	3.3815		0	24550
	western yarrow		0			0.1	9.5		0		0	
			0	x			0		0		0	
			0				0		0		0	
			0				0		0		0	
			0				0		0		0	
	Mix seeds/sq.ft.	14	38	12	106	7.1	81	13	15	4.5	345	
Plant Spacing (ft)												
<b>Shrubs</b>	oceanspray		5									
	ninebark		5									
	snowberry		5									
	shrub willow											6
	chokecherry		5					6				
	casara											
	red elderberry											5
	native currants											5
	ceonothus spp.					5		6				
	buffaloberry		5					6				
	redosier dogwood											6
<b>Trees</b>	Douglas-fir		10									
	ponderosa pine		10			12		12				
	western white pine		10									
	western larch		10									
	lodgepole pine											
	paper birch											
	sitka alder											
	black cottonwood											10
	quaking aspen											10

**Table 29. Eastside – Filtration Attribute 25’’+ Precipitation Zone**

		No Soil Limitation				Soil severely limited		Other soil limitation		Other soil limitation		
		(deep)				(shallow and/or rocky)		Sandy		wet		
		Seeding Rate										
		lbs	seeds	lbs/	seeds	lbs	seeds	lbs	seeds	lbs	seeds	seeds
<b>Species</b>		ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	ac	sq ft	/lb
<b>Overstory</b>	intermediate wheatgrass	8	14.692		0		0		0		0	80000
	mountain brome	1	1.8365		0		0		0		0	80000
	annual or perennial rye		0	4	22.7	4	22.681		0		0	247000
	hard fescue	2	25.712		0	3	38.567	2	25.71		0	560000
	tall wheatgrass		0		0		0		0		0	78000
	tall fescue		0	4	18.8		0	4	18.82	4	18.82	205000
<b>Understory</b>			0		0		0		0		0	
			0		0		0		0		0	
			0		0		0		0		0	
			0		0		0		0		0	
<b>Forbs</b>			0		0		0		0		0	
	Mix seeds/sq.ft.	12	44	8	42	7	72	6	45	4	19	
<b>Shrubs</b>	redosier dogwood	5								6		
	willows	6								8		
<b>Trees</b>	black cottonwood	10								12		
	quaking aspen	8								10		

Plant Spacing (ft)

**Table 30. Seeds per lb.**

	seeds per lb
crested wheatgrass	200000
Siberian wheatgrass	250000
Snake River wheatgrass	139000
Indian ricegrass	240000
thickspike wheatgrass	156000
Basin wildrye	165000
Needle and thread	180000
big bluegrass	917000
sand dropseed	5300000
mammoth wildrye	55000
bottlebrush squirreltail	192000 <sup>a</sup>
Canby bluegrass	926000
Sandberg bluegrass	925000
western yarrow	4124000 <sup>b</sup>
forage kochia	395000
scarlet globemallow	500000 <sup>c</sup>
antelope bitterbrush	20000 <sup>d</sup>
snow buckwheat	300000 <sup>e</sup>
spiny hopsage	347000 <sup>f</sup>
big sagebrush	2466000 <sup>g</sup>
4-wing saltbush	52000 <sup>h</sup>
gray rabbitbrush	652500 <sup>i</sup>
winterfat	113000

a. Jacy Gibbs plant descriptions

b. from p 112, 1982, USDI FWS. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West

c. PLANTS

d. Plant Guide, NV

e. Pullman PMC

f. PLANTS

g. PLANTS

h. PLANTS

i. PLANTS

**Table 31. Western Washington Critical Area Planting Species Selection Guide**

<b>Soil Type**:</b>	<b>Site Conditions*: No supplemental fertilizer or water after establishment*</b>	<b>Site Conditions*: Topsoil destroyed or removed</b>	<b>Site Conditions*: Tree/shrub planting planned</b>	<b>Site Conditions*: Mature vegetation height desired short</b>	<b>Site Conditions*: Temporary Cover</b>
Excessively drained, very dry in summer. Recommended seeding season: Fall	Tall Fescue Fine Fescue Orchardgrass Bentgrass Alfalfa Red Clover White Clover	Tall Fescue Fine Fescue Orchardgrass Bentgrass Alfalfa Red Clover White Clover	Fine Fescue Orchardgrass Alfalfa Red Clover White Clover	Bentgrass Fine Fescue White Clover Red Clover	Annual Ryegrass Barley Cereal Rye Spring Wheat Winter Wheat*** Triticale Austrian Winter Peas*** Yellow Sweetclover
Well-drained all year or shallow soil. Recommended seeding season: Spring or Fall	Tall Fescue Orchardgrass Perennial Ryegrass Fine Fescue Bentgrass Red Clover White Clover Big Trefoil**** Birdsfoot Trefoil	Tall Fescue Orchardgrass Fine Fescue Bentgrass Red Clover White Clover Birdsfoot Trefoil	Fine Fescue Orchardgrass Red Clover White Clover Big Trefoil**** Birdsfoot Trefoil	Bentgrass Fine Fescue White Clover Red Clover Big Trefoil**** Birdsfoot Trefoil	Annual Ryegrass Perennial Ryegrass Barley Oats Cereal Rye Spring Wheat Winter Wheat*** Triticale Austrian Winter Peas*** Yellow Sweetclover
Somewhat poorly drained in winter & early spring. Recommended seeding season: Spring or Fall	Tall Fescue Fine Fescue Perennial Ryegrass Bentgrass Timothy Alsike Clover White Clover Big Trefoil**** Birdsfoot Trefoil	Tall Fescue Bentgrass Fine Fescue Timothy White Clover Alsike Clover Big Trefoil****	Fine Fescue Timothy Alsike Clover White Clover Big Trefoil**** Birdsfoot Trefoil	Bentgrass Fine Fescue White Clover Alsike Clover Big Trefoil**** Birdsfoot Trefoil	Annual Ryegrass Perennial Ryegrass Barley Oats Cereal Rye Spring Wheat Winter Wheat*** Triticale Austrian Winter Peas***
Saturated in late fall, winter and spring. Recommended seeding season: Fall	Tall Fescue Fine Fescue Bentgrass Timothy Alsike Clover White Clover Big Trefoil****	Tall Fescue Fine Fescue Bentgrass Alsike Clover White Clover Big Trefoil****	Fine Fescue Timothy Alsike Clover White Clover Big Trefoil****	Fine Fescue Bentgrass White Clover Alsike Clover Big Trefoil****	Oats Cereal Rye Annual Ryegrass

\* Seeds will not germinate unless sufficient moisture is available - summer seedings may not succeed without irrigation

\*\* For sites receiving irrigation or fertilizer, soils will often behave like the “next wetter” soil type (one step lower in the chart), so select species from this lower line instead.

\*\* On steeper slopes (greater than 15%), or south or west slopes, soils will often behave like the “next drier” soil type (one step higher in the chart), because moisture will drain out of them more quickly, so select species from boxes on this upper line instead.

\*\*\* Winter Wheat and Austrian Winter Peas should be used for fall seedings only.

\*\*\*\* Big trefoil seed usually is unavailable. Check with seed sources before recommending it.

**Don’t use legumes on embankments where burrowing animals are a problem.**

**Table 32: Western Washington Pasture & Hayland Planting Species Selection Table**

<b>Soil Type:</b>	<b>Use: Grazing only for Grazing &amp; Hay</b>	<b>Use: Exclusively for Hay or Silage</b>	<b>Use: Winter &amp; Early Spring Pasture</b>	<b>Use: Exercise or Confinement Area</b>	<b>Use: Temporary Cover***</b>
Excessively drained, very dry in summer. Recommended seeding season: Fall	Tall Fescue Orchardgrass Alfalfa Red Clover White Clover Birdsfoot Trefoil	Tall Fescue Orchardgrass Alfalfa Red Clover White Clover	Annual Ryegrass <sup>1</sup> Perennial Ryegrass <sup>1</sup> Tall Fescue Red Clover  <sup>1</sup> seeded annually	Bentgrass Fine Fescue Tall Fescue White Clover	Annual Ryegrass Barley Cereal Rye Spring Wheat Winter Wheat Triticale Austrian Winter Peas****
Well-drained all year or shallow soil. Recommended seeding season: Spring or Fall	Tall Fescue Orchardgrass Annual Ryegrass Perennial Ryegrass Alfalfa Red Clover White Clover Birdsfoot Trefoil	Tall Fescue Orchardgrass Alfalfa Red Clover White Clover	Annual Ryegrass Perennial Ryegrass Tall Fescue Red Clover	Bentgrass Fine Fescue Tall Fescue White Clover	Annual Ryegrass Perennial Ryegrass Barley Oats Cereal Rye Spring Wheat Winter Wheat Triticale Austrian Winter Peas****
Some what poorly drained in winter & early spring. Recommended seeding season: Spring or Fall	Tall Fescue Annual Ryegrass Perennial Ryegrass Alsike Clover White Clover Big Trefoil Birdsfoot Trefoil	Tall Fescue Timothy Alsike Clover White Clover Big Trefoil Birdsfoot Trefoil		Bentgrass Fine Fescue Tall Fescue White Clover	Annual Ryegrass Perennial Ryegrass Barley Oats Cereal Rye Spring Wheat Winter Wheat Triticale Austrian Winter Peas****
Saturated in late fall, winter and spring. Recommended seeding season: Fall	Tall Fescue Alsike Clover White Clover Big Trefoil Birdsfoot Trefoil	Tall Fescue Timothy Alsike Clover White Clover Big Trefoil Birdsfoot Trefoil		Bentgrass Fine Fescue Tall Fescue White Clover	Oats Cereal Rye
Mixed drainage: dry uplands & wet swales. Recommended seeding season: Fall	Tall Fescue Annual Ryegrass Perennial Ryegrass Alsike Clover White Clover Big Trefoil Birdsfoot Trefoil	Tall Fescue Orchardgrass** Timothy Alsike Clover Red Clover White Clover Big Trefoil Birdsfoot Trefoil	Annual Ryegrass Perennial Ryegrass Tall Fescue Alsike Clover	Bentgrass Fine Fescue Tall Fescue White Clover	Annual Ryegrass Perennial Ryegrass Barley Oats Cereal Rye Spring Wheat Winter What Triticale Austrian Winter Peas****

\*\* Use only in a mix with other species.

\*\*\* Clip or graze all grains before the seedheads appear, or awns may cause mouth and eye irritation in livestock. Winter Wheat and Austrian Winter Peas should be used for fall seedings only.

\*\*\*\*See species information for specific feeding recommendations.

**Table 33: Western Washington Native Woody Plants for Wildlife**

Scientific Name	Common Name	Growth Habit	Propagation Method	Moisture Needs			Sunlight Needs	Soil Needs	Roots	Mature Height	Wildlife Uses						
				Dry	Moist	Wet					Seeds	Fruit	Browse	Nesting	Cover	Insects	Comments
<i>Abies grandis</i>	grand fir	tree	seed	x	x		sun to part-shade	deep, moist, alluvial soils	deep and wide spreading	130 ft	grouse		bird eat sap, porcupine eats inner bark		large mammals	birds	
<i>Acer circinatum</i>	vine maple	shrub	seed	x	x	x	sun to partial shade	sandy loams	lateral roots	40 ft	squirrels and birds		deer and elk				
<i>Acer macrophyllum</i>	bigleaf maple	tree	seed	x	x		sun to partial shade	variety, rocky	shallow	100 ft	squirrels and birds						
<i>Alnus rubra</i>	red alder	tree	seed, cuttings and suckers	x	x	x	sun to partial shade	wide range	shallow, strong, lateral roots	90 ft	birds		deer and grouse	great blue heron	beaver use branches	birds	
<i>Alnus sinuata</i>	Sitka alder	shrub	seed, cuttings		x		sun	moist	shallow, extensive	25 ft		gold-finches					
<i>Amelanchier alnifolia</i>	serviceberry	shrub	suckers, seed	x			sun to partial shade	variety, prefers loamy, well drained fertile soils	deep, spreading	30 ft		birds, bear, deer and elk	deer, elk and rodents				
<i>Arbutus menziesii</i>	Pacific madrone	tree	seed	x			sun	dry, coarse	spreading	90 ft		birds					
<i>Arctostaphylos uva-ursi</i>	kinnikinnick	shrub	seed and stem cuttings	x			sun	sandy, rocky and well drained	branches root where they touch the soil, mat-forming	2 ft		deer, elk, bear and birds	deer and elk				
<i>Berberis aquifolium</i>	tall Oregon grape	shrub	cuttings, layers	x			sun to partial shade	variety	deep	5 ft		birds, deer and elk	deer				
<i>Betula papyrifera</i>	western paperb Birch	tree	seed, cuttings and grafting	x	x		sun	variety, prefers loams	extensive	70 ft	birds, rodents, deer and elk		sap-sucker eats sap, grouse eat catkins and buds			birds	
<i>Cornus canadensis</i>	bunchberry	shrub	seed, root cuttings, layering and grafting		x	x	sun to shade	loam; tree trunks and rotting logs	spreading	1 ft		birds					

**Table 33: Western Washington Native Woody Plants for Wildlife (continued)**

Scientific Name	Common Name	Growth Habit	Propagation Method	Moisture Needs			Sunlight Needs	Soil Needs	Roots	Mature Height	Wildlife Uses						Comments
				Dry	Moist	Wet					Seeds	Fruit	Browse	Nesting	Cover	Insects	
<i>Cornus stolonifera</i>	red-osier dogwood	shrub	cuttings, layers		x	x	sun to partial shade	variety	shallow, strong, spreading	20 ft		birds and bear	rabbit, moose, deer and elk		wildlife		
<i>Corylus cornuta</i>	hazelnut	shrub	seed and suckers	x	x		sun to shade	variety, including rocky	branching	15 ft	nuts eaten by wildlife				birds	yellow warbler	
<i>Crataegus douglasii</i>	black hawthorn	shrub	seed	x	x		sun to partial shade	loam, mod deep to deep, well-drained and porous	shallow and diffuse	25ft		birds and black bear		song birds	wildlife		
<i>Fraxinus latifolia</i>	Oregon ash	tree	seed			x	sun to partial shade	prefers loams, rich in humus	shallow, wide-spreading	80 ft	birds, deer and bear						
<i>Gaultheria shallon</i>	salal	shrub	seed	x	x		sun to shade	variety, likes acidic soils		8 ft		deer, elk and birds			birds and small mammals		
<i>Holodiscus discolor</i>	oceanspray	shrub	seed	x	x		sun to part shade	variety, including rocky	shallow, spreading	10 ft	white crowned sparrow and chickadee		deer and elk		small mammals		
<i>Lonicera involucrata</i>	black twinberry	vine	cuttings		x	x	sun to shade	prefers loams	shallow, spreading	15 ft		many species of wildlife					
<i>Malus fuscus</i>	western crabapple	shrub			x	x	sun to partial shade	variety		35 ft		birds, deer and elk	deer, elk, rabbit and mice	birds	wildlife		
<i>Oemleria cerasiformis</i>	Indian plum	shrub	seed and cuttings	x	x		sun to shade	variety	shallow spreading	15 ft		many species of wildlife					
<i>Philadelphus lewisii</i>	mock orange	shrub	cuttings and layers	x	x		sun to shade	loamy to ricky	fibrous	10 ft			deer				
<i>Physocarpus capitatus</i>	Pacific ninebark	shrub	cuttings	x	x	x	sun to shade	variety	shallow, lateral	15 ft		bears	deer		birds and small mammals		

**Table 33: Western Washington Native Woody Plants for Wildlife (continued)**

Scientific Name	Common Name	Growth Habit	Propagation Method	Moisture Needs			Sunlight Needs	Soil Needs	Roots	Mature Height	Wildlife Uses						Comments
				Dry	Moist	Wet					Seeds	Fruit	Browse	Nesting	Cover	Insects	
<i>Picea sitchensis</i>	Sitka spruce	tree	seed		x	x	sun to shade	variety, prefers moist acidic soils with high organic content	shallow, platelike, long lateral roots, few branchings	150 ft	small mammals and birds		rabbit and grouse, porcupine eat inner bark				
<i>Pinus contorta contorta</i>	shore pine	tree	seed	x	x	x	sun	poor sandy soils and peat	variable	65 ft	birds and rodents				deer	birds	
<i>Pinus contorta latifolia</i>	lodgepole pine	tree	seed	x	x	x	sun	poor soils	variable	100 ft	birds and rodents				deer		
<i>Populus tremuloides</i>	quaking aspen	tree	grows from cuttings		x	x	sun	sandy loams	forms clones connected by a common parent root system	80 ft			deer and elk, yellow-bellied sap sucker eats sap				birds
<i>Populus trichocarpa</i>	black cottonwood	tree	seed	x	x	x	sun	variety, prefers loams	shallow, fibrous	120 ft			beaver and deer	eagle and osprey, other birds			birds
<i>Prunus emarginata</i>	bitter cherry	tree	seed	x	x	x	sun	loam, sand or gravel	spreading	60 ft		birds, deer, elk, and fox					
<i>Pseudotsuga menziesii</i>	Douglas-fir	tree	seed	x	x		sun	well drained mineral soil	shallow	180 ft	rodents and birds		black bears eat sap, grouse eat leaves, wildlife eats bark	eagle and osprey	large mammals	birds	
<i>Quercus garryana</i>	Oregon white oak	tree	cuttings	x	x		sun	well drained gravel or sand	tap root	75 ft		squirrel and birds	bird eat sap				birds
<i>Rhamnus purshiana</i>	casacara	shrub	seed		x	x	sun to shade	fertile, loamy	shallow	30 ft		birds	deer		wildlife	birds	

**Table 33: Western Washington Native Woody Plants for Wildlife (continued)**

Scientific Name	Common Name	Growth Habit	Propagation Method	Moisture Needs			Sunlight Needs	Soil Needs	Roots	Mature Height	Wildlife Uses					Comments	
				Dry	Moist	Wet					Seeds	Fruit	Browse	Nesting	Cover		Insects
<i>Ribes lacustre</i>	black gooseberry	shrub	seed		x	x	sun	variety; prefers loam		6 ft		many species of wildlife					Check to make sure not an alternate host for white pine blister rust if white pine is in the area
<i>Ribes sanguineum</i>	red flowering currant	shrub	stem and root cuttings	x	x		sun to partial shade	loam		6 ft		many species of wildlife					Check to make sure not an alternate host for white pine blister rust if white pine is in the area
<i>Rosa nutkana</i>	wild rose	shrub	cuttings	x	x		sun to partial shade	dry to moist	poor	4 ft		birds		birds	birds		
<i>Rosa spp.</i>	Rose	shrub	cuttings	x	x	x	sun to shade	loam to rocky		8 ft		birds and deer					
<i>Rubus parviflorus</i>	thimbleberry	shrub	cuttings, root cuttings	x	x		sun to partial shade	loam		6 ft		birds and mammals					
<i>Rubus spectabilis</i>	salmonberry	shrub	cuttings		x	x	sun to partial shade	variety; prefers fertile areas rich in humus	shallow, fibrous; trailing branches set roots	12 ft		birds			wildlife		
<i>Salix spp.</i>	willows	shrub	cuttings		x	x	sun	variety	shallow, extensive	40 ft	birds		rabbits, beaver, deer and elk		birds		
<i>Sambucus cerulea</i>	blue elderberry	shrub	cuttings, root cuttings, seed	x	x		sun to partial shade	variety	thick taproot with fibrous, spreading, lateral roots	20 ft		berries eaten by wildlife			wildlife		
<i>Sambucus racemosa</i>	red elderberry	shrub	divisions; root cuttings and cuttings	x	x	x	sun to shade	variety	fibrous, strong adventitious	20 ft		birds and small mammals	deer		birds		
<i>Spiraea douglasii</i>	Douglas spirea	shrub	suckers, cuttings			x	sun to shade	wet	extensive fibrous	7 ft					birds and small mammals		
<i>Symphoricarpos albus</i>	snowberry	tree	seed	x	x		sun to shade	prefers deep loams, mod. well to well drained	extensive, branching, fibrous	6 ft		birds	deer and elk		birds and rodents		

**Table 33: Western Washington Native Woody Plants for Wildlife (continued)**

Scientific Name	Common Name	Growth Habit	Propagation Method	Moisture Needs			Sunlight Needs	Soil Needs	Roots	Mature Height	Wildlife Uses					Comments	
				Dry	Moist	Wet					Seeds	Fruit	Browse	Nesting	Cover		Insects
<i>Taxus brevifolia</i>	Pacific yew	tree	seed	x	x		sun to shade	loam	fibrous	45 ft		birds only					The bark and other parts of the tree contain an anti-cancer drug, taxol, which is also found in related yew species.
<i>Thuja plicata</i>	western redcedar	tree	seed		x	x	sun to shade	loam	shallow	160 ft	birds		deer and elk, yellow-bellied sap sucker eats sap	wood-peckers	raccoons and skunks den in cavities	yellow-bellied sap sucker	
<i>Tsuga heterophylla</i>	western hemlock	shrub	seed		x		sun to shade	moist, acidic soils with high organic content	shallow	160 ft	birds		deer and porcupine		large mammals		
<i>Vaccinium ovalifolium</i>	tall blue huckleberry	shrub	seed and cuttings	x	x		partial shade to shade	acidic, loamy		6 ft		black bear, chipmunk and birds		deer			
<i>Vaccinium ovatum</i>	evergreen huckleberry	shrub	seed and cuttings	x			sun to shade	acidic, rocky, gravelly		15 ft		berries eaten by wildlife			wildlife		
<i>Vaccinium parvifolium</i>	red huckleberry	shrub	seed and cuttings		x		partial shade to shade	acidic, loamy soils or rotting wood		10 ft		birds and black bear					

**References:**

<http://reference.allrefer.com/wildlife-plants-animals/plants/tree/cradou/fire-ecology.html>  
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