Summary

Introduction

This Final Environmental Impact Statement (FEIS) presents the environmental consequences, at the programmatic scale, of a proposal to increase the number of herbicides available to the nine Bureau of Land Management (BLM) districts in Oregon for use in their existing noxious weed, invasive plant, and other vegetation management programs. The BLM in Oregon has been limited to the use of four herbicides[1] since 1987, and their use is limited to the treatment of noxious weeds (FEIS:3[2]).

***Terminology*:**

Invasive plants (or weeds) are non-native aggressive plants with the potential to cause significant damage to native ecosystems and/or cause significant economic losses.

Noxious weeds are a subset of invasive plants that are county-, State-, or Federally- listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property.

The BLM manages approximately 15.7 million acres in Oregon, or about 25 percent of the land in the State. Vegetation management to meet the Federal Land and Policy Management Act's public lands management policies and to satisfy the mandates of other laws, policy, and management plans takes place annually on thousands of acres of BLM lands in Oregon (FEIS:4). The BLM and its cooperators[3] manage vegetation on thousands of acres per year to maintain or restore forest and rangeland health; provide sustainable habitat for Special Status and other species of plants and animals; reduce the risk of wildland fire; and, provide for safe use and access to a variety of authorized developments. For these treatments, a full range of non-herbicide treatment methods are described in existing management plans, have been analyzed in existing National Environmental Policy Act (NEPA) documents, and are currently in use to achieve vegetation management objectives (FEIS:6).

In 1984, the BLM was prohibited from using herbicides in Oregon by a U.S. District Court injunction issued in Northwest Coalition for Alternatives to Pesticides, et al. v. Block, et al. (Civ. No. 82-6273-E). The injunction stemmed from a court decision that the BLM had not conducted a worst-case analysis for the herbicides being used at that time. Following completion of an EIS addressing four herbicides for the treatment of noxious weeds, the injunction was modified by the court in November 1987 (Civ. No. 82-6272-BU). The injunction permits the use of the four herbicides analyzed, and limits their use to the control of noxious weeds (FEIS:3).

In 2007, the BLM national office completed the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) and related Record of Decision, making 18 herbicides available for a full range of vegetation treatments in 17 western states including Oregon. Oregon cannot implement that decision, however, until and unless the District Court injunction is lifted (FEIS:3).

1 2,4-D, dicamba, glyphosate, and picloram

2 References in the *Summary* refer to the page numbers in the body of the Final EIS.

3 Cooperators: Leasees, permittees, and others with authorized uses or occupancy on BLM lands.

The BLM in Oregon has decided not to petition the court with the PEIS, but to prepare an Oregon-specific programmatic EIS, tiered to the PEIS. This EIS was prepared primarily:

1) To address the U.S. District Court injunction in a single programmatic document, and;
2) Because unlike the other western states, most of the herbicides proposed for use have not been used on Oregon BLM lands for more than 20 years, if at all.

Neither of those conditions applies to the other 16 western states, which were using up to 20 herbicides for a full range of vegetation management objectives prior to the 2007 Record of Decision for the PEIS (FEIS:4).

The EIS does not examine specific treatments. Additional NEPA analysis at the district or project level will analyze the effects of specific project proposals (FEIS:3).

What Action is Proposed?

The Proposed Action (Alternative 4) would add 9 of the nationally-approved herbicides west of the Cascades and 12 east of the Cascades[4] to the 4 already in use (Table S-4). In addition, it would expand their use beyond noxious weed treatments to include: the control of all invasive plants; the control of pests and diseases; the control of native and other non-invasive vegetation in rights-of-way, administrative sites, and recreation sites; and, the treatment of vegetation to achieve habitat goals specified in interagency Recovery Plans or other plans specifically identified as part of recovery or delisting plans, Conservation Strategies, or Conservation Agreements for Federally Listed and other Special Status species (FEIS:7-8, 31-32). No aerial application would be permitted west of the Cascades (FEIS:31).

It is estimated that herbicide use would increase from 16,700 acres per year under the No Action Alternative (Alternative 2) to 45,200 acres per year under the Proposed Action (Alternative 4) (FEIS:78). Because newer, more target-specific herbicides would be used, the average pounds per acre of herbicide applied, would decrease about 30 percent (FEIS:80). All but 3,000 acres of the estimated increase would be east of the Cascades, and 11,000 acres of the increase is estimated to be imazapic applications on invasive annual grasses, including medusahead and cheatgrass, primarily to help with restoration of native plants following wildfires or prescribed burns (FEIS:83). Approximately 9,000 acres of the increase would treat native and other non-invasive vegetation causing safety and maintenance issues on rights-of-way, administrative sites, or recreation sites (FEIS:83-84). These treatments are now done with non-herbicide methods (FEIS:84), and using herbicides would save about $1 million per year (FEIS:342), and have a collateral benefit of killing undetected invasive plants near roads and other high-use areas and thus preventing them from being moved elsewhere (FEIS:136-137).

An estimated 5,700 acres of the proposed increase would go to improving habitat for Federally Listed or other Special Status species (FEIS:78), mostly in sagebrush habitats east of the Cascades (FEIS:256, 83). Herbicides would also be available to treat native plants to control exotic pests and diseases in State-identified control areas, like the area currently quarantined for Sudden Oak Death in southwestern Oregon (FEIS:31). In that area, tanoak stumps near Sudden Oak Death infestations would be treated to prevent resprouting, depriving the pathogen its preferred host (FEIS:162).

4 Districts east and west of the Cascades identified different program needs because of differences in vegetation types and weed occurrence.

Why is the Action Needed?

Noxious weeds and other invasive plants are difficult to control. Many species simply cannot be controlled with manual and mechanical treatments alone because their roots are deep and readily re-sprout, because they are in areas where soil disturbance is not acceptable, access limitations prevent effective control, or because they would simply reseed into mechanically disturbed sites. Many plant species are not effectively controlled by the four herbicides currently available to BLM in Oregon. In spite of an aggressive Integrated Vegetation Management program using all available treatment methods, these plants are spreading, habitats are being degraded, and hazardous fuel buildup is increasing. About 1.2 million of the 15.7 million acres of BLM lands in Oregon are currently infested with noxious weeds at some level,[5] and they are spreading at an estimated rate of 12 percent per year (Appendix 7). Ecological damage from extensive noxious weed infestation is often permanent. Adverse effects include displacement of native plants; reduction in habitat and forage for wildlife and livestock; loss of habitat for Federally Listed and other Special Status species; increased soil erosion and reduced water quality; reduced wilderness and recreation values; reduced soil productivity; and changes in the intensity and frequency of fires (FEIS:6-7).

There are also specific management situations where *native* and other non-invasive vegetation is going untreated or only partially treated because available vegetation management methods are inefficient or costly. The management of encroaching vegetation within road, power line, pipeline, and other rights-of-way and developments is being conducted with non-herbicide methods at a higher cost on BLM lands than on adjacent non-BLM lands where herbicides are available. The additional costs and reduced effectiveness ultimately affect utility subscribers and/or subtract from funds available for other vegetation treatments. Mechanical methods can also spread invasive plants. Western juniper is spreading into other native shrub/grass communities, capturing available soil water, and altering soils in ways that inhibit retention and reestablishment of native plants in those communities. The plant pathogen Sudden Oak Death is getting a foothold in southwest Oregon, threatening to kill tanoaks and other plants throughout the State and lead to plant quarantines on a variety of nursery plants (FEIS:7).

To better meet BLM's noxious weed and other vegetation management responsibilities, there is an underlying *Need* for more effective vegetation control measures. Because all other known non-herbicide methods are available and being used to the extent practicable within existing funding and capabilities, the *Need* for more effective control measures translates to a proposal to make more herbicides available for use on public lands administered by the BLM in Oregon (FEIS:7).

What Would it Mean Not to Meet the Need?

To answer that question, a No Action Alternative (Alternative 2) was analyzed. Noxious weeds would continue to spread at an estimated rate of 12 percent (144,000 acres per year), and infest about 5.9 million acres or one-third of the BLM lands in Oregon, in 15 years (FEIS:133, 138). Millions of acres of imperiled sagebrush habitat would be converted to medusahead and cheatgrass, which are invasive annual grasses with little habitat or forage value (FEIS:274) and prone to regular intense fires that remove all other vegetation and endanger rural communities (FEIS:277). The BLM would continue to try, without herbicides, to control tanoak on its portion of the State quarantine area for Sudden Oak Death in southwest Oregon. Tanoak is a prolific sprouter, and the continued persistence of Sudden Oak Death at the quarantine area is thought to be at least partially related to BLM's inability to control that sprouting with herbicides (FEIS:161). If Sudden Oak Death escapes the quarantine area and spreads unchecked as it has in California, ecological damage from the loss of most tanoak and several other host trees throughout western Oregon and possibly into Washington would be severe. Such a spread would also

5 "Infestations" range from monocultures of invasive weeds to a few stems per acre.

cost Oregon's nursery industry an estimated $28 to $259 million per year in lost export opportunities, quarantines, and cleaning (FEIS:160).

Management of native and other non-invasive vegetation in rights-of-ways, administrative sites, and recreation sites would continue without herbicides, costing $1 million more per year than with herbicides (FEIS:342), and causing ground disturbances that exacerbate the spread of invasive plants (FEIS:136, 252). About 3,700 acres per year of habitat improvement opportunities for Special Status species would be forgone (FEIS:83-84).

A "no herbicides" Reference Analysis is also analyzed to help set a benchmark from which to compare herbicide use effects (FEIS:27). Overall, treatments without herbicides are more expensive and less effective at controlling noxious weeds (FEIS:136, 340). Under the Reference Analysis, noxious weeds are projected to spread to 8.6 million acres in 15 years (about one-half of the BLM lands in Oregon) (FEIS:138).

Are There Other Alternatives that Would Meet the Need?

Three action alternatives are identified that would meet the *Need* and meet some or all of the *Purposes*. In addition to the Proposed Action (Alternative 4):

Alternative 3 would add eight and nine herbicides, west and east of the Cascades respectively, to the four currently being used (Table S-4). It would permit herbicides to be used on invasive plants other than noxious weeds, such as cheatgrass. This alternative would also make herbicides available to treat any vegetation as necessary to control pests and diseases in State-identified control areas, such as that for Sudden Oak Death in southwestern Oregon (FEIS:30). Herbicide use would be expected to increase from 16,700 acres under the No Action Alternative (Alternative 2) to 30,300 acres under Alternative 3 (FEIS:78), although total pounds of herbicide used would decrease about 35 percent (at the typical rate) because many of the additional herbicides are used in much lower quantities (FEIS:80). More than 80 percent (11,000 acres), of the increase would be to treat the invasive annual grasses medusahead and cheatgrass east of the Cascades, usually to facilitate native plant restoration following wildfire or prescribed fire (FEIS:83). The herbicides available under this alternative would be effective on almost all of the known invasive plants in Oregon (FEIS:136). Alternative 3 would meet the *Need* and many of the *Purposes*.

Alternative 5 would add 14 herbicides to the four already being used (Table S-4), and make them available for any vegetation management objective except livestock forage or timber production. As with all the alternatives, treatments must be permitted by the product label and be consistent with the product's Oregon registration (FEIS:28). The analysis estimates that herbicide use under this alternative would be about 50,000 acres per year, an increase of about ten percent (4,800 acres) from the Proposed Action (Alternative 4) (FEIS:78). Most of this increase would go to additional habitat improvements east of the Cascades (FEIS:83). All of the elements of the Proposed Action (Alternative 4) are included in this alternative, so both Alternatives 4 and 5 would meet the *Need*, and meet all eight *Purposes* to varying degrees.

What Factors Will be Used in Making the Decision Between Alternatives?

The decision by the BLM Oregon/Washington State Director will be based on the degree to which the selected alternative meets the *Need* and *Purposes* (FEIS:11). The *Need* is *to better meet BLM's noxious weed and other vegetation management responsibilities, there is an underlying need for more effective vegetation control measures* (FSEIS:12).

The eight *Purposes* to be variously achieved by the selected alternative are:

1. *Control invasive plant species to protect native ecosystems and the flora and fauna that depend on them.*
2. *Protect the safety and function of BLM and other authorized infrastructures by controlling encroaching native and other non-invasive vegetation.*
3. *Manage native vegetation to provide sustainable habitats for wildlife, fish, and native plants, particularly those included in the Special Status Species Program.*
4. *Manage vegetation to reduce the risk that large-scale high-intensity fires will unacceptably damage resources and human developments.*
5. *Cooperatively control invasive plants so they do not infest or re-infest adjacent non-BLM lands.*
6. *Prevent herbicide control treatments from having unacceptable adverse effects to applicators and the public, to desirable flora and fauna, and to soil, air, and water.*
7. *Control plant pests and diseases by removing their native plant hosts when necessary to meet Oregon Department of Agriculture-identified control objectives.*
8. *Minimize treatment costs and improve treatment effectiveness, so resource and economic losses from invasive plants and other vegetation growth are reduced and more of the* Need *can be met within expected funding* (FEIS:8-12).

What are the Effects of the Alternatives?

The Herbicides

In order to identify the potential effects of herbicide use, the annual acres to be treated with each herbicide and with each non-herbicide method were estimated for each alternative. Weed and other vegetation management specialists from the Oregon State Office and the nine district offices in Oregon made predictions of annual treatment levels for the next 10 to 20 years assuming current budget trends (FEIS:77-78). Those totals are summarized below, displayed for BLM districts west and east of the Cascades (Table S-1).

Table S-1. Estimated Annual Treatment Acres with Herbicide and Non-Herbicide Methods, West (W) and East (E) of the Cascades (FEIS:77-78)

	Reference Analysis	Alternative 2 (No Action)	Alternative 3	Alternative 4 (Proposed Action)	Alternative 5
Number of Herbicides	0	4	W: 12 E: 13	W: 13 E: 16	18
Herbicide Acres	0	W: 7,000 E: 9,700	W: 8,000 E: 22,300	W: 10,000 E: 35,200	W: 10,200 E: 39,800
Non-Herbicide Treatment Acres	W: 8,600 E: 33,500	W: 6,400 E: 22,400	W: 6,600 E: 21,500	W: 4,630 E: 12,075	W: 4,560 E: 10,430
Total Treatment Acres	W: 8,600 E: 33,500	W: 13,400 E: 32,100	W: 14,600 E: 43,800	W: 14,630 E: 37,175	W: 14,760 E: 50,230

The *potential* for each of the 18 herbicides to have adverse effects is identified as *risk*. A Risk Assessment process established risk ratings for each herbicide for various categories of fish, wildlife, plants, workers, and the public based on specific (unguarded) exposure scenarios. Although the Proposed Action would result in some increased *risk* associated with the proposed increase in the use of herbicides, it would be limited by the implementation of Standard Operating Procedures and PEIS Mitigation Measures specifically designed to limit exposures (FEIS:93). Thus, the likelihood of actual adverse effects is low, and for every resource, the analysis indicates the effects of

invasive weed spread are more adverse (Table 2-6, *Purpose* 1). The broader array of herbicides available for use would also allow for the selection of one that is most effective at accomplishing the weed control objective with the least amount of risk to nearby non-target resources including soil, air, and water (FEIS:11, 233).

Noxious Weed Effects and Rate of Spread

To help examine the effects of the spread of noxious weeds, the analysis also estimated the current spread rate for noxious weeds, and estimated how the different alternatives might be expected to change that rate (FEIS:135-137).

The list of adverse effects of noxious weeds and other invasive plants is long and varied (FEIS:133-134, 598-602). For example, they displace native species and degrade the ecosystems that depend upon them (FEIS:147-149). Many lack fibrous root systems or adequate foliage cover, so they do not protect soils from rain splash or overland flow (FEIS:178-179). Many have allelopathic effects (FEIS:281, 362). Many are poisonous to wildlife, livestock, wild horses, and burros (FEIS:270). Some invade stream banks but do not hold the soils, increasing siltation of spawning gravels and reducing water quality (FEIS:230). They displace riparian vegetation, reducing stream shading and the deposition of microfauna and detritus into streams that support the food chain (FEIS:230). They act as barriers that limit human and wildlife passage (FEIS:134). The invasive annual grasses increase fire occurrence and intensity, removing sagebrush plant communities (FEIS:139-104, 274). They make rangeland unusable, displacing forage for livestock grazing and destroying ranches (FEIS:264). They clog waterways and shade out native aquatic vegetation (FEIS:131).

Under Alternative 2 (No Action), herbicide and non-herbicide methods can be effective on 104 of the 120 State-listed noxious weeds in Oregon. Treatments under this alternative are estimated to be 60 percent effective; that is, they eliminate the treated weed so it does not require retreatment an estimated 60 percent of the time (FEIS:136). This means 45,000 acres of annual treatments translates to 27,300 acres where the weed is controlled and would not spread (FEIS:137). Since these treatments focus on new satellite populations, new weeds, newly infested drainages, or the edges of expanding populations where weed spread would become exponential, 27,300 acres of control translates to 273,000 fewer infested acres in 15 years (FEIS:137-138).

Effective control is estimated at 30 percent for the Reference Analysis, where non-herbicide methods are only effective against about one-third of the noxious weeds. Alternative 3 includes effective controls for 116 of the 120 State-listed noxious weeds in Oregon; effectiveness is estimated at 80 percent (FEIS:136). Finally, it is estimated that the 9,300 acres of native vegetation control in rights-of-way, administrative sites, and recreation sites in Alternatives 4 and 5 would incidentally control or avoid spreading undetected noxious weeds on 25 percent of those treatments, or 2,350 acres per year (FEIS:136-137). Applying these calculations to each of the alternatives results in the following 15-year noxious weed spread parameters (Table S-2).

Table S-2. Projected Annual Noxious Weed Spread and Acreage Change for Each Alternative (FEIS:137-138)

Alternative	Gross treatment acres	Treatment effectiveness	Effectively treated acres	Annual spread in 15 years	Total acres infested in 15 years	15- year acre change from No Action	Portion of OR BLM lands infested 15 years
Reference Analysis	42,100	30%	12,630	14%	8,600,000	+2.7 million	1/2
2 (No Action)	45,500	60%	27,300	12%	5,900,000	0	1/3
3	58,400	80%	46,720	7%	4,000,000	-1.9 million	1/4
4 (Proposed Action)	58,400	80%[1]	49,070	6%	3,700,000	-2.2 million	1/5-1/4
5	58,400	80%[1]	49,070	6%	3,700,000	-2.2 million	1/5-1/4

[1] Plus the 2,350 acres incidentally gained from treating native vegetation in rights-of-way, recreations sites, and administrative sites.

Human Health and Safety

Nationally, the BLM has selected 18 herbicides from among hundreds available, picking those needed to accomplish the objectives while having the least risk to humans and the environment (FEIS:58). The additional herbicides that would become available under Alternative 3 are generally less toxic than those currently being used (FEIS:48-49, 94-104, 354-356).

At typical rates, 2,4-D (Alternatives 2 through 5) is identified as having a moderate risk, and bromacil, diuron, and tebuthiuron (Alternatives 4 and 5) are identified as having risks ranging from none to high, depending upon the exposure scenario (FEIS:104, 354-356). Diquat has a low risk in some occupational scenarios, and triclopyr and diquat have a low risk in at least one of the accidental exposure scenarios evaluated (FEIS:102-103). All six of these herbicides have a PEIS Mitigation Measure that limits application to typical rates if feasible (FEIS:59-61).

Nearly all use of bromacil, diuron, and tebuthiuron would be east of the Cascades (FEIS:77), and bromacil and diuron would be used mostly where complete vegetation control is needed, such as for reducing fire hazard in unstaffed communications and other non-public developed sites, or to keep vegetation from growing into pavement edges (FEIS:62). Diquat is only available in Alternative 5 and projected use is low (FEIS:77); it is expected to be used only where one of the other five available aquatic herbicides would not work (FEIS:238).

Summary of the Major Effects of Each Alternative

While there is a potential for adverse resource and human health effects from various elements of the alternatives, the Standard Operating Procedures and PEIS Mitigation Measures would, by design and when coupled with site-specific analysis and project design, reduce risk to the point where significant adverse effects at the programmatic scale would be unlikely (FEIS:93). Even Federally Listed and other Special Status species were deemed not at significant risk because of required pre-project clearances, consultation requirements, and/or additional buffer requirements (FEIS:155-156, 235-238, 245).

The acres estimated to be treated by each herbicide or non-herbicide method under each alternative and displayed in Chapter 3's *Background for Effects Analysis* section on Table 3-3 are integral to the following summary of the major effects of each alternative. Selected parameters for the alternatives relevant to the effects comparison are displayed on Table S-3.

Table S-3. Selected Parameters for Each Alternative Relevant to the Effects Comparison (FEIS:77-78, 80, 138)

Parameter	Reference Analysis	Alt. 2 (No Action)	Alt. 3	Alt. 4 (Proposed Action)	Alt. 5
Number of Herbicides Available	0	4	W: 12 E: 13	W: 13 E: 16	18
Invasive Plant Herbicide Annual Treatment Acres/Lbs	0	16,700 acres 23,010 lbs[2]	30,300 acres 14,830 lbs	30,300 acres 14,830 lbs	30,300 acres 14,830 lbs
Invasive Plant Non-herbicide Annual Treatment Acres	42,100	28,800	28,100	28,100	28,100
Native Plant Herbicide Annual Treatment Acres/Lbs	0	0	250[1]	14,900 acres 19,865 lbs	19,700 acres 23,445 lbs
Rate of Spread at 15 years	14%	12%	7%	6%	6%
Difference in noxious weed infested acres in 15 year compared to the No Action Alternative	Up 2.7 million	0	Down 1.9 million	Down 2.2 million	Down 2.2 million

[1] Pest and disease control in State-identified control areas only.
[2] Noxious weeds only.

Reference Analysis: No Herbicide Use. A no-herbicides strategy would provide effective control for about one-third of the noxious weed species (FEIS:136), potentially precluding effective control around high priority Federally Listed and other Special Status species' sites (FEIS:149, 235-236, 251-252), traditional gathering areas (FEIS:286-287), and high-public use sites where weeds could be picked up and transported (FEIS:132-133, 304). Control activities can be hazardous to those doing the weed treatments (FEIS:344-345), result in soil disturbance that can lead to reinvasion (FEIS:136), put cultural (FEIS:286-287) and soil resources (FEIS:185) at risk and cost more per acre (FEIS:340). Weed spread is predicted to increase under this strategy as the BLM and its neighbors become less successful (FEIS:139). Weeds are projected to infest 2.7 million more acres in 15 years than under the No Action Alternative (Alternative 2) (FEIS:138) – negatively affecting virtually every resource from wildlife to visual quality (Chapter 4). The human environment would suffer because of decreased water quality (FEIS:203-204), decreased wildlife (FEIS:254) and other elements of ecological diversity (FEIS:131-134), decreased access to natural resources (because of barriers like blackberries along streams) (FEIS:305), long-term changes including loss of species or populations (FEIS:151), loss of productivity (FEIS:281), and altered soil chemistry (FEIS:134). Social acceptance of this alternative is likely to be varied based on different views regarding the consequences of herbicide use and invasive weed spread (FEIS:324-327).

Alternative 2: (No Action) – Use 4 Herbicides to Treat Noxious Weeds Only. This alternative would provide effective control for 104 of the 120 State-listed noxious weed species in Oregon, but would not include tools effective on some invasive and noxious weeds including the invasive annual grasses (FEIS:136). Medusahead and cheatgrass occupy 600,000 and 5 million acres respectively (FEIS:271). Wildfire in these grasses would continue to convert remaining sagebrush habitats, decrease range carrying capacity for wildlife, wild horses, and livestock, and increase the risk of wildfire (FEIS:277). The four herbicides available under this alternative generally present some risk to one or more elements of the environment (FEIS:94-99), and many are used at a site for two or three consecutive years because they are not completely effective, compounding adverse environmental effects (FEIS:117). Repeatedly using the same herbicides also increases the likelihood that weeds resistant to that herbicide will take over the site (FEIS:155). Cooperative weed management strategies across ownerships would continue to be problematic since BLM neighbors use a wider variety of other herbicides (FEIS:153, 258). Current 2,4-D use would continue to present a moderate risk to applicators (FEIS:356), non-noxious invasive weeds like cheatgrass cannot be treated with herbicides (FEIS:10, 152, 277), and noxious weeds would continue to spread at 12 percent or 144,000 acres per year on BLM lands in Oregon (FEIS:137). At this rate, noxious weeds are predicted to occupy one-third of all BLM lands in 15 years, causing proportionate losses in habitat (particularly for sage grouse and other sage steppe species), wild horse and livestock grazing, watershed protection, recreational opportunities, and other resource uses (Chapter 4). Social acceptance of this alternative would likely be fairly high (FEIS:324-327). Aerial application would be permitted west and east of the Cascades (FEIS:30).

Alternative 3: Use 12 (W) or 13 (E) Herbicides to Treat Invasive Weeds and Control Pests and Diseases. This alternative would go much of the way toward accomplishing most of the *Purposes*. The availability of eight and nine additional herbicides west and east of the Cascades respectively would provide effective controls for 116 of the 120 noxious weed species (FEIS:136). The weed spread rate would eventually be reduced to 7 percent and infested acres in 15 years would be reduced by 1.9 million acres when compared to the No Action Alternative (Alternative 2) (FEIS:136-138). The BLM would have access to most of the herbicides used by neighbors, counties, and weed control boards, making cooperative projects more feasible and providing an incentive for better control across all ownerships (FEIS:153, 258). Having control tools effective on most noxious weeds in Oregon increases the likelihood that weed control efforts to protect Special Status plant and animal species' habitats and traditional use areas would be successful (FEIS:149, 235-236, 251-252). Although acres treated with herbicides would increase (FEIS:78), pounds of herbicide (FEIS:80) and acres treated with moderate or high risk herbicides (FEIS:48-49) would both go down substantially. Potential adverse effects of noxious weeds to wildlife

(FEIS:255), water (FEIS:204-205), and grazing- and recreation-dependent communities would all be reduced (FEIS:324-327). Air quality would be most adversely affected under this alternative (FEIS:168); the availability of imazapic would make prescribed burning a viable tool for restoring sage steppe habitats (FEIS:83, 255). Many wildfires and prescribed burns in invasive annual grasses simply return to these grasses unless an effective follow-up herbicide treatment and reseeding is used (FEIS:277).

The ability to use herbicides to help control Sudden Oak Death or other State-identified pests and diseases would provide the State and other cooperators a unified, potentially more successful, approach to protecting ecosystems and the nursery industry from this pathogen (FEIS:161-162). The cost per acre of effectively treated noxious weeds would be reduced 20 percent (FEIS:340). The acres treated with herbicides that are a moderate risk to applicators (2,4-D) would be reduced by about 50 percent (FEIS:356). Potential adverse effects to fish and wildlife would be reduced when compared to the No Action Alternative (Alternative 2) Table 2-5). Social acceptance of this alternative is likely to be high (FEIS:324-327). No aerial application would be permitted west of the Cascades (FEIS:30).

Alternative 4: (Proposed Action) – Use 13 (W) or 16 (E) Herbicides to Treat invasive Weeds plus Limited Additional Uses. This alternative is predicted to reduce noxious weed spread to 6 percent per year and result in 2.2 million fewer infested acres in 15 years when compared to the No Action Alternative (Alternative 2) (FEIS:136-138). Herbicide use would reduce native and other non-invasive vegetation control costs in rights-of-way, administrative sites, and recreation sites by nearly $1 million per year (FEIS:342). These treatments would slightly reduce dust and vehicle emissions (FEIS:168) and reduce the likelihood of occupational injuries by reducing mechanical (chainsaw, etc.) treatments on steep wooded slopes when compared to the No Action Alternative (Alternative 2) (FEIS:331, 344-345), but would increase the potential for an herbicide spill or misapplication. They would also preclude the need to separately spray noxious weeds along roads prior to mowing (FEIS:316), and incidentally control 2,350 acres per year of unidentified or low-priority noxious weed populations along roadsides and other areas where there is a high likelihood of their being picked up and moved by vehicles (FEIS:136-137). Alternative 4 would also provide herbicides for about 5,700 acres of habitat improvement for Federally Listed and other Special Status species identified in interagency Conservation Strategies, 65 percent of which would be new opportunities currently deemed impractical without herbicides (FEIS:84).

Of the additional herbicides added by this alternative, bromacil, diuron, and tebuthiuron have the highest risk to humans (FEIS:356), fish (FEIS:234), and for diuron, wildlife (FEIS:256). All but diuron are both pre- and post-emergent (FEIS:59-61), with most applications being restricted to east of the Cascades where they would be used to treat vegetation along roads, pipelines, pump stations, and other non-cropland areas (FEIS:77). Some of the tebuthiuron would be applied to sagebrush at low rates to improve sage grouse habitats (FEIS:256). PEIS Mitigation Measures restrict application to typical rate if feasible, specify avoiding aerial application of bromacil and diuron, and specify increased buffers on water and Federally Listed and other Special Status species' habitats (Appendix 2). Finally, the social acceptance of using any herbicides to treat native vegetation along public roads would likely be less than the social acceptance for Alternative 3, at least west of the Cascades (FEIS:326). No aerial application would be permitted west of the Cascades (FEIS:31).

Alternative 5: **Use 18 Herbicides to Treat Invasive Weeds and Meet Other Vegetation Management Objectives.** This alternative would add 4,900 acres of herbicide use above what is proposed for Alternative 4 (FEIS:78), and would make herbicides available for any treatment objective except livestock forage and timber production (FEIS:32). Most of this increase would be for additional habitat improvement projects east of the Cascades (FEIS:207). It would also make all 18 BLM-approved herbicides available throughout the State, with 4,300 acres of the increase (when compared to Alternative 4) split between 2,4-D and imazapic (FEIS:77-78). Aerial application would be permitted west and east of the Cascades (FEIS:32). Additional habitats would benefit

as not all western juniper and rabbitbrush encroachment expected to be treated under this alternative is within Special Status species' habitats covered by Alternative 4 (Proposed Action) (FEIS:257). Social acceptance of approving herbicide use for a fairly unspecified group of projects may not be high (FEIS:325-327).

Can Any of the Adverse Effects be Mitigated?

The analysis indicates that by using the Standard Operating Procedures and PEIS Mitigation Measures (Appendix 2), the potential for adverse effects is low (FEIS:93). Where the potential for adverse effects is identified, potential mitigation measures are identified and will be considered by the decision-maker (FEIS:50-53).

Many potential mitigation measures are variations on measures already adopted by the PEIS. Some suggest limitation on application rates or methods for several of the herbicides with risks identified in Risk Assessment documents (FEIS:50-53).

What Monitoring is Necessary?

Where the BLM is already using herbicides, formal monitoring is required by various BLM manuals. Environmental Protection Agency and Oregon Department of Agriculture annual reporting is also required, and relevant Endangered Species Act consultation documents typically include monitoring requirements. This monitoring includes implementation monitoring, relying in particular on Pesticide Use Proposal documents for every application, followed by Pesticide Application Records filled out within 24 hours of each application. Both documents have sufficient detail to determine if all planning and application requirements are met. The BLM is currently implementing a National Invasive Species Information Management System (NISIMS), which will provide tools for data collection and long-term Bureau-wide analysis and statistics for invasive plant infestations and treatments (Appendix 3).

Effectiveness monitoring includes visiting every application site again after treatment, and maintaining weed maps. Biological control agent releases are also monitored, and monitoring is required of any BLM activity judged to have a moderate or high likelihood of spreading noxious weeds (Appendix 3).

In addition to existing monitoring, the selection of one of the action alternatives could create a changed circumstance or condition (e.g. a concern over a potential environmental effect) that would suggest a need for additional monitoring. Those circumstances might include the use of the newly adopted herbicides with different ecological risks than the four herbicides currently used, more acres being treated, more acres being treated in proximity to people or susceptible environmental resources, more use of broadcast spraying with its potential for drift, or simply increasing the use of "new" herbicides above EIS-estimated levels as weed specialists become more familiar with their advantages. To respond to this potential need, the monitoring appendix suggests a five-year examination of weed spread to see if the selected alternative is making the expected difference, and monitoring of the application of herbicides identified in the analysis as high risk to a particular resource in a particular setting (Appendix 3).

These potential new monitoring needs are identified as optional in the Monitoring appendix (Appendix 3), and the decision-maker will identify selected monitoring when the Record of Decision is signed (FEIS:12).

Which Alternative is Preferred?

Alternative 4, the Proposed Action, is the Preferred Alternative. It meets the *Need*, and meets all eight *Purposes* to some degree. Like Alternative 3, the additional, generally newer, herbicides are more target-specific, can be used in lower doses, and are generally less likely to adversely affect non-target plants and animals than the four herbicides currently in use. The additional herbicides would also be effective against a wider array of invasive plants, including the invasive annual grasses medusahead and cheatgrass, as well as other weeds for which there are currently no effective controls available to the BLM in Oregon (FEIS:50).

The ability to treat vegetation encroaching on rights-of-ways, recreation sites, and administrative sites with herbicides under Alternative 4 would reduce the cost for these regular maintenance treatments by about $1 million per year, would reduce ground disturbance that can encourage invasive plants, and would eradicate small undetected populations just getting established along roads and other public use areas. Alternative 4 would also allow the use of herbicides for improving habitat for Federally Listed and other Special Status species like sage grouse (FEIS:50).

Alternative 5 would have the same benefits as Alternative 4, and it would make herbicides available for the full range of resource management activities except livestock forage and timber production. Alternative 5 is estimated to increase herbicide use by ten percent from Alternative 4, and most of this increase would be expected to go toward additional habitat improvement projects not practical without herbicides. However, there is a lower need for herbicides for these activities, and the alternative departs from the narrow program clarity and focus requested by many of the scoping comments (FEIS:50).

Table S-4. Herbicides Available Under Each Alternative (FEIS:59-61)

Herbicide	Characteristics and Target Vegetation	Reference Analysis	Alt 2 No Action	Alt 3	Alt 4 Proposed Action	Alt 5
Herbicides Currently Approved for use on BLM Lands in Oregon (for noxious weed control only)						
2, 4-D	Selective; common targets include annual and biennial broadleaf weeds, kochia, whitetop, perennial pepperweed, Russian thistle and knapweed, sagebrush, and rabbitbrush.		√	√	√	√
Dicamba	Selective; common targets include knapweeds, kochia, and thistles.		√	√	√	√
Glyphosate	Non-selective; common targets include grasses (including Italian ryegrass), sedges, broadleaf weeds, and woody shrubs.		√	√	√	√
Picloram	Selective; common targets include perennial and woody species, knapweeds, starthistle, thistle, bindweed, leafy spurge, rabbitbrush, rush skeletonweed, and poison oak.		√	√	√	√
Additional Herbicides Proposed for Use in One or More of the Action Alternatives						
Bromacil	Non-selective; common targets include annual grasses and broadleaf weeds, cheatgrass, puncturevine, ragweed, wild oat, dandelion, quackgrass, and wild carrot.				E	√

Herbicide	Characteristics and Target Vegetation	**Reference Analysis**	**Alt 2** No Action	**Alt 3**	**Alt 4** Proposed Action	**Alt 5**
Chlorsulfuron	Selective; common targets include thistles, wild carrot, giant horsetail, poison hemlock, Russian knapweed, marestail, perennial pepperweed, puncturevine, tansy ragwort, common tansy, common teasel, dalmation toadflax, yellow toadflax, whitetop, and dyers woad			E	E	√
Clopyralid	Selective; common targets include thistles, common burdock, knapweeds, yellow starthistle, oxeye daisy, hawkweeds, prickly lettuce, dandelion, cutleaf teasel, kudzu, and buffalobur.			√	√	√
Diflufenzopyr + Dicamba	Selective; common targets include knapweeds, kochia, and thistles.					√
Diquat	Non-selective; common targets include giant salvinia, hydrilla, and watermilfoils.					√
Diuron	Selective; common targets include annual grasses (including bluegrass) and broadleaf weeds, lambsquarters, kochia, and Russian thistle.				√	√
Fluridone	Selective; common targets include hydrilla and watermilfoils.			√	√	√
Hexazinone	Selective; common targets include annual and perennial grasses and broadleaf weeds, brush, and trees.			√	√	√
Imazapic	Selective; common targets include cheatgrass, leafy spurge, medusahead, whitetop, dalmation toadflax and russian knapweed.			√	√	√
Imazapyr	Non-selective; common targets include annual and perennial broadleaf weeds, brush, trees, saltcedar, Russian olive, and tanoak.			√	√	√
Metsulfuron methyl	Selective; common targets include whitetop, perennial pepperweed and other mustards, and biennial thistles.			√	√	√
Sulfometuron methyl	Non-selective; common targets include cheatgrass, annual and perennial mustards, and medusahead.			√	√	√
Tebuthiuron	Selective; common targets include sagebrush (thinning).				E	√
Triclopyr	Selective; common targets include saltcedar, purple loosestrife, Canada thistle, tanoak, and Himalayan blackberry.			√	√	√

E - Only allowed in BLM Districts east of the Cascades