Appendix E: Herbicide Information

Introduction

This appendix provides specific information about the nature and effectiveness of the herbicides selected for use on the fourteen noxious weed species.

Herbicide treatment of infestations will use approved herbicides for the targeted weed species. Herbicides are part of a collective group of products called pesticides used to control vegetation. Herbicide will be applied directly to weed leaves and stems. A surfactant may be used to enable herbicide penetration of the plant cuticle, a thick, waxy layer present on leaves and stems of most plants.

All herbicides registered for use in the U.S. and California must have a label certifying that the Federal Environmental Protection Agency (EPA) and the California Department of Pesticide Regulation (DPR) have approved the herbicide for use. Product labels are legal documents whose language is determined and approved by the EPA during the pesticide registration process. All herbicides proposed for use are registered in the U.S. and California and have a label certifying that the EPA and the DPR have approved the herbicide for use on the targeted weed species.

The label contains information about the product, including its relative toxicity, potential hazard to humans and the environment, directions for use, storage and disposal, and first aid treatment in case of exposure. Product labels are legal documents whose language is determined and approved by the EPA during the pesticide registration process. These label directions provide for public and worker safety by requiring posting of treated areas, pre-designation of mixing, storage and filling sites, and transportation and handling practices in accordance with toxicity of each formulation.

The length of time each herbicide controls noxious weeds varies with the type of herbicide, environmental conditions, and target weed. Some herbicides control weeds for a short time period, while others can provide several years of control from one application. EPA approved herbicide labels include safe handling practices, application rates, and labels, susceptibility of weeds to different herbicides, Material Safety Data Sheets, guidelines, and Emergency Spill Response proposed for use on this project are contained in the project file at the Supervisor’s Office in Alturas, California.

Use of herbicides for noxious weed treatment involves application of products developed, labeled, and produced to treat weed species at certain stages of plant growth. All but one of the herbicides considered in this analysis are “selective” which means they control certain plant species while allowing other species to remain unaffected. Glyphosate is the only non-selective herbicide

considered. Several herbicides are considered because they vary in effectiveness on different invasive weeds. Herbicide treatment will include the use of the following herbicides: 2,4-D, clopyralid, dicamba, glyphosate, chlorsulfuron, and triclopyr as well as two mixtures (Mix 1: Dicamba + 2,4-D, Mix 2: Chlorsulfuron + 2, 4-D), applied at appropriate rates according to label directions determined by EPA and DPR requirements. Herbicide selection depends on weed species, level of infestation, location, other resource concerns (see Best Management Practices), and the applicability of herbicides. Herbicide selection considers, but is not limited to, the following criteria:

- Herbicide effectiveness on target weed species;
- Proximity to water or other sensitive areas;
- Soil characteristics;
- Potential unintended impacts to non-target species such as conifers or shrubs;
- Application method;
- Adjacent treatments (private or state land); and
- Timing of treatment
- Herbicides Targeted for Noxious Weeds Species

Herbicides in the Alternatives and targeted weed species are shown in Chapter 2, Tables 2-14 and 2-15.

The application rates in Chapter 2, Table 2-14 are based on the current label instructions for the specific plant and application. If the label instructions change the treatment will be adjusted accordingly.

General Herbicide Descriptions

Clopyralid

Clopyralid is a selective post-emergence herbicide controlling broadleaf species in the sunflower, legume, and smartweed family. This herbicide affects the target weed by mimicking the plant hormone auxin and causes uncontrolled plant growth and eventual death. It has a half-life in the soil of 20 days and is degraded primarily by microbial metabolism. Once applied to the ground, it rapidly disassociates and does not bind strongly with soil particles, which results in clopyralid having a high potential to contaminate ground or surface water. It may be used to treat the biennial thistles, Canada thistle, diffuse knapweed, Mediterranean sage, Russian knapweed, spotted knapweed, and yellow starthistle.

Dicamba

Dicamba is considered a general use herbicide for forestry, rangeland and rights-of-way uses. It is a selective herbicide used to control broadleaf weeds, brush, and vines and it affects target plants by regulating growth. About half of this product is broken down by microbial activity in 10 and 35 days

once applied. Dicamba is highly mobile in the soil and does have the potential to contaminate ground or surface water. This herbicide is very versatile in noxious and invasive weed control and has been proven successful in the treatment of biennial thistles, Canada thistle, Dyer's woad, leafy spurge, rush skeletonweed, spotted knapweed, sulfur cinquefoil, and yellow and Malta starthistles.

Glyphosate

Glyphosate is a broad-spectrum, nonselective herbicide used for the control of annual and perennial plants including grasses, sedges, broadleaf weeds, and woody plants. This herbicide is used on a variety of crops and its method of action is to inhibit amino acid and protein synthesis. It is moderately persistent in the soil and has an estimated half-life of 30 to 50 days. Glyphosate is strongly absorbed in most soils and normally does not leach out of the profile. Microbes are primarily responsible for the breakdown of this herbicide in the environment. Glyphosate has been successful in controlling Canada thistle, cheatgrass, leafy spurge, spotted knapweed, Dalmatian toadflax, and yellow as well as Malta Starthistles.

Triclopyr

Triclopyr is a growth-regulating herbicide for the control of woody and broadleaf perennial weeds. It has a half-life in the soil of 30 to 90 days, and degrades to carbon dioxide and organic matter through microbial action. Triclopyr has a moderate to low solubility in water and normally binds to clay and organic matter, so its potential to contaminate ground water is slight. Triclopyr is effective in the treatment Common crupina, Dyers woad, tall whitetop and yellow starthistle.

2,4-D

2,4-D is a selective herbicide that is used to control broadleaf weeds by interfering with the metabolism of the plant. It has a half-life in the soil of 10 days and normally is broken down through microbial activities. It is moderately to highly mobile in the soil, which restricts its use in and around high ground water tables or open water. This herbicide is one of the oldest, most studied, and extensively used herbicides across the United States for over 50 years, though it does not appear it was used to any extent in the project area. Most previous herbicide work was targeted for the control of grasses to increase reforestation success, so 2,4-D was not warranted. This herbicide is one of the most versatile in the control of noxious and invasive weeds and has been proven successful in the treatment of biennial thistles, Canada thistle, diffuse knapweed, Dyer's woad, leafy spurge, Mediterranean sage, oxeye daisy, rush skeletonweed, Russian knapweed, spotted knapweed, sulfur cinquefoil, Dalmatian toadflax, tall whitetop, and yellow and Malta starthistles.

On August 8, 2005, the Environmental Protection Agency (EPA) released its comprehensive assessment of 2,4-D under the Agency's reregistration program. EPA's decision document concluded that 2,4-D does not present risks of concern to human health when users follow 2,4-D product instructions as outlined in EPA's 2,4-D Reregistration Eligibility Decision (RED) document.

Chlorsulfuron

Chlorsulfuron controls many broadleaf weeds especially mustard spp., pigweed spp., and several thistles. Most perennial grasses are tolerant to chlorsulfuron making it a good herbicide choice for use in range and wildland settings dominated by perennial grasses. Chlorsulfuron has soil activity and provides effective residual control of several weed species. Little of this effect will occur utilizing the direct spray application called for in all alternatives. The average field half-life is 40 days, although persistence can be much longer on soils with a high pH (greater than 7.5). Chlorsulfuron is a member of the sulfonylurea chemical family. The mode of action is as an inhibitor of a key enzyme required for plant cell growth- acetolactate synthase. Chlorsulfuron is primarily used for post-emergent weed control and has rapid foliar and root absorption. The active ingredient application rate is very low compared to most growth regulators such as 2,4-D and dicamba.

Herbicide Mix 1: Dicamba + 2,4-D

The mixing of dicamba and 2,4-D into a single spray solution can increase herbicide efficacy on several noxious weeds including many thistle and knapweed species. This tank-mix is also commonly used in areas where multiple weed species with different herbicide susceptibility are growing together. The mixing of 2,4-D and dicamba does not change the chemical properties of either herbicide. When using this tank-mix, label restrictions for both dicamba and 2,4-D will be followed.

Herbicide Mix 2: Chlorsulfuron + 2,4-D

The mixing of chlorsulfuron with 2,4-D can increase herbicide efficacy on Scotch thistle and perennial pepperweed. This tank-mix is also commonly used in areas where multiple weed species with different herbicide susceptibility are growing together. For example, applying this tank mix to a roadside with perennial pepperweed, Canada thistle, and diffuse knapweed growing intermixed provides better control of all weed species compared to applying either herbicide individually. Mixing chlorsulfuron and 2,4-D also provides the benefit of a longer application timing for some thistle species. For example, 2,4-D only provides post-emergent control of yellow starthistle seedlings, and chlorsulfuron only provides pre-emergent control of yellow starthistle. When the two herbicides are mixed, the tank mix provides both pre- and early post-emergent control of yellow

starthistle. The mixing of chlorsulfuron and 2,4-D does not change the chemical properties of either herbicide. When using this tank-mix, label restrictions for both herbicides will be followed.

Herbicide Concentrations and Application Rates for Target Weed Species

Chapter 2, Table 2-14 displays the herbicide concentrations for each of the weed species to be treated with herbicides by alternative. The information in the table displays the review of noxious weed information and the information on the herbicides which are most effective and approved for use in California for the weeds identified for control on the Modoc National Forest.

Herbicide Fact Sheets

Appendix E in the DEIS contained Herbicide Fact Sheets from a series issued by the Forest Service, the Bureau of Land Management, and the Bonneville Power Administration for their workers and the general public. It provides information on forest and land management uses, environmental and human health effects, and safety precautions for the herbicides proposed for use on the Modoc National Forest to eradicate and known noxious weed infestations. Unless otherwise stated, the toxicity data presented in this fact sheet refer to the active ingredient. The fact sheets were prepared by Information Ventures, Inc. under U.S. Forest Service http://infoventures.com/e-hlth/ Copyright (c) 1994-2004, Information Ventures, Inc.

The fact sheets were included in the DEIS to provide an easy to read and understand information sheet about the herbicides not as the sole source of information utilized in the DEIS. The FEIS herbicide information is from a variety of sources including but not limited to product labels approved by EPA, SERA reports, individual worksheets developed for this analysis, and related information related to treatment of the 14 noxious weed species related to treatment methods from the USDA Forest Service, California Department of Agriculture, University of California, University of Montana, Pennsylvania State University and others.