

NATIVE WILLAMETTE VALLEY OAK HABITAT
AND
PRAIRIE RESTORATION
SITE-PREPARATION AND SEEDING INFORMATION SHEET

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Note: These are techniques that I, personally, have tried. For a full list of a variety of site prep and seedling techniques, please see the first reference at the end under "Additional Resources" in Appendix A.

APPENDIX B- Target Chemicals for Weed Control Seed Production and Restorations

APPENDIX C - Resources for Wildlife Habitat Conservation in Oregon

GRASSLAND SITE-PREPARATION: DEFINE YOUR STARTING CONDITIONS

- 1) Remnant prairie with a good native component
- 2) Meadow with a good native component
- 3) Meadow with only a few natives
- 4) Uncultivated old fields and pasture with no natives
- 5) Cultivated agricultural field
- 6) Highly disturbed (excavation, logging etc)
- 7) Steep areas where erosion is a concern

(1 or 2) You need to tiptoe around the natives and only use herbicide in weedy areas with few or no natives. These areas can be planted with plugs of native plants in the fall, or seeded if the area is free of major weeds. In the native rich areas, you can spot-spray weeds or use mechanical control methods such as weed-eaters, pruners or hand-pulling.

(3) You must decide if it's OK to lose the few native species you have and then try to reestablish them from seed. For example, many of our old fields have yarrow and buttercup but little else; since these species are commercially available, you can focus your efforts on preparing a site substantially reduced of weeds, and re-seed them.

(4 and 5) Use herbicide (glyphosate) for AT LEAST two seasons to kill existing vegetation. This should be applied as soon as you can get into the site. Suggested rate is 2 quarts/acre in cooler weather and 1 quart/acre in warmer weather [1 - 2% glyphosate solution] and 0.25-0.5% surfactant. Herbicide should be applied fall, early spring, summer, and fall at a

MINIMUM. Please, no tilling! Many grasses will be killed in one season; however, many of our **deep-rooted** or **rhizomatous** forbs such as Queen Anne's lace, perennial vetch, St. John's-wort, Canadian thistle, and clover take more than one season to control. In addition, hard-seeded species and annuals such as sow thistle, crane's bill, mustard, and speedwell will take advantage of the newly opened space and become flush the second season. Timing of the herbicide application is crucial. It is desirable to eliminate each suite of weeds prior to flowering.

Note: Cultivation is not necessary in the age of no-till drills. Tilling only brings weed seed continually to the surface and you will NEVER, EVER, EVER, exhaust the weed seed that has built up in the soil for generations.

A recent Restoration site-preparation forum hosted by the Lane Council of Governments and attended by restorationists, researchers, water and soil scientists, and farmers concluded that the best way to prepare a pasture or agricultural field for native prairie seed reintroduction is herbicide application for at least two years without cultivation. Or, if you must till, do it ONLY ONCE and start the herbicide regime. If bare soil is a concern, plant a cereal cover crop such as wheat, oats, or barley in September to control erosion and suppress weeds. According to The Oregon State Extension Service (see Appendix A Below) cover crops "protect the soil surface, smother weeds, ...and scavenge nitrogen from the soil before it is leached below the root zone by winter rains."

It is important to look at each site realistically and realize the weed seed bank is bigger than you are and that it will never be exhausted. The seed drill will invariably dredge up weed seed no matter how "clean" it may seem post-herbicide application. In **uncultivated** old fields and pasture, aggressive, non-native grasses such as **perennial bentgrass** (the hardest to eliminate), tall oatgrass, and velvetgrass can be the long-term competitive issue for successful native plant reestablishment. In **cultivated** fields, the long-term issue is often broadleaf weeds. (See Seeding Options below for herbicide strategies depending on existing vegetation).

Note: if not controlled, **perennial bentgrass** will completely take over a restoration site even after the native grasses have established. This grass eliminates the "bunchgrass" prairie structure (which allows open ground for nesting sites, forbs, and native pollinator habitat) if not **aggressively** spot-sprayed the each season.

Many native species (both grasses and forbs) are very slow to establish. They need a site free of other vegetation in order to germinate unimpeded and to mature. Most bunchgrasses and perennial forbs grow slowly and don't set seed until their second season (some forbs not until the third or fourth.) They are also poor competitors. Once the prairie species are established, it is critically important to burn the site every 3 - 5 years. If you can't burn, mow. Burning, however, is the most effective tool to maintain native prairie. Willamette Valley Prairie species evolved with fire. Fire reduces the competition from thatch and woody species, stimulates the root crowns of the native grasses and forbs, and reopens the site for native annual species. Burning may also discourage the non-

native grasses and forbs that did not evolve with fire. Burning every year is not recommended because it increases the abundance of weedy non-native annual species and noxious thistles. It may also be necessary to continually augment the area with new native seed and/or plants after burning or mowing to try and tip the balance to a sustainable native stand.

During the first and second growing season, it is VERY IMPORTANT to spot treat noxious weeds with herbicide or hand-pulling. It is more advantageous to target perennial broadleaf weeds such as St. John's wort, Canadian thistle, tansy ragwort, clover, and perennial grasses - especially bentgrass! Hand pulling is NOT recommended for rhizomatous species since this may increase the plants. Annual weeds will not persist in great numbers once the native perennials have established during the second and third growing season.

(6) If the site has been disturbed by earthmoving it is absolutely **essential** to not let it lay fallow. Both erosion concerns and the tendency of weeds to occupy bare soil emphasize the need to sow something on the site as soon as possible. If the desire is to re-vegetate the site with native plant species, try to allow any weed seeds that might be present to germinate and then spray them with glyphosate. Species to be sown should be fall and/or winter germinating grasses and forbs that compete well with non-native species. This ensures that they 1) establish prior to erosion problems; 2) they occupy the spot before fall and winter weeds establish; and 3) they can compete with any non-native species that may still be present on the site. For suggested species, see option 3 below. If the area has been disturbed in the spring or early summer and must be occupied by vegetation (some agencies stipulate this) sow a summer cover crop. Then, spray out the cover before seed set and sow native seed in the fall.

(7) Native species are **extremely** small, even those that germinate in the fall or winter, so they will NOT hold soil on steep sites. It might be advantageous on erodible sites to either 1) sow a summer cover crop such as Sudan grass at about 70 lbs/acre, then mow and bail it when in flower or 2) sow a late summer nurse crop of a spring cereal grain at about 20-30 lbs/acre. Sowing the spring grain in late summer will ensure it establishes good roots and holds the soil during the fall and early winter. These crops usually winter kill. Oversow the area in October with the native seed crop. Just in case the nurse crop does not winter kill, the native grasses sown should only be low bunchgrasses that do not flower the first year (*Roemer's fescue*, *Koeleria macrantha*, *Poa secunda*, *Danthonia californica*). Then the cover crop can be mowed to a height of 6-8 inches before flowering. The grain can be drilled at the moderate rate suggested and, perhaps, on wider spacing than the native seed. This should ensure little competition from the nurse crop. Barley has been recommended due to its lack of regrowth if mowed. Mowing when the barley is just starting to flower will also reduce the chance of regrowth.

NATIVE SEEDING: OPTIONS

1. If the site is clean of weedy grasses but non-native forbs are still a problem (common in **cultivated** agricultural fields), seed grasses only the first year, then overseed with native forbs. This will allow additional growing seasons where a broadleaf herbicide can be applied. Some herbicides, such as 2,4-D, are only completely effective on a relatively small group of weeds. Thus, it is advisable to use a wider spectrum herbicide (see Appendix B for suggestions).

If the site is clean of weedy forbs but non-native grasses are still a problem (common in **old fields, meadows, and pasture**), seed native forbs only the first year, then overseed with native grasses. This will allow additional growing seasons where grass-specific herbicides such as Poast® or Envoy® can be applied.

After the first stand is established, **burning** or **mowing** the site prior to the second native seed application is a good method for opening up the site. For drilled seed, the suggested sowing rate is 7 - 10 lbs/acre for grasses and 3-8 lbs/acre for forbs. For seed that is broadcasted or hydroseeded this rate should be doubled (this allows for seed predation, and loss due to erosion, desiccation, and poor soil contact). Seed size should be taken into consideration with higher rates used for large seeds and lower rates for small seeds. Seed mixes can be calculated to take into account the seeds/lb of species desired. Drill seed to a maximum depth of $\frac{1}{4}$ ". Mulching is not recommended for drilled seed due the necessity of light for most native prairie species to germinate. For broadcast seed, light mulch may be applied but it must be weed free! This will help increase contact with the soil and prevent predation by birds. If seed is broadcast, try to run a drum **roller** (heavy metal or water-filled) over the seed. Soil contact is VITAL for good germination.

The best time to sow our native prairie species is in the fall (Oct-Nov). This will allow any stratification (overwintering so seed will imbibe water and germinate) requirements to be met. Species that do not need stratification, such as many annuals and some perennials, still need some amount of cold and wet to germinate. They may be sown in the late-winter, however, they will produce very small plants and the annuals will produce very little seed.

- a. Native bunchgrasses can be sown as a mix with the majority of the mix (85%) comprised of slower growing bunchgrasses: *Festuca roemerii* (Roemer's fescue), *Poa secunda/scabrella* (pine bluegrass), and *Koeleria macrantha* (prairie junegrass); 10-15% of mix the quickly establishing species *Elymus trachycaulus* (slender wheatgrass) and *Elymus glaucus* (blue wildrye). If the most aggressive native grass, *Bromus carinatus* (California brome) is used, it should be no more than 2-5% of a mix.
- b. *Danthonia californica* (California oatgrass) should be planted in mono-culture plots. This grass does not germinate until early March and may not be able to

germinate well if sown with the grasses listed in part "a" which germinate in fall. This also allows an additional application of glyphosate mid-winter. If erosion is a concern, it can be sown with a SMALL amount of *Deschampsia elongata* (slender hairgrass) which germinates in the fall but is not very aggressive. Suggested sowing rate for *Danthonia californica* is 5-7 lbs/acre. It is important to note that California oatgrass is very small the first growing season (3-5 blades) so it leaves a lot of room for weedy species. The tufts will get larger the following year - about 1 ft in diameter.

- c. Forb mixes (see Table 1) should have no more than 10 species, with annuals comprising 25% of the mix and perennials comprising 75%. This increases the chance of successful establishment of each species. Establishing the perennial forb species while the soil is bare gives a greater chance of long-term persistence as the grass starts to dominate the site. The annuals will drop out in significant numbers by the second year, but periodic disturbance by burning or mowing will re-open the site to the annuals. A variety of mixes can be applied to a site by designating plots. This patchwork approach will give the site a more "natural" look over time. In our current restoration project, the most successful forb species by the second season have been 4 species that spread via rootstock, *Sidalcea* sp (checkermallow), *Prunella vulgaris* var. *lanceolata* (self-heal), *Achillea millefolium* (yarrow) and *Eriophyllum lanatum* (Oregon sunshine). Other perennials such as *Lomatium dissectum* (fern-leaved lomatium) and *Lupinus albicaulus* (sickle-keeled lupine) are still small the second season but it is expected they will be more robust by the third.
 - d. Many annual species are great nectar and seed sources for birds and butterflies. Since they become reduced by perennial dominance by the second season, sowing a border area with a mix of annual forbs and no grass, will allow the populations of these species to be maintained on the site and add additional color and habitat value to the restoration area.
2. If the site is very clean you can apply grasses and forbs at the same time (this only occurs when the top layer of weed seed has been exhausted - for example, by solarization). If you have access to a seed drill, one option is to drill grasses in one direction and forbs perpendicular to the grasses. However, this disturbs the ground twice and may intensify the weed issue. Another option is to drill the grasses and broadcast the forbs using a hand-crank spreader, a large spinner-spreader pulled by an ATV or tractor, or by hand. This ensures the forbs (especially those that do not germinate until spring) do not compete with the grasses and that all the space between drill lines is occupied. If the latter option is chosen, the forbs must be sown at a much higher rate which could increase the cost of the project. If no drill is available, broadcast seeding everything together is still effective (see #1 for sowing rate suggestions.) For ease and uniformity of application, (both drill and

broadcast), seed should be mixed with a cutting agent. Medium-grade vermiculite (available from nursery supply stores) or sifted, moist sawdust works well. Rice hulls or crushed hazelnut shells have also been suggested. For broad seeding, I have found that one, 5 gallon bucket of vermiculite covers about 2750 ft².

- If the site is in poor condition or has been disturbed you can sow species that germinate quickly and are good competitors. *Elymus glaucus*, *Elymus trachycaulus* (99% of grass mix) and *Bromus carinatus* (1% of grass mix) germinate quickly and are robust the first year. Bromes are very aggressive so a little goes A LONG WAY. The following forbs germinate in the fall and early winter: Perennials *Achillea millefolium*, *Lomatium utriculatum*, *Lupinus albicaulus*, *Prunella vulgaris* var. *lanceolata*, *Eriophyllum lanatum*, and *Rannunculus occidentalis* (75% of forb mix) and annuals *Clarkia amoena*, *Clarkia purpurea*, *Collomia grandiflora*, *Gilia capitata*, *Lotus unifoliolatus*, *Madia gracilis*, and *Sanguisorba occidentalis* (25% of forb mix.)

TABLE 1 - Willamette Valley Native Wetland and Upland Prairie Species
wp = wet prairie; up = upland prairie; w = woodland

SPECIES	ANNUAL OR PERENNIAL	COMMON NAME
<i>Grasses, Sedges, Rushes</i>		
<i>Carex tumulicola</i> (up)	P	Foothill sedge
<i>Danthonia californica</i> (up, wp)	P	California oatgrass
<i>Deschampsia cespitosa</i> (wp)	P	Tufted hairgrass
<i>Elymus glaucus</i> (up, wp)	P	Blue wildrye
<i>Elymus trachycaulus</i> (<i>Agropyron caninum</i>) (up)	P	Slender wheatgrass
<i>Festuca californica</i> (w, up)	P	California fescue
<i>Festuca roemerii</i> (up)	P	Roemer's fescue
<i>Juncus tenuis</i> (wp)	P	Slender rush
<i>Koeleria macrantha</i> (up)	P	Srairie junegrass
<i>Luzula comosa</i> (<i>L. campestris</i>) (up)	P	Woodrush
<i>Poa secunda</i> (<i>P. scabrella</i>) (up, wp)	P	Pine bluegrass
<i>Forbs</i>		
<i>Achillea millefolium</i> (up, wp)	P	Yarrow
<i>Agoseris grandiflora</i> (up)	P	Large-flowered agoseris
<i>Allium amplexans</i> (wp)	P	Slim-leaf onion
<i>Allium acuminatum</i>	P	Taper-tip onion
<i>Aquilegia formosa</i> (up)	P	Columbine
<i>Asclepias speciosus</i> (up, wp)	P	Showy milkweed
<i>Aster hallii</i> (up, wp)	P	Hall's aster
<i>Aster subspicatus</i> (w)	P	Douglas' aster

SPECIES	ANNUAL OR PERENNIAL	COMMON NAME
Balsamorhiza deltoidea	P	Balsamroot
Brodieae coronaria (up, wp)	P	Harvest brodieae
Calochortus tolmiei	P	Cat's ears
Camassia leichtlinii (up, wp)	P	Leichtlin's camas
Cammasia quamash (wp)	P	Common cammas
Castilleja tenuis (Orthocarpus hispidis) (wp)	A	Hairy Owl clover
Clarkia amoena (up, wp)	A	Farewell to spring
Clarkia purpurea ssp purpurea (up)	A	Purple godetia
Clarkia rhomboidea (up)	A	Rhombic-petaled clarkia
Collinsia grandiflora (up, wp)	A	Large-flowered blue-eyed mary
Collomia grandiflora (up)	A	Large-flowered collomia
Delphinium menziesii (up)	P	Menzie's larkspur
Delphinium oreganum (up)	P	Willamette Valley larkspur
Dichelostemma congestum (Brodieae congesta) (up)	P	Ookow
Dodecatheon hendersonii (up, w)	P	Broad-leaved shooting star
Dodecatheon pulchellum (wp)	P	Few-flowered shooting star
Eriophyllum lanatum (up, wp)	P	Oregon sunshine
Erythronium oregonum (up)	P	Fawn lily
Geranium oreganum (up)	P	Oregon geranium
Gilia capitata (up)	A	Blue field gilia
Iris tenax (up)	P	Oregon iris
Ligusticum apiifolium (up)	P	Licorice root
Lomatium dissectum (up)	P	Fern-leaved lomatium/biscuit root
Lomatium nudicale (up)	P	Bare stem lomatium/biscuit root
Lomatium utriculatum (up)	P	Spring gold
Lotus micranthus (up)	A	Small-flowered deervetch
Lotus unifoliolatus (L. purshianus) (up, wp)	A	Spanish clover
Lupinus albicaulis (up)	P	Sickle-keeled lupine
Lupinus bicolor (up)	A	Small-flowered lupine
Lupinus polyphyllus (wp)	P	Large-leaf lupine
Madia elegans (up)	A	Showy tarweed
Madia gracilis (up)	A	Common / grassy tarweed
Perideridia oregana or P. gairdneri (up, wp)	P	Yampah
Potentilla glandulosa (up)	P	Slickly cinquefoil
Potentilla gracilis (up, wp)	P	
Prunella vulgaris var. lanceolata (up, wp)	P	Self-heal

SPECIES	ANNUAL OR PERENNIAL	COMMON NAME
<i>Psoralea physodes</i> (up)	P	Scurf pea
<i>Ranunculus occidentalis</i> (up)	P	Western buttercup
<i>Sanguisorba occidentalis</i> (up, wp)	A	Western burnet
<i>Sanicula bipinnatifida</i> (up)	P	Purple sancicle
<i>Sidalcea campestris</i> (up)	P	Meadow checker mallow
<i>Sidalcea malviflora</i> ssp. <i>virgata</i> (up)	P	Rose checker mallow
<i>Silene hookerii</i> (up)	P	Hooker's silene
<i>Sisyrinchium angustifolium</i> (wp)	P	Blue-eyed grass
<i>Spiranthes romanzoffiana</i> (up, wp)	P	Ladies' tresses
<i>Trifolium tridentatum</i> (up)	A	Tomcat clover
<i>Triteleia hyacinthina</i> (<i>Brodieae hyacinthina</i>) (up, wp)	P	Hyacinth brodieae
<i>Vicia americana</i> (up)	P	American vetch
<i>Viola adunca</i> (up)	P	Early blue violet
<i>Viola nuttallii</i> var. <i>praemorsa</i> (up)	P	Yellow prairie violet
<i>Wyethia angustifolia</i> (up)	P	Mule's ear
<i>Zigadenus venenosus</i> (up, wp)	P	Death camas

OAK HABITAT - SITE PREPARATION:

WHAT ARE YOUR STARTING CONDITIONS????

- 1) Mature oak woodland with conifers over-topping the oaks and young conifer and oak in the understory
- 2) Young oak in very thick stands
- 3) Invasive shrubs
- 4) Bare-ground after tree and shrub removal
- 5) Canadian thistle, knapweed, and biennial thistle infestations
- 6) Oak savanna (grassland with large, open-growth oaks spaced 2-5 trees/acre)
- 7) No/Few Oak

(1) Remove conifers by hand-cutting. Conifers that would harm oaks if felled can be limbed and topped to provide wildlife habitat. Also, some conifers can be partially limbed and left for replacement snags. Young, skinny oaks with no lower branches should be thinned. Retain any oaks that are in more open habitat and have developed lower branches. Woodland target density should be approximately 40 - 50 trees/acre.

Table 2 – Suggested Understory Vegetation for Oak Woodland

SPECIES	ANNUAL OR PERENNIAL	COMMON NAME
<i>Grasses & Sedges</i>		
Bromus sitchensis	P	Columbia brome
Bromus vulgaris	P	Sitka brome
Carex deweyana	P	Dewey's sedge
Elymus glaucus	P	Blue wildrye
Festuca californica	P	
<i>Forbs</i>		
Aquilegia formosa	P	Columbine
Camassia leichlinii	P	Tall camas
Erythronium oregonum	P	Fawn lily
Geum macrophyllum	P	Large-leaved avens
Iris tenax	P	Oregon iris
Ligusticum apiifolium	P	Licorice root
Lomatium dissectum	P	Fern-leaved lomatium
Osmorhiza chilensis	P	Sweet cicely
Prunella vulgaris ssp. lanceolata	P	Self-heal
Rupertia physodes (Psoralea p)	P	Scurf pea
Sidalcea campestris	P	Meadow checkmallow
Tellima grandiflora	P	Fringe cup
<i>Small Trees & Shrubs</i>		
Amelanchier alnifolia	P	Serviceberry
Corylus cornuta (var californica)	P	Western hazelnut
Holodiscus discolor	P	Ocean spray
Mahonia (berberis) aquifolium	P	Oregon grape
Oemleria cerasiformis	P	Oso berry or Indian plum
Ribes sanguineum	P	Red-flowering current
Rosa gymnocarpa	P	Baldhip rose
Symphoricarpos albus	P	White snowberry

(2) Remove the majority of the oaks so that grassland can be reestablished or enhanced. Retain oaks with lower branches and remove the others. The trees with lower branches will be able to mature into open-grown oaks with large crowns. These large branches will contain numerous microhabitats, will become draped with nutritious lichens, and produce abundant acorns. Target density should be 2 - 5 trees/acre. Hand-cutting is one option but there are low-impact (rubber-tracked) skid-steers available that can mechanically remove the trees and apply herbicide to the stump (oaks resprout). Since it is desirable to re-seed immediately after exposing bare soil (see #4 below), logging should be done just before spring rains stop or fall rains begin.

(3) Mow or hand-cut invasive shrubs such as Himalayan and evergreen blackberry, poison-oak (native but can become noxious if not controlled), Scotchbroom, English hawthorn,

holly, and sweetbriar rose. Many rubber-tracked skid-steers have brushing mowers that can handle large areas of tall brush. Hawthorn will re-sprout so application of herbicide to the freshly cut stump is imperative. Poison oak and English ivy climbing trees can be cut from the trees using handsaws or a heavy jabbing tool with a sharp blade at the end to cut the weed's roots near the base of the tree. English ivy growing on the ground can be hand-pulled or cut. However, it roots at the nodes so must be put onto plastic to dry and die. For long-term maintenance and control of brush, see #4 below.

(4) Bare soil is an open invitation to weeds (especially thistles) so it must be immediately seeded with aggressive native grasses such as *Elymus trachycaulus* and *Elymus glaucus*. They will germinate readily if sown while there is rain. This will also reestablish native grassland in these areas and allow for long-term shrub control by periodic fire. After seeding the grass, the broad-leaf weeds can be spot-sprayed until under control. Allow two years before burning the grasses to ensure hardiness of the crown. If burning is not an option, mowing is the best alternative. If the area is clean of invasive broadleaf species, sow native forbs after the burning or mowing treatment.

Note: Both of these grass species germinate really well on the residue left after a brush pile has been burned and ensure that weeds do not overtake the bare ground.

(5) Canadian thistle and knapweed are rhizomatous perennials and must not be pulled or tilled as a weed control method. The most effective method of control is to spot-spray the rosettes with a composite-specific herbicide (containing clopyralid) very early in the spring before the grass becomes too tall. Note: herbicides with clopyralid are long-lived in soil and compost so the chemical should only be applied to the target plant. Biennial thistles (bull, Italian, milk) can be treated with glyphosate in the rosette stage. If they are in the early flowering stage, it is best to treat them early with a general broadleaf herbicide, which will kill the plants more quickly, and before seed set.

(6) Work to improve the grassland for ground nesting species (see *Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington* listed in Suggested References and the Grassland Section above). Retain some smaller oaks as replacement trees.

Note: Retain or plant some native shrubs where appropriate (ravines or around mature trees). Good wildlife shrub species are: *Amelanchier alnifolia*, *Rhamnus purshianus*, and *Holodiscus bicolor*. Non-native shrubs such as Himalayan /evergreen blackberry, English hawthorn, and scotch broom should be removed. Again, there are low-impact skid-steers available that can mow these species down. Re-growth of blackberry can be spot-sprayed with glyphosate in October. Spot spraying for three years has proven very effective. Regular maintenance of the site by burning or mowing should keep the shrubs in control.

(7) If you want to plant oak on your site AND want native grassland habitat, establish the prairie first (see above for suggested methods). When the grassland is established (in 2 - 3 years), mow or burn the site in the fall and plant oaks in clusters of 4 - 5 trees. Plant the clusters at a savanna density (2 - 5 clusters/acre). Oaks (and other native trees and shrubs) establish best when planted in the winter. Spring is often iffy due to unpredictable rainfall. When the oaks are 5-10 years old, the clusters can be thinned to ensure open-growth oaks are established at a savanna density.

APPENDIX A

SUGGESTED ADDITIONAL RESOURCES

- **Techniques for Restoring Native Plant Communities in Upland and Wetland Prairies in the Midwest and West Coast Regions of North America** by Greg Fitzpatrick (TNC White Paper)
<http://www.ci.eugene.or.us/parks/wetlands/pdfs/EPA-WhitePaperFinal.pdf>
- **Native Seed Network** <http://www.nativeseednetwork.org>
- **OSU Professor of Botany, Mark Wilson**
<http://www.onid.orst.edu/~wilsomar/Index.htm>
- **The Institute for Applied Ecology** <http://www.appliedeco.org/>
- **Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington - Partners In Fight**
http://community.gorge.net/natres/pif/con_plans/west_low/west_low_plan.html
- **Restoring Rare Native Habitats in the Willamette Valley** by Bruce Campbell, ODFW.
<http://www.biodiversitypartners.org/pubs/index.shtml>
- **A Landowner's Guide for Restoring and Managing Oregon White Oak Habitats** Oak ecology, site assessment, restoration planning/methods, controlling invasive species, wildlife enhancement. etc. by Dave Vesely and Gabe Tucker, Pacific Wildlife Research. Contact Connie Barnes for the book
<mailto:connie@irmforestry.com> or order on-line at <http://www.oregonoaks.org/>
- **Landowner Video Guide for Restoring and Managing Oregon White Oak Habitats (65 min)** On-the ground coverage of habitat conditions, management opportunities, restoration projects, common landowner goals, controlling invasive species, etc. by Hugh Snook, BLM, and Barry Schreiber, Flora & Fauna Video Production. Available free at www.OR.BLM.gov/Salem

- **R-J Consulting Services, LLC (contract brush and tree removal with low-impact skid steer).** 541-967-9550 (home) 541-979-7282 (cell)
<mailto:rowen2378@juno.com>
- **Integrated Resource Management (contract brush and tree removal with low-impact skid steer and grant writing).** 541-484-1217 <mailto:darin@irmforestry.com>
- **USFW Partners for Fish and Wildlife Program** <http://partners.fws.gov/>, **Steve Smith, Willamette Valley Administrator** 541-757-7236
mailto:Steve_Smith@fws.gov
- **ODFW Landowners Incentive Program**
<http://www.dfw.state.or.us/test/LIP/overview.html>, **Bruce Campbell, Willamette Valley Administrator** 503-947-6099 <mailto:Bruce.H.Campbell@DFW.STATE.OR.US>
- **OSU Extension Service, Private Landowner Workshops For Conservation and Restoration of Native Woodlands.** Brad Withrow-Robinson 503-434-7517 brad.w-r@oregonstate.edu
- **Cereal Grains as Cover Crops.** OSU Extension Service
<http://eesc.orst.edu/agcomwebfile/edmat/html/EM/EM8692/EM8692.html>

APPENDIX B

Target Chemicals for Weed Control Seed Production and Restorations

Lots of Info on Web - Here are some I have found helpful

<http://www.greensmiths.com/herbicides.htm>

Overview of some chemicals for specific weeds

<http://www.ipaw.org/herbicides.htm>

http://grounds-mag.com/mag/grounds_maintenance_new_pest_controls/

Note this site says Envoy effective on perennial grasses! I found this to be true

http://grounds-mag.com/mag/grounds_maintenance_understand_mode_action/

How they work

<http://stephenville.tamu.edu/~butler/foragesoftexas/weedcontrol/hermode.pdf>

http://www.utextension.utk.edu/publications/pbfiles/PB1728_sec2.pdf

<http://www.maltawildplants.com/ASTR/Docs/CNZBO/Weedchart.pdf>

Weeds susceptible to various herbicides

My Experience

Note: Broadleaf (dicots) chemicals are safe for monocots (grasses, sedges, rushes, lilies, iris)

EXCEPT WHEN FLOWERING (contorts seed heads and lowers yields)

- Glyphosate [short lived in soil]
 - Everything! [However, spraying post pollination, they will set seed]
 - Fall applied to blackberry 3-5 years, effective control
- Envoy (grass-specific)
 - Works on all wide-leaf grasses (even perennials)
 - Not on annual fescue, and red fescue (skinny leaves)
 - Hit while young and growing (ineffective in flower)
 - Safe for non-grass monocots (lilies, iris, sedges, rushes)
- 2,4,-D (broadleaf) [short-lived in soil]
 - Good for: composites (thistles, dandelion ect), pearlwort, mustards, geraniums
 - Not good for: clover, speedwell, chickweeds, miners lettuce, vetch
- Mecoprop "MCP" (broadleaf) - Combined with MCPA and dicamba or MCPA and 2,4-DP [short lived in soil]
 - Kills pretty much everything (not very effective on vetch)!
 - Clover, speedwell (MCPA), chickweeds, burdock, bedstraw!
 - Best to target prior to pollination or seed-set may still take place.
- Clopyralid and Triclopyr [long-lived in soil]
 - Targets are composites (especially Canadian thistle) and legumes (great on clover)
 - Spot-spray ONLY

APPENDIX C

Resources for Wildlife Habitat Conservation in Oregon

Prepared by Katie Frerker, Food Alliance 2006

At-Risk Species: The Oregon Department of Fish and Wildlife compiled a complete list of all vertebrate, invertebrate, and plant species in Oregon that have a federal or state at-risk conservation status. The list include species that are federal or state endangered, threatened, or candidate species, state sensitive or vulnerable, or natural heritage conservation status. The most recent list can be found at www.dfw.state.or.us/LIP/species_list.pdf with an explanation of the codes at www.dfw.state.or.us/LIP/species_list_explain.pdf.

Incentive Programs and Funding: Incentive programs are offered by a variety of public and private sources, including federal agencies (Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service), state agencies, regional or local agencies, and private organizations. For a complete summary of conservation

incentive programs available in Oregon, go to www.biodiversitypartners.org/state/or/incentives.shtml.

Land Trusts: Land trusts are nonprofit organizations that, as all or part of their mission, actively work to conserve land by undertaking or assisting in land or conservation easement acquisition, or by their stewardship of land or easements. There are land trusts in some, but not all, parts of Oregon. To find a land trust near you, go to www.ltanet.org/findlandtrust and click on "Oregon", then "local land trusts".

Natural Resources Conservation Service: The NRCS provides leadership in a partnership effort to help people conserve, maintain, and improve natural resources and environment. The NRCS also offers several incentive programs specifically for wildlife habitat conservation. Find your local office or technical specialist in Oregon at www.or.nrcs.usda.gov/contact.

Oregon Wildlife Conservation Strategy: This new action plan identifies at-risk native habitats and species in each ecoregion of the state, including: oak woodlands, oak savannas, prairies, wetlands, wet prairies, riparian areas, aquatic habitats, grasslands, ponderosa pine woodlands, and sagebrush steppe / shrublands. For information about where, how, and why to conserve native habitats in Oregon, go to www.dfw.state.or.us/conservationstrategy, or call 503-947-6315 to get a copy on CD.

OSU Extension Service: The OSU extension service offers assistance to landowners in many subject areas, including agriculture and forestry. The Master Watershed Steward Program provides excellent, in-depth training including: watershed and stream processes, riparian area functions and management, salmonid biology, stream assessment, restoration, water quality monitoring, wetland evaluation and enhancement, soils and erosion, and working together to create successful groups. For more information, go to seagrant.oregonstate.edu/wsep/masterprogram.html.

Restoration of Priority Habitats in the Willamette Valley: This landowner guidebook, produced by Bruce Campbell and Defenders of Wildlife, provides detailed information about restoring priority habitats in the Willamette Valley. It is an excellent guide, but it's out of print. To print your own copy, go to www.biodiversitypartners.org/pubs/Campbell/Landownerguide.pdf.

Soil and water conservation districts: SWCDs help landowners, land managers, and residents use conservation measures and management practices to protect near-stream areas and reduce the transport of chemicals and nutrients to streams in sedimentation or runoff. These conservation efforts cool water temperatures, stabilize streambanks, and protect water bodies from impacts by farm and ranch animals. Find your SWCD at www.oacd.org.

Watershed councils: Watershed councils are locally organized, voluntary groups established to improve the condition of local watersheds. They include the diverse interests in the watershed and are balanced in their makeup. They provide an opportunity to independently evaluate watershed conditions and identify opportunities to restore or enhance the watershed. Partnerships between landowners, local, state, and federal agencies, and other groups integrate local efforts. Find your watershed council at www.oweb.state.or.us/OWEB/WSHEDS/wsheds_councils_list.shtml.

Wildlife Habitat Conservation and Management Program - Rules and Statutes: Statutes for the wildlife habitat special assessment are ORS 308A 400-430 and ORS 308A 700-743, which can be found at www.leg.state.or.us/ors/308a.html. Administrative rules for the habitat program are OAR 635.430, which can be found at arcweb.sos.state.or.us/rules/OARS_600/OAR_635/635_430.html.