

# Post-Fire Cheatgrass Control using Aerial Spraying

**Wilson/101 Ranch**

*Draft Environmental Assessment*



**U.S. Department of Energy - Bonneville Power Administration**

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# Chapter 1. Purpose and Need

## 1.1 Introduction

This draft Environmental Assessment (EA) is being prepared by the Bonneville Power Administration (BPA) to evaluate the effects of aerial application of soil inoculant<sup>1</sup> and herbicide<sup>2</sup> to control cheatgrass spread in the wake of the 2012 Brown's Gulch wildfire. BPA proposes to fund the Shoshone Paiute Indian Tribe (ShoPai) to apply these compounds using helicopter or fixed wing aircraft for spraying approximately 139 acres on Parcel 1 of the Wilson/101 Ranch (Ranch) in Elko County, south of Mountain City, Nevada.

BPA has prepared this draft EA pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4321 et seq.) and its implementing regulations which require Federal agencies to assess the impacts that their actions may have on the environment and make this impact analysis available to the public.

## 1.2 Need

BPA needs to respond to the ShoPai's request to fund aerial spraying for cheatgrass control.

## 1.3 Purpose

In meeting the underlying need, BPA seeks to achieve the following purposes:

- Support efforts to mitigate for the effects of development and operation of the Federal Columbia River Power System (FCRPS) on fish and wildlife in the mainstem Columbia River and its tributaries, under the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act) (16 U.S.C. 839b(h)(10)(A)) in a manner consistent with the Northwest Power and Conservation Council's Fish and Wildlife Program.
- Assist in carrying out commitments under the 2009 Memorandum of Agreement between the Shoshone-Paiute Tribes of the Duck Valley Reservation and the BPA and to assist BPA in fulfilling its mitigation obligation associated with the construction of, and inundation created by, the Anderson Ranch and Black Canyon dams and reservoirs of the Federal Columbia River Power System in southern Idaho.
- Minimize adverse effects to the human environment, avoid jeopardizing the continued existence of Endangered Species Act-listed species and avoid adverse modification or destruction of designated critical habitat.

## 1.4 Background

### 1.4.1 Bonneville Power Administration

BPA is a federal power marketing agency within the United States Department of Energy. BPA's operations are governed by several statutes, including the Northwest Power Act. The Act directs

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<sup>1</sup> MB-906 soil inoculant manufactured by BioWest Ag. Solutions

<sup>2</sup> Plateau herbicide manufactured by BASF

BPA to protect, mitigate, and enhance fish and wildlife affected by the development and operation of federal hydroelectric facilities on the Columbia River and its tributaries.

To assist in accomplishing this, the Act requires BPA to fund fish and wildlife protection, mitigation, and enhancement actions consistent with the Columbia River Basin Fish and Wildlife Program developed by the Northwest Power and Conservation Council (Council). Under this Program, the Council makes recommendations to BPA concerning which fish and wildlife projects to fund. The Council's recommendations include mitigation associated with wildlife habitat losses related to the Federal Columbia River Power System dams in southern Idaho of Anderson Ranch and Black Canyon dams under the Memorandum of Agreement between the Shoshone-Paiute Tribes of the Duck Valley Reservation and the Bonneville Power Administration..

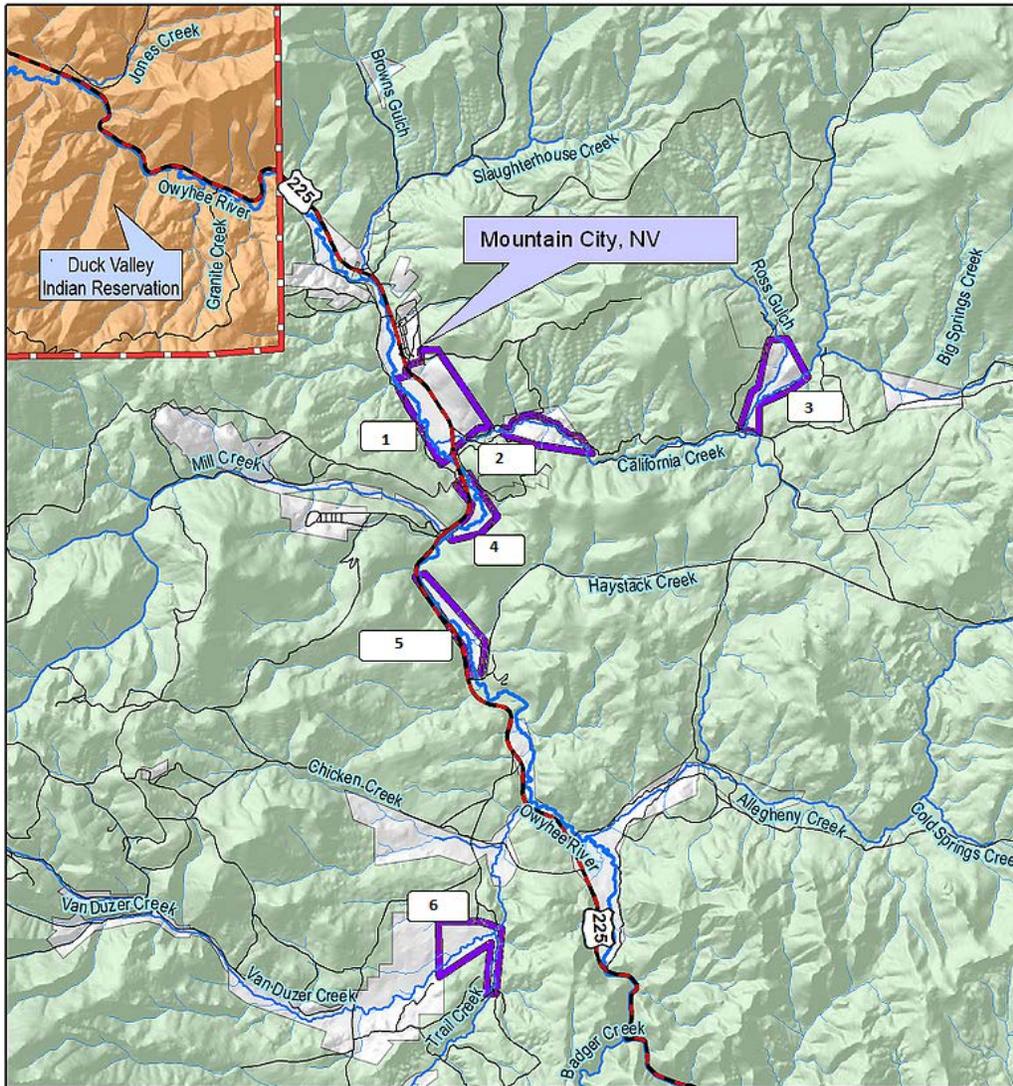
#### **1.4.2 Location: Wilson/101 Ranch**

Weed treatment actions will be applied to 139 acres of burned hillsides on Parcel 1 of the Wilson/101 Ranch in northeastern Elko County, Nevada (see Figure 1).

The Ranch is a 938-acre ranch located on the East Fork Owyhee River in Mountain City, Nevada. The Ranch was purchased by the ShoPai with funding from BPA in November 2009. The property was purchased for BPA to permanently protect, mitigate and enhance fish and wildlife habitat to help address the construction and inundation impacts of the Federal Columbia River Power System hydroelectric projects in southern Idaho, including Anderson Ranch and Black Canyon dams.

As shown in Figure 1, the Ranch consists of six parcels. Habitats present on the Ranch include sagebrush steppe, deciduous scrub-shrub wetland, riverine, and agriculture/pasture.

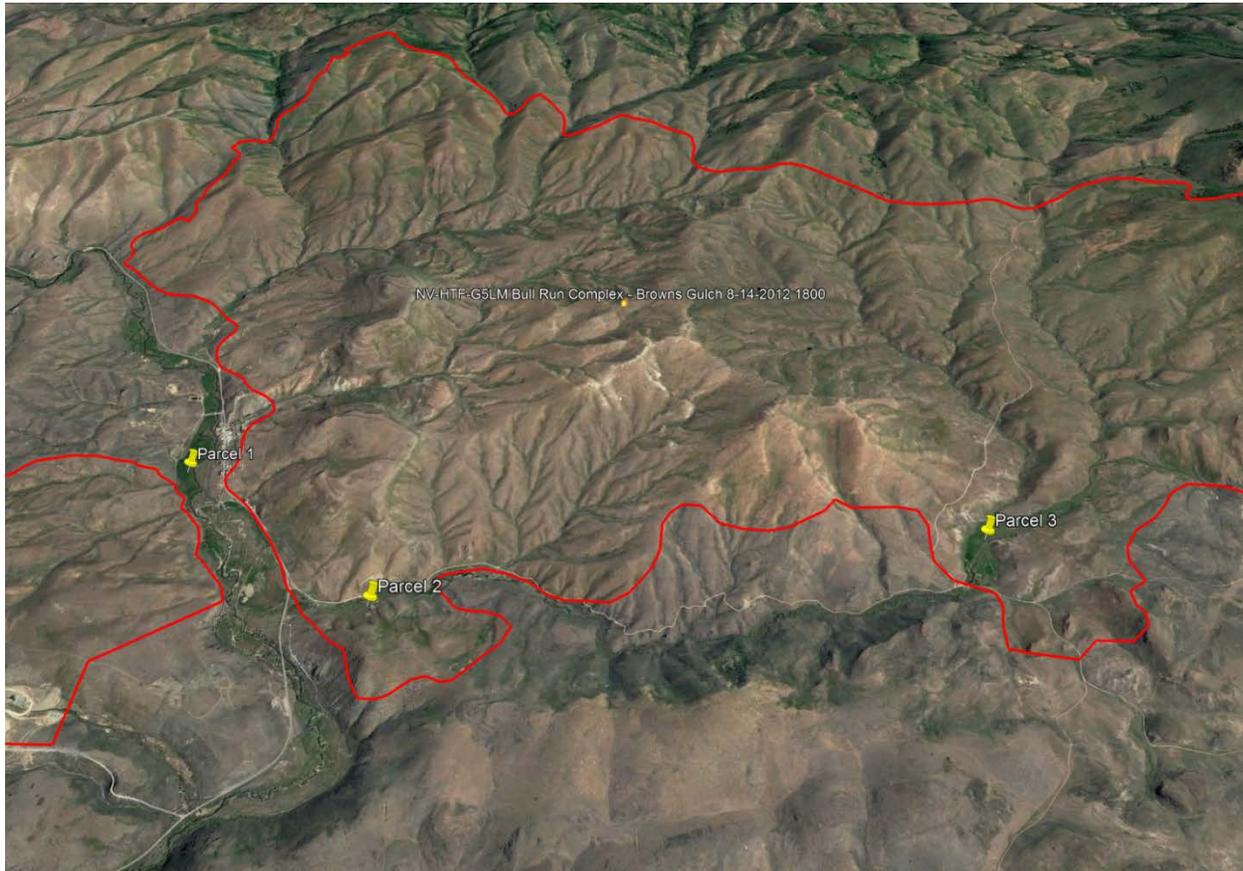
**Figure 1 Location of Wilson/101 Ranch (six parcels)**



### **1.4.3 Brown's Gulch Fire**

The Brown's Gulch fire started in August 2012 from multiple lightning strikes over a series of days, ultimately burning over 13,000 acres (Figure 2). The fire swept through Parcels 1, 2, and 3 of the Ranch with the most extensive habitat impacts occurring on Parcels 1 and 3 (Figure 2). Approximately 165 of 175 acres of sagebrush steppe habitat were burned.

**Figure 2 Brown's Gulch fire perimeter (red) and Wilson/101 Ranch parcel locations**



#### **1.4.4 Sagebrush-Steppe, Cheatgrass, and Wildfire**

The goal of this cheatgrass-control proposal is to prevent conversion of the native sagebrush-steppe plant community in the hills surrounding the Ranch to an invasive cheatgrass-sagebrush plant community given the effects of the 2012 Brown's Gulch wildfire. The conversion to cheatgrass would displace native plants to which native wildlife are adapted and dependent; and it would modify the natural wildfire regime to one that is more frequent, more intense, and more selective against sagebrush and other native woody shrubs. Such conversion is common in these habitats where the bare ground and nutrient flush caused by wildfire promotes high germination rates of cheatgrass already present (Miller et al. 2011). Cheatgrass seed is abundant in the soils on the hills surrounding the Ranch and this plant community conversion is occurring on the Ranch and would continue without control action (M. Montgomery personal communication November 2019). Aerial spraying is necessary to effectively treat the large acreage affected over multiple years

### **1.5 Public Involvement**

To help determine issues to be addressed in the EA, BPA conducted public outreach. BPA mailed letters on December 28, 2018, to landowners, tribes, government agencies, and other potentially affected or concerned citizens and interest groups. The public letter provided information about the Proposed Action and EA scoping period, requested comments on issues to be addressed in the EA, and described how to comment (mail, fax, telephone, and the BPA website). The public letter was posted on a project website established by BPA to provide information about the project and

the EA process. The public comment period began on December 28, 2018, and BPA accepted comments on the program from the public until January 28, 2019.

One comment was received during the scoping period which questioned what treating a cheatgrass infestation “has to do with mitigating the impacts of the [Federal Columbia River Power System] on fish and wildlife”. As discussed in Section 1.3, this project is proposed as mitigation for the losses arising from the development and operation of the Federal Columbia River Power System damson fish and wildlife habitat and is off-site mitigation for these impacts.<sup>3</sup>.

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<sup>3</sup> See 16 USC 839b(h)(8)(A).

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## Chapter 2. Proposed Action and the No Action Alternative

### 2.1 Proposed Action

Under the Proposed Action, BPA would fund the ShoPai to aeri ally spray approximately 139 acres of Parcel 1 for cheatgrass control in the area shown in Figures 3 and 4.

The proposed treatment consists of ground-based and aerial application of Plateau, an EPA-registered herbicide known to be effective on cheatgrass (see Appendix B), in combination with MB 906, a bacterial soil inoculant. Plateau would be applied at a rate of 6 ounces per acre (up to a maximum of 0.19 pounds of active ingredient per acre per year) in combination with MB 906 at a rate of 163 ounces per acre (up to a maximum of 1 gallon of active ingredient per acre). Herbicide would be applied utilizing water as a carrier, with no less than an average of 5 gallons per acre of tank mix applied for Plateau and no less than 30 gallons per acre of MB 906. The treatment would be applied in the spring and fall of 2019 and repeated twice annually (spring and fall) in the two subsequent years for a total of three years (six applications total) if necessary to achieve cheatgrass control objectives.

**Figure 3 Aerial view of treatment area (within yellow outline), looking east**



**Figure 4 Area of aerial spray herbicide application**



The areas visible as holes and buffers within the external boundaries of the spray area in Figure 5 are those with standing or flowing water. The areas indicate 150-ft. buffers around the springs and intermittent/ephemeral streams that would, or potentially could, have water during the spray period. These areas would not be treated.

Plateau is a well-known, EPA-registered, formulation of Imazapic<sup>4</sup> that has been in use for decades. It is a selective herbicide for both pre and post-emergent control of certain annual and perennial grasses (including cheatgrass) and some broadleaf weeds. It has been useful for weed control in natural areas where the goal is to establish native warm-season prairie grasses and certain legumes (Tu *et al.* 2001). It is relatively non-toxic to terrestrial and aquatic mammals, birds, and amphibians; has an average half-life<sup>5</sup> of 120 days in soil; and is rapidly degraded (one to two day half-life) by sunlight in aqueous solution (Tu *et al.* 2001).

<sup>4</sup> Chemical formula: (±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1Himidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid

<sup>5</sup> A half-life is the amount of time it takes for half of a substance or entity to undergo some specified process. In the case of pesticides, it concerns the loss of its effectiveness or toxicity.

MB 906 is the trade name of a soil inoculant composed of a strain of the naturally-occurring soil-borne bacteria, *Pseudomonas fluorescens*. It was developed by the U.S. Department of Agriculture to target specific weedy grasses, including cheatgrass. This bacterium is present in native soils, but not naturally in amounts adequate to suppress cheatgrass infestations. It inhibits root growth by binding to the outside of root cells. It does not kill cheatgrass but lowers its competitiveness so other plants can crowd it out. It also inhibits seed growth in seeds already in the soil that can germinate years later. MB 906 is currently undergoing review by the EPA to be registered as a bio-herbicide and is anticipated to be available as such prior to this proposed application. It is currently available on the market as a soil inoculant.

The treatment would be applied in the spring and fall of 2019 using backpack sprayers and fixed wing or rotary-winged aircraft. It may be repeated in the spring and fall of the two subsequent years for a total of three years (six applications). The application method would be determined by terrain, feasibility, and anticipated success of application. Aerial application would be patterned and flown to secure as uniform an application of herbicide as possible. A Differentially Correctable Global Positioning System (DGPS) would be utilized to minimize spraying of non-targeted areas and for tracking and data collection to ensure and monitor application within the designated treatment area.

Staging of fixed-wing or rotary aircraft would be at a suitable, previously established, airstrip determined under contract between the ShoPai and the contract applicator. Fueling of aircraft and refilling of spray tanks would occur only at this staging area.

## 2.2 No Action Alternative

Under the No Action Alternative, BPA would not fund the ShoPai to aerially spray parcels of the Wilson/101 Ranch for cheatgrass control. For the purposes of this analysis, the No Action Alternative presumes the ShoPai would not aerially spray using other funding sources.

## 2.3 Mitigation Measures

The following measures are proposed to reduce the potential effects of the Proposed Action.

**Table 1 Mitigation Measures**

Resource	Mitigation Measure
Vegetation	Herbicide shall be applied within the designated area only.
	A Differentially Correctable Global Positioning System (DGPS) shall be utilized for tracking of herbicide application and data collection. The system shall be sufficiently sensitive to provide immediate deviation indications, and must be capable of determining a differentially corrected location with an error of no more than one to two meters in the horizontal plane. The guidance system shall be capable of updating current position at a rate of a minimum of one time per second with differential correction covering the complete operational area, and the signal being accurately recorded at least 90% of the operational time.
	Aerial applications shall occur along evenly-spaced, straight and regular paths of flight.

	Wind velocities for aerial chemical applications of herbicides must be 6 mph or less in all instances.
<b>Geology and Soils</b>	Prepare a spill contingency plan in advance of treatment.
	Follow approved procedures for cleanup of accidental spills as defined by herbicide Safety Data Sheets.
<b>Water</b>	Herbicide shall not be applied within 150 feet of water sources (troughs, ponds, open water).
	Provide a spill kit capable of containing and preventing release of chemical into adjacent water sources. Have it readily available during mixing and loading operations.
	Herbicide shall not be applied if there is rain, snow, or fog.
<b>Public Health and Safety</b>	Follow proper herbicide handling, transport, storage, and disposal methods and precautions as defined by herbicide Safety Data Sheets.
	Ensure proper exposure control and personal protection is provided as defined by herbicide Safety Data Sheets.
	A copy of the Plateau/Imazapic MSDS shall be available at all work sites.
	All vegetation control measures shall comply with all Tribal, Federal, state, and local regulations.
	Apply the most stringent interpretation of specification, law, regulation, or label direction if a contradiction among them is found concerning application of the proposed chemicals.
	The contractor must hold a current Nevada Commercial Applicator License.
	Pilots shall meet certification requirements of the Federal Aviation Administration Regulations for this type of work.
	Fully comply with product label directions and advisory statements.
	Notify adjacent landowners prior to treatment.

## Chapter 3. Affected Environment and Environmental Consequences

This chapter describes the existing environmental resources that could be affected by the Proposed Action and the potential impacts the Proposed Action would have on those resources.

The impact levels are characterized as high, moderate, low, or no impact. The impact levels are based on the analysis provided, which incorporates the considerations of context and intensity defined in the Council of Environmental Quality Regulations (40 Code of Federal Regulations [CFR] 1508.27). Mitigation measures that would help reduce or avoid impacts are identified in Section 2.3.

Cumulative impacts are also discussed, which are those impacts that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or individual performs them. Cumulative impacts could result from individually minor but collectively significant actions taking place over a period of time.

The area of focus of this analysis is on the Ranch and adjacent landowners with hand and aerial application of soil inoculant and herbicide for cheatgrass control. There are no ground-disturbing actions (such as digging, bull-dozing, plowing, or leveling) associated with the Proposed Action. The actions assessed in the sections below relate to the presence of humans and low-flying aircraft operating on and over the site, and the introduction of the herbicide and inoculant into the environment.

### 3.1 Vegetation

#### 3.1.1 Affected Environment

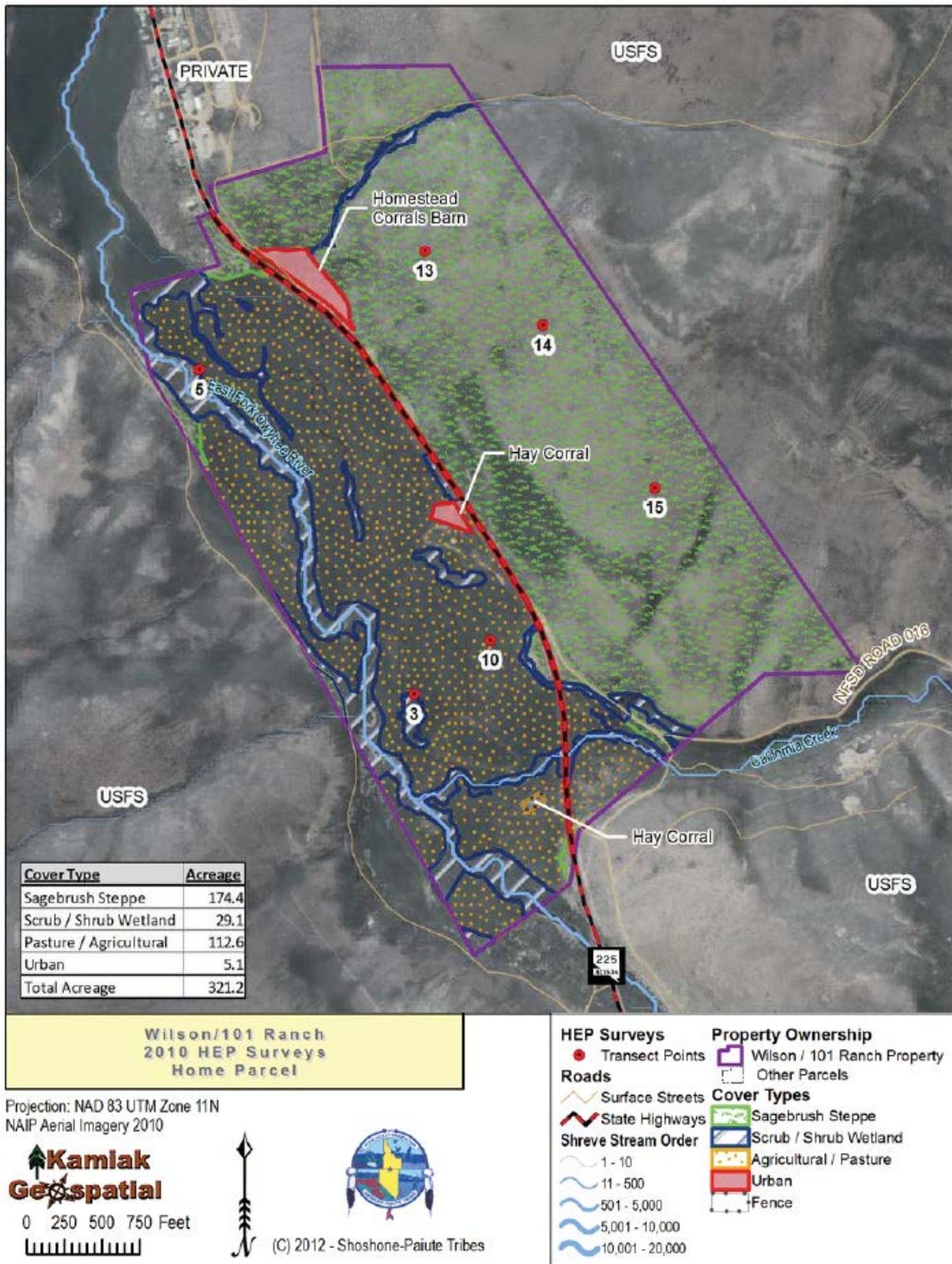
##### 3.1.1.1 Vegetation on Wilson Ranch Parcel 1

Three vegetative types are found on the Ranch: sagebrush steppe, deciduous scrub-shrub wetland, and agriculture/pasture (wet meadow). The 321-acre Parcel 1 supports 174.4 acres of sage-brush steppe, 29.1 acres of deciduous scrub-shrub, 112.6 acres of agriculture/pasture, and 4.9 acres in buildings and equipment storage. (see Figure 6, from data collected in 2010). No ESA-listed vegetation or associated critical habitat occurs within the area. The Proposed Action area is entirely within the sagebrush steppe habitats on Parcel 1 shown in Figure 5.

Sagebrush steppe is characterized by the dominance of big sagebrush (*Artemisia* spp.). Other shrubs include antelope bitterbrush (*Purshia tridentata*), green rabbitbrush (*Chrysothamnus viscidiflorus*) grey rabbitbrush (*Chrysothamnus nauseosus*) and currant (*Ribes* spp.). The understory is composed of a mix of perennial grasses such as Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa sandbergii*) and basin wild rye (*Elymus cinereus*). Forb species present include: buckwheat species (*Eriogonum* spp.), lupines (*Lupinus* spp.), arrow-leaf balsamroot (*Balsamorhiza sagittata*), western yarrow (*Achillea millefolium*), Indian paintbrush (*Castilleja* spp.) and a variety of desert parsley species (*Lomatium* spp.).

Essentially the entire sagebrush-steppe habitat on Parcel 1 was burned over in the 2012 Brown's Gulch fire. The affected acres were reseeded and have not been grazed since the reseeding. Some of the seeded species established, but cheatgrass established as well, increasing the chance of repeated fire. The site is now dominated by cheatgrass and resembles the vegetative conditions shown in Figure 6.

Figure 5 Parcel 1 vegetative cover types



### 3.1.1.2 Cheatgrass

Cheatgrass (*Bromus tectorum*), an annual plant native to Eurasia, is an aggressive, invasive weed, originally introduced into North America through soils brought by ocean-going vessels. It is now a dominant species and a significant component of rangeland vegetation throughout the west. In the eastern U.S., cheatgrass is usually found along roadsides and disturbed sites, but in the west, it is highly abundant, having invaded disturbed and undisturbed grassland communities to become the dominant species in many lower-elevation areas.

As with most non-native species, cheatgrass lacks biological predators in North America, providing it an ecological advantage over native species in competition for nutrients, sunlight, and water. Its early-season growth habits provide an additional competitive advantage by allowing it to grow tall and abundant before native species emerge. During years of high precipitation, this grass can produce more than 10,000 plants per square yard.

It is notorious for its ability to thrive in areas disturbed by construction, fire, floods, poor grazing practices, and intense recreation, but, as previously stated, would also invade undisturbed areas. It is difficult to control once becoming established. As it begins to dominate an area, it displaces native plants, adversely altering native plant communities and impacting wildlife. Its destructive habits have placed it on most western states' noxious weed lists.

**Figure 6 Plant community dominated by cheatgrass near Parcel 1**



Cheatgrass turns brown and dies by early summer leaving behind thick, continuous dry fuels creating extreme wildfire hazards. Its highly-flammable, and densely-growing populations provide abundant fine-textured fuels that increase fire intensity and shorten fire-return intervals<sup>6</sup>. A typical cheatgrass fire on flat terrain with wind speeds of 20 miles per hour may generate up to eight-foot flame lengths and travel more than four miles per hour. Cheatgrass fires are dangerous because

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<sup>6</sup> A “fire-return interval” is the time, usually in years, between naturally-caused wildfires.

they move quickly, and the grass serves as a ladder fuel<sup>7</sup> igniting larger and more volatile vegetation.

Native plant communities are often dramatically altered when fire strikes cheatgrass-dominated landscapes. Erosion, changes in soil properties, declines in agricultural production, and damage to water resources are common results.

Cheatgrass can be controlled mechanically, biologically, chemically, or by applying fire under controlled conditions. The best results usually come from a combination of these techniques with follow-up treatments over multiple years since cheatgrass seed may survive in soils for multiple seasons.

### **3.1.2 Environmental Effects**

#### **3.1.2.1 Proposed Action**

The primary purpose of the Proposed Action is to effectively adversely affect a specific target plant - cheatgrass, and the chosen herbicide, Imazapic, is an effective plant killer. For this evaluation of effects on vegetation, the primary potential impacts would be to non-target terrestrial plants associated with the application of Imazapic and any unintended direct deposition or spray drift. In addition, Imazapic may be transported off-site by percolation, runoff, or by wind erosion of soil and contact with other plant species thereby.

Unintended direct spray would result in an exposure level equivalent to the application rate, and it is plausible that some non-target plants immediately adjacent to the application site could be sprayed directly under aerial applications. It is much less likely that such unintended direct spray would result during backpack spraying. Imazapic is a very effective herbicide and unintended direct spray at the full application rate would result in mortality to most plants sprayed.

Indirect spray, through off-site spray drift would be dependent on spray height above the ground, droplet size, weather conditions, and other lesser variables. Droplet size can be affected by various factors including nozzle size and plane speed. In many aerial spray scenarios, droplets are generally less than 100 microns in diameter and may be as small as 50. Smaller droplets can drift farther. Off-site drift has been tested extensively using these variables, with results showing that in general, high density droplets of herbicides from aerial spraying at 25 meters above the ground in wind less than 3 mph would generally fall within 20 meters of the plane's flight path, but low density droplets can drift up to 100 meters away (Montana State University 2018). Since droplet size and density determine the application rate, the unintended application rate from spray drift would decrease with increased distance of drift from the flight path. The resulting effect on plants would also decrease with distance of drift from the flight path. Mitigation measures would require strict adherence to product label application instructions which dictate how the product would be aurally applied to minimize off-site drift, and following those instructions, as required, would minimize adverse effect to off-site vegetation.

Unintended direct exposures of non-target plant species may also occur through the use of contaminated ambient water for irrigation. Although there are no studies in the literature addressing the impact of Imazapic in contaminated irrigation water, the effects of such exposure scenarios on non-target vegetation have been observed with other herbicides (e.g., Bhandary et al. 1991). Imazapic is relatively mobile in the environment; thus, some contamination of irrigation water is possible. Durkin and Follansbee (2004) modeled such an occurrence using parameters

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<sup>7</sup> A ladder fuel is one that provides fire an opportunity to climb in height or increase in intensity to ignite higher and/or larger fuels.

comparable to those of both the Proposed Action and Parcel 1. Their conclusions showed that the functional application rate at the crops watered by the irrigation ditch following dilution from overland migration to the ditch and from water in the ditch would be inconsequential, and would have much less effect than off-site aerial drift and runoff (Durkin and Follansbee 2004).

Damage to terrestrial plants from runoff is possible in some areas but is not likely to be substantial in the treatment area. Some riparian and aquatic plants could be affected, under conditions in which runoff is favored (e.g., poorly-drained clay soils and relatively high rainfall rates) but this is not such an area. Rainfall, and thus runoff events, on the treatment area are infrequent, and the soils are well-drained. As discussed under Section 3.2, Geology and Soils, below, when erosion events do occur, runoff and erosion can be rapid and off-site contamination problematic, but the mitigation measures in Section 2.3 prohibit application during such rain events.

There is little concern with MB906's effects on vegetation. It is found naturally in soil and water with some strains actually providing protection for the roots of some plant species against parasitic fungi and some nematodes (Haas and Keel 2003). The strain of MB-906 used in this proposal has been developed for its root-growth-inhibiting action specific to cheatgrass and other weedy grass species.

The effects of the Proposed Action on non-target vegetation would be low to moderate.

### **3.1.2.2 No Action Alternative**

There would be no herbicide or inoculant effects to non-target plant species from the No Action Alternative, since no applications would occur. There would, however, be continued growth and spread of cheatgrass on burned-over native sagebrush-steppe habitat with continued loss of native species on the acres proposed for treatment and increasing dominance of cheatgrass over native species. The effects of the No Action Alternative on non-target vegetation would be moderate.

### **3.1.3 Cumulative Effects**

Contributors to cumulative impacts to vegetation over time include historical grazing, agriculture, fire suppression (which created the conditions for wide-spread high-intensity, vegetation community-replacement wildfires), climate change, and the introduction of non-native species such as cheatgrass. Together, these impacts have combined to degrade native riparian and upland plant communities in, and surrounding, the Ranch, culminating in the condition being treated by this action: the loss of the native sagebrush-steppe plant community and site conversion to an invasive cheatgrass-dominated vegetative condition.

The natural-vegetation site-potential, however, remains suitable for supporting the historical sagebrush-steppe plant community. The Proposed Action would not contribute cumulatively to the trend toward native-plant community loss, but rather would retard that trend and begin the process of restoration.

The cumulative effect of the Proposed Action on vegetation would be low.

## **3.2 Geology and Soils**

### **3.2.1 Affected Environment**

The Ranch is within the Columbia River Basin and considered part of the Northern Basin and Range Ecoregion (Bryce et. al 2003). This ecoregion is characterized by dissected lava plains, rocky uplands, alluvial fans, and scattered mountain ranges. The Ranch is located within the Semi-Arid Uplands of this ecoregion, which is characterized by low mountains, hills, volcanic cones, and

buttes. Elevations vary from 5,600 feet at Parcel 1 to 6,180 feet at the Parcel 3. All parcels contain bottomlands adjacent to a creek or river, many of which have historically been utilized to produce hay. Most of the upland areas are on moderate to steep slopes that support sagebrush-steppe habitat.

The hillside to be treated supports granite-derived soils that are moderately deep and well-drained, with a moderately coarse textured and gravelly surface layer (Hahn 1986). Runoff from these soils is very rapid, and the hazard of erosion is high (Hahn 1986).

### **3.2.2 Environmental Effects on Geology and Soils**

#### **3.2.2.1 Proposed Action**

Based on field dissipation studies, Imazapic is moderately persistent in soils with a half-life of 31 to 233 days depending upon soil type and climatic conditions (American Cyanamid 2000). It is described as being “moderately persistent in soils” and “has not been found to move laterally with surface water” (Tu et al. 2001). It has limited horizontal mobility in soil, and generally moves just 6 to 12 inches, although it can leach to depths of 18 inches in sandy soils (R. Lym, pers. comm. as cited in Tu et al. 2001). Imazapic does not volatilize from the soil surface and its degradation by sunlight on soils is negligible (half-life of 150 days; American Cyanamid 2000). The major route of Imazapic loss from soil is through microbial degradation (WSSA 1994).

The soils, however, are erosive, and Imazapic bound to these soils could be transported off-site in high run-off events. Mitigation measures, however, call for applications only during dry periods, so the risk of such runoff is low.

At this treatment site, with its low rainfall, well drained soils, and Imazapic’s limited mobility in soils, the effects of the application would be localized and short term (less than one year per application).

Effects of the Proposed Action on soils and geology would be low.

#### **3.2.2.2 No Action Alternative**

There would be no herbicide or inoculant impact to geology and soils from the No Action Alternative, since no applications would occur.

### **3.2.3 Cumulative Effects**

Contributors to cumulative impacts to geology and soils over time include historical mining, grazing, agriculture, and fire suppression (which created the conditions for wide-spread high-severity wildfires that increase short-term accelerated runoff potential in intensively burned-over areas). While mining and agricultural actions (cultivation and restructuring of hydrological patterns in the lowlands) may have impacted geology and soils in specific locations, cumulatively these actions have had minimal impact to geology and soils across the broader upland landscape. Grazing (vegetation change, trailing, and trampling) and high intensity wildfire (loss of plant cover and loss of soils in high-intensity fire events) are the primary factors cumulatively affecting geology and soils in the upland landscapes affected by the Proposed Action. These both act to increase the potential for soil erosion from both wind and water across the landscape.

The Proposed Action, however, does not contribute cumulatively to this increased erosion potential. It does not include any ground-disturbing activities, nor contribute to adverse loss of native vegetation. Rather, it contributes to the restoration of native plant communities that evolved with the soils on these landscapes which, under historical fire and weather regimes, maintained a dynamic stability to those soils.

The cumulative effect of the Proposed Action on soils and geology would be low.

### 3.3 Water

#### 3.3.1 Affected Environment

The Wilson/101 Ranch is located within the Owyhee Subbasin of the Middle Snake Province of the Columbia River Basin. The subbasin is comprised of seven watersheds with all six Wilson/101 Ranch parcels, including Parcel 1, located within the Upper Owyhee watershed. This watershed is comprised of the East Fork Owyhee River and its tributaries from the headwaters in northern Nevada to the confluence with the South Fork Owyhee River approximately 10 miles east of the Idaho/Oregon border.

Flows in the East Fork Owyhee River drainage vary seasonally, and between years, with most surface runoff being the result of high elevation snowmelt and rainfall with peak runoff occurring during spring. The area to be treated varies between 100 and 200 feet higher in elevation than the East Fork Owyhee River with the closest point being over 600' away.

The treatment area encompasses two ephemeral draws; one draining into the area near the ranch buildings in the northwestern portion of the spray area, and one draining the southern end. The northern draw flows only during the spring and is excluded from the treatment area as shown in Figure 5. The southern draw only flows during an active rainfall event and is included in the area to be sprayed, since no flow would be occurring during active spraying.

There are three springs located above the ranch buildings in the northwest corner of the treatment area, two of which are immediately above those buildings. All are near the identified treatment area, though they are to be excluded from spraying as shown in Figure 5. The two lowest springs have been developed for domestic and stock-water uses (with a water right dating from 1898) and have a buried pipeline running from them to the ranch house, bunkhouse, and barn. The upper spring provides water to a large stock-water tank located near it in the draw.

Three other springs are located in the mid and southern portion of the treatment area and have been excluded from treatment as shown in Figure 5 (circular exclusion areas).

Water quality is poor in the East Fork Owyhee River, according to the Nevada Department of Environmental Protection's "Combined Water Quality Integrated Report" for state waters (NDEP 2012). As Table 2 indicates, the East Fork Owyhee River between Mill Creek and the Reservation boundary (which runs through Parcel 1) does not meet standards for a number of criteria, and is listed as impaired for two of the river's identified beneficial uses.

**Table 2 NDEP Water Quality Assessment (2008-2010 Combined)**

Stream Segment	Does Not Meet Water Quality Standards for:						Beneficial Uses Not Supported		
	Copper	Iron	Temperature	Total suspended solids	Turbidity	Total Phosphorus	Irrigation	Aquatic Life	Recreation with Water Contact
E.F. Owyhee River from Mill Creek to Reservation (flows through Parcel 1)	x	x	x	x				x	x

The chemical issues are primarily the result of historical mining activity, largely from the historical Rio Tinto Mine, only three river miles upstream<sup>8</sup>. The temperature issues are largely the result of the timing of water releases from Wildhorse Reservoir (over 16 miles upstream), lack of shading, and channel widening along much of the river.

### **3.3.2 Environmental Effects on Water**

#### **3.3.2.1 Proposed Action**

Direct and indirect effects to water quality are minimized by application of mitigation measures and adherence to label instructions that limit the proximity to water for herbicide storage, handling, and mixing, and that specify action for spill prevention and clean up.

Mitigation measures, such as no-spray buffers; wind speed and weather restrictions; and the use of GPS-based application technology, would minimize the potential for herbicide exposure to water from direct spray and wind drift. There would be no spraying in areas with flowing streams, standing water, or springs. Aerial spraying would be conducted over 150 feet from intermittent streams that might have water in them during the spray periods, and over 600 feet from the perennial flows of the East Fork Owyhee River.

The application area is sparsely vegetated in many places, with bare soil present in small patches throughout the site. Herbicides that are applied to bare soils could be transported by wind into adjacent water bodies before they are absorbed by plants or soil. Avoidance of these small bare soils patches during application is impractical, so some contamination from wind-blown soil is possible, but determined to be minimal since the patches are small and the site is not known for dust generation even during wind events.

Precipitation events occurring before chemicals are broken down, taken up by plants, or bound to soils or organic matter have the potential to contaminate water sources from surface or subsurface run-off. Herbicide concentrations typically peak and fall over a very short period of time following application, and though herbicide in surface runoff can reach stream channels rapidly, it can also be completely removed from runoff that trickles a long distance through vegetation and organic debris (NMFS 2012). Imazapic applied at the Parcel 1 treatment area would have time delays (between application and weather events), long distances to cover, and minimum overland flow (from infrequent rainfall events with large volumes of water) that would prevent or impede its transport to open bodies of water. It also has limited horizontal mobility in soils (see Section 3.2.2)

The potential for surface runoff in the project area would also be minimized by mitigation measures that prohibit the application of herbicides when there is rain, snow, or fog, and that require spray buffers around water bodies and stream channels. These measures would reduce the potential for surface run-off to enter water bodies to discountable levels.

Herbicides also have the potential to leach into groundwater. The low rainfall in the area, however, is not conducive to the transport of Imazapic very far beneath the ground surface; and studies show it leaches to depths of only 18" even in sandy soils (see Section 3.2.2). Also, the water table here is deep, providing ample opportunity for pesticide degradation from microbial action before it reaches groundwater.

Imazapic could enter the intermittent stream near the Parcel 1 ranch buildings by accidental spill or spray and then ultimately flow into the East Fork Owyhee River. Modeling assessments for accidental Imazapic spills into small streams and ponds were conducted by Durkin and Follansbee (2004) and evaluated at various concentrations under various application rates. Their findings

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<sup>8</sup> There is an ongoing remediation project for the Rio Tinto Mine to address the pollutants in the stream.

revealed that even at the highest likely application rate none of the exposure scenarios reached a level of concern for water quality that presented a risk to humans, other than the scenario of a large spill into a small pond where a small child drinks the contaminated water. This is an extreme and unlikely scenario, and mitigation measures are prescribed, and spill plans are prepared to prevent or mitigate this risk.

Chemical contamination was not one of the water quality issues identified in the NDEP Water Quality Assessment discussed in Section 3.3.1, above, so accidental spill or spray of Imazapic into the East Fork Owyhee would not increase or exacerbate any of the water quality issues listed there. Also, Imazapic degradation in water would occur in a matter one to two days (Tu et al. 2001), so the impact would be very short-term.

The effect of the Proposed Action on water quality would be low.

### **3.3.2.2 No Action Alternative**

There would be no herbicide or inoculant impact to water resources from the No Action Alternative, since no applications would occur.

### **3.3.3 Cumulative Effects**

Cumulative impacts to water quality come from historical mining and the toxic leaching from mine tailings; flow regime alterations from the operation of irrigation diversions and Wildhorse reservoir; and the impact of grazing and agriculture along the Owyhee River. This action is anticipated to contribute very little to cumulative impacts because of the very low likelihood that Imazapic would enter the Owyhee River for reasons discussed in Section 3.3.2, and if it did, its photolytic degradation in water would occur in a matter of one to two days (Tu et al. 2001). The cumulative effects on water from the Proposed Action would be low.

## **3.4 Fish and Other Aquatic Species**

### **3.4.1 Affected Environment**

Historically, spring and summer Chinook (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) inhabited the Owyhee Subbasin including the East Fork Owyhee River and its tributaries. The East Fork Owyhee River has been identified as former Chinook salmon spawning habitat. Newspaper accounts from the late 1800s had numerous articles regarding salmon runs, trading of salmon between Indian tribes and miners, and the capture and sale of salmon from this area. With the construction of the Owyhee Dam in 1932, however, salmon and steelhead were prevented from migrating up the Owyhee River, and the species soon died out.

Though Chinook salmon have been extirpated from the river, almost 200 were ceremonially released on the Duck Valley Indian Reservation in the East Fork Owyhee River in 2015. Most were harvested using traditional spear fishing techniques. This would likely be repeated in the future and may be conducted with steelhead, but these fish do not constitute a viable population, and survivors of this ceremonial event are not expected to survive given the lack of suitable habitat.

Of the 79 species of fish native to Nevada, 14 occur in the East Fork Owyhee River watershed. Five non-native species, smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*) brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and rainbow/cutthroat hybrids have been documented as occurring in the East Fork Owyhee River watershed. Table 3 in Appendix A displays the species of fish found in the river today. The sensitivity of these fish to the pollution in

the river is also shown. No ESA-listed fish or other aquatic species or associated critical habitat occurs within the area.

As discussed in the “Water” section, above, habitat for fish is poor in the East Fork Owyhee River. Chemical pollution, temperature issues, over-widening, and lack of shade or cover are all limitations for fish habitat. These are the conditions of the river flowing through Parcel 1.

### **3.4.2 Environmental Effects on Fish and Other Aquatic Species**

#### **3.4.2.1 Proposed Action**

Fish and aquatic insect exposure to Imazapic would occur primarily through direct contact with contaminated surface waters. The Proposed Action, however, is designed to avoid flowing streams, standing water, and springs, so there would be no such direct contact. Aerially spraying would be conducted over 150 feet from intermittent streams that might have water in them during the spray periods, and over 600 feet from the perennial flows of the East Fork Owyhee River, but contamination of aquatic habitats may result from accidental direct spray; wind drift; wind-blown soils; spills or leakage; or runoff and leaching through the soil into groundwater (which could then affect surface water over time). Aerial spraying would not occur during rainfall events. The weight of evidence, however, suggests that no adverse effects in fish or aquatic invertebrates from such exposure are plausible (Durkin and Follansbee 2004).

Aquatic animals seem to be relatively insensitive to Imazapic exposures. In acute toxicity studies, all tested species (channel catfish, bluegill sunfish, trout, and sheepshead minnow) evidenced relatively low toxicity (Barker and Skorzynski 1998; Yurk et al. 1992a, b). Similarly, no effects on fathead minnow eggs and fry were seen in a 32-day study (Barker et al. 1998a). This very low toxicity of Imazapic to fish is probably related to very low rates of uptake of this compound by fish as evidenced in a 28-day test where the concentration of Imazapic measured in the water was found to stay higher than the bio-concentration of the compound in fish in that same water (Barker et al. 1998a). Durkin and Follansbee (2004) likewise found that adverse effects were unlikely by using typical or worst-case exposure assumptions at typical application rates.

As with fish, no adverse effects have been observed with aquatic invertebrates (Barker and Liu 1998a, b; Yurk et al. 1993b) as well as a life-cycle study in *Daphnia magna* (Barker et al. 1998b).

No studies on the toxicity of the strain of *P. fluorescens* used as MB 906 have been conducted, since that bacterium is a non-toxic, naturally-occurring, native microbe. However, *P. fluorescens* (and other similar, naturally-occurring bacteria) is a known cause of fin rot in aquaria and aquaculture fish, but can also occur in natural populations. One strain has been developed as a control solution for invasive zebra and quagga mussels, but research to date indicates very high specificity to these invasive mussels, with low effects to non-target species (Molloy et al. 2013).

The effects on fish and aquatic organisms from the Proposed Action would be low given that MB-906 is non-toxic and there would be no application of Imazapic directly to aquatic habitats. Additionally, Imazapic’s prescribed application rate is low, its relative toxicity is low, and indirect contamination (if any) would be at low concentrations.

#### **3.4.2.2 No Action Alternative**

There would be no herbicide or inoculant impact to fish or other aquatic species from the No Action Alternative, since no applications would occur.

### 3.4.3 Cumulative Effects

Cumulative impacts to currently degraded aquatic habitats (Section 3.4.1) come from historical mining and the toxic leaching from mine tailings; flow regime alterations from the operation of irrigation diversions and Wildhorse reservoir; and the impact of grazing and agriculture along the Owyhee River over time. This Proposed Action is anticipated to contribute very little to cumulative impacts to aquatic habitats, fish, and aquatic species because of the very low likelihood that Imazapic would enter the Owyhee River for reasons discussed in Section 3.3.2, its rapid photolytic degradation in water, and the low toxicity of Imazapic to aquatic organisms.

The cumulative effects on water from the Proposed Action would be low.

## 3.5 Wildlife

### 3.5.1 Affected Environment

#### 3.5.1.1 *Habitat types and conditions*

As discussed in Section 3.1, there are three primary habitat types present in and near Parcel 1 treatment area: sagebrush steppe, deciduous scrub-shrub wetland, and agriculture/pasture (wet meadow).

The condition of the Ranch's sagebrush steppe as wildlife habitat had been determined to be good to optimal for sage grouse and other species associated with this habitat type by assessments conducted in the past decade (USFS 2011). However, this habitat type on Parcel 1, once optimal, has been burned over and is converting to cheatgrass. Its suitability for sage grouse and other sagebrush steppe-associated species, once considered optimal, has been compromised and no longer provides the forage and cover values that it did prior to the fire.

The agricultural land on Parcel 1 is flood irrigated and produces a high quality native/introduced grass hay mix that provides habitat for many species. Across Nevada, agricultural lands comprise only 1.1% of the total land base of the state. These lands provide critical habitat for up to 100 species of birds and their protection and enhancement are identified as a conservation priority in the Nevada Bird Conservation Plan (Great Basin Bird Observatory 2010).

Riparian/wetland scrub-shrub habitat is present on Parcel 1 along the East Fork Owyhee River. This habitat is in poor condition, with only scattered small clumps of willow and other riparian shrub species spaced far apart along the river. There are however, seven acres of wetland habitat in good condition to the west of the river, and two acres down slope of the ranch buildings.

#### 3.5.1.2 *Species present*

No ESA-listed wildlife species or associated critical habitat occurs within the area.

#### **Birds**

A large number of avian species utilize habitat on the Ranch during different times of the year.

In the spring and early summer many breeding birds utilize the riparian cover, wet meadows and adjacent upland areas for breeding, nesting, and brood-rearing habitat. Some of the species that have been observed on the property include: belted kingfisher (*Ceryle alcyon*), black-crowned night heron (*Nycticorax nycticorax*), Brewer's sparrow (*Spizella breweri*), vesper sparrow (*Pooecetes gramineus*), common yellowthroat (*Geothlypis trichas*), long-billed curlew (*Numenius americanus*), yellow warbler (*Dendroica petechia*), bobolink (*Dolichonyx oryzivorus*), western tanager (*Piranga ludoviciana*) and willow flycatcher (*Empidonax traillii*).

Game birds that have been observed, or are thought to occur, on the property include: Greater sage-grouse (*Centrocercus urophasianus*), California quail (*Callipepla californica*), chukar (*Alectoris chukar*) and ruffed grouse (*Bonasa umbellus*).

Parcel 1 is near sage-grouse breeding/early brood-rearing habitat (nesting), late brood-rearing habitat (summer), and winter habitat on adjacent National Forest System lands. The meadows provide early and late brood-rearing habitat and the uplands provided important movement corridors from nesting habitat to brood-rearing habitat prior to the burn. Its current condition and its conversion to cheatgrass compromise this area for this use by sage grouse.

During late winter and early spring, sandhill cranes (*Grus canadensis*) occupy the wet meadows and engage in courtship behavior.

A list of bird species likely to be found using Parcel 1 for all or some of its habitat needs is included in Appendix A.

### **Mammals**

Large mammals observed include mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and pronghorn (*Antilocapra americana*). Elk have been observed in the California Creek drainage in early spring and mule deer utilize Parcel 1 throughout the spring, summer, and fall, with a few deer overwintering in the area.

The most abundant predator species frequenting the property is the coyote (*Canis latrans*), although both bobcat (*Felis rufus*) and mountain lion (*Felis concolor*) have been documented nearby.

Medium-sized mammals are well-represented at the Ranch. Beavers (*Castor canadensis*) are present on the East Fork Owyhee River and California Creek to the east. Northern river otters (*Lutra canadensis*) have been observed along the river on Parcel 1. Evidence of badgers (*Taxidea taxus*) is common across the property.

The variety and extent of cover types, provides habitat for a diversity of small mammal species, including many species of bats.

A list of mammal species likely to be found using Parcel 1 for all or some of their habitat needs is included in Appendix A.

### **Reptiles and Amphibians**

Up to 20 species of reptiles and six species of amphibians could occur on the property (Appendix A). Columbia spotted frogs (*Rana luteiventris*) and adult Pacific tree frogs (*Hyla regilla*) have been documented at Parcel 1. The nonnative bull frog (*Lithobates catesbeianus*) has not been detected on Parcel 1, though they have been reported on other Ranch parcels nearby.

## **3.5.2 Environmental Effects on Wildlife**

### **3.5.2.1 Proposed Action**

This action includes no ground-disturbing actions, and the action would occur outside of migratory bird nesting seasons and in habitats dominated by non-native species that do not provide nesting habitat for migratory birds, or habitats suitable for most native mammals.

Direct exposure to Imazapic and MB-906 can occur when mammals and birds contact chemical residues with their skin or eyes or when they inhale vapors or particulates. Small resident mammals such as mice and rabbits would likely be present when spray is applied and receive direct contact; medium and large-sized mammals (such as coyotes and deer, respectively) would likely

flee the site before any direct contact with spray. Indirect exposure to mammals and birds can occur through dermal contact with contaminated vegetation; grooming activities, and ingestion of contaminated vegetation, prey species, or water. A wide range of exposures can be anticipated from the consumption of contaminated vegetation. The highest exposures would likely occur after a direct spray.

No studies on the toxicity of MB 906 have been conducted, since it is a native, non-toxic, naturally-occurring microbe, but four unpublished studies on Imazapic were submitted to the U.S. EPA to support its registration. A 13-week study in rats (Fischer 1992), and two 2-year studies in rats and mice (Fischer 1994a) (Fischer 1994b) revealed that Imazapic was not toxic to experimental rodents even at very high dietary concentrations over prolonged periods of time. A 1-year study in dogs revealed toxic effects on muscle, blood, and liver, even at low doses, though the effects were not considered adverse (Wolford 1993). In a study on the reproductive effects of Imazapic on rabbits, maternal mortality was noted at all dosage levels (MacKenzie 1992), but the mortalities were attributed to the study's techniques, not to ingestion of Imazapic.

The acute toxicity of Imazapic to birds was found to be low, with no mortality observed after testing on quail (Fletcher and Sullivan 1993a) and ducks (Fletcher and Sullivan 1993b), though in ducks there was a slight decrease in food consumption over the 20-day post-dosing observation period (Fletcher and Sullivan 1993b). No effects in either quail (Pedersen et al. 1993a) or ducks (Pedersen et al. 1993b) were observed after eight days of dietary exposures to Imazapic. These studies indicate that birds may be somewhat less sensitive to Imazapic than mammals, and exposure scenarios evaluated by Durkin and Follansbee (2004) revealed no reasonable exposure estimates that would have adverse effects.

No toxicity data are available for reptiles or amphibians, thus, no quantitative risk characterization for these animals can be made. Only one bioassay is available on terrestrial invertebrates, the honey bee, and its sensitivity to Imazapic was very close to that of the mammals tested.

The proposed application rates for Imazapic pose an insignificant risk to birds and mammals when considering the toxicity studies discussed above. The estimated dietary exposures to rats, mice, and meadow voles from maximum label application rates would be approximately 38,000, 4,500, and 5,900-fold lower, respectively, than the acute dietary LD50<sup>9</sup> for rats. The available data also suggest that though larger mammals, (e.g. dogs and rabbits), may be more sensitive to Imazapic than smaller mammals (e.g. mice and rats), the effects would not be adverse using typical or worst-case exposure assumptions at the typical application rate (Fischer 1992, Fischer 1994a, Fischer 1994b, Wolford 1993)<sup>10</sup>. The estimated dietary exposures to bobwhite quail, marsh wrens, and American robins from application rates consistent with the label would be approximately 24,000, 2,700, and 2,100-fold lower, respectively, than the acute dietary LD50 for bobwhite quail (WSDOT, 2015).

No studies on the toxicity of MB 906 have been conducted, since it is a non-toxic, naturally-occurring, native microbe.

The effects of the Proposed Action on wildlife would be moderate.

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<sup>9</sup> LD50 is an abbreviation for "Lethal Dose, 50%" or median lethal dose. It is the amount of the substance required (usually per body weight) to kill 50% of the test population.

<sup>10</sup> As in any ecological risk assessment, this risk characterization must be qualified. Imazapic has been tested in only a limited number of species and under conditions that may not well-represent populations of free-ranging non-target animals. Notwithstanding this limitation, the available data are sufficient to assert that no adverse effects on animals are anticipated based on the information that is available.

### **3.5.2.2 No Action Alternative**

There would be no herbicide or inoculant impact to wildlife from the No Action Alternative, since no applications would occur.

### **3.5.3 Cumulative Effects**

This Proposed Action would not contribute to the factors acting cumulatively to adversely impact wildlife and their habitats in this area. Historical grazing, agriculture, fire suppression (which created the conditions for wide-spread high-intensity, vegetation community-replacement wildfires), climate change, and the introduction of non-native species such as cheatgrass have degraded the sagebrush-steppe wildlife habitats in the project area. The proposed action is restorative, by suppressing the cheatgrass which would otherwise maintain the site in its currently degraded state.

The localized, short term, toxicity risk of Imazapic would pose no long-term cumulative effect to wildlife or their habitats.

The cumulative effect of the proposed action would be low.

## **3.6 Land Use, Recreation, and Transportation**

### **3.6.1 Affected Environment**

The ShoPai currently operate the Ranch to maintain and/or enhance habitat for wildlife. Management actions include irrigating the meadows, bank stabilization projects, revegetating areas with native species, and invasive weed control. Haying and grazing have been used in the past to meet wildlife objectives with timing and other restrictions applied to avoid negative impacts to wildlife.

The Ranch is also used as an educational facility. Field tours have been conducted to share successful management results. Conservation projects have been implemented to protect soil and improve habitat. The Ranch is used as an area to collect native seed for plants to be grown in tribal greenhouses.

Most recreational activity in the area occurs during the spring, summer, and fall months as the adjacent National Forest System lands provide excellent hunting opportunities. ATV riders and hunters generate the bulk of the activity in the area and provide a boost to the local economy in the form of motel, RV park, and bar business. USFS roads are not maintained in the winter, providing recreational snowmobile opportunities, though it varies year to year based on snowpack.

There are few roads (besides Highway 225) within Parcel 1, and those are merely tire tracks which have been used in the past to access pastures and facilitate movement of hay to and from corrals. There is an old, over-grown, two-track road along the west boundary of the parcel, though it is not accessible to most vehicles. Other small sections of road access a water tank in the protected draw above the ranch buildings, and provide access to the west and northwest pastures in the wetland/agriculture lowlands of the parcel.

### **3.6.2 Environmental Effects on Land Use, Recreation, and Transportation**

#### **3.6.2.1 Proposed Action**

This project proposes no changes to roads or land use, nor does it alter the land in any way that would have effects on current land uses. The proposed spraying would not be on agricultural fields;

it is above them and across Highway 225, with no spraying in a location where overland flow or instream flow can carry chemicals onto the fields. The operation of low-flying aircraft over the treatment area would not interfere with any agricultural operations. There would be no impact on land use or transportation.

Late fall and early spring spraying avoids the hunting season for sage grouse, but overlaps that of nearly all other small game hunting seasons such as chukar, Hungarian partridge, quail, crow, and rabbit. Fall applications may overlap deer-hunting season, which is the only big game species likely to be pursued on or near the treatment area. The treatment area, however, is small compared to the amount of area available to hunt nearby, and disturbance from treatment activities would be for only one to two days. The effect of this action on recreational activities would be low.

### **3.6.2.2 No Action Alternative**

There would be no impact to land use, recreation, or transportation from the No Action Alternative, since no aerial applications or operations would occur

### **3.6.3 Cumulative Effects**

There would be no long-term changes to land uses, transportation, or recreation from the Proposed Action, and applications of Imazapic and MB-906 would not alter the capability of these lands for any uses in the future. There would be no cumulative effect from the Proposed Action on land use, recreation, or transportation.

## **3.7 Cultural and Historical Resources**

### **3.7.1 Affected Environment**

Cultural resources include things and places that demonstrate evidence of human occupation or activity related to history, architecture, archeology, engineering, and culture. Historic properties, as defined by 36 CFR 800, the implementing regulations of the National Historic Preservation Act (54 U.S.C. 300101 et seq.), are a subset of cultural resources that consists of any district, site, building, structure, artifact, ruin, object, work of art, or natural feature important in human history that meets defined eligibility criteria for the National Register of Historic Places.

The Northern Shoshone, Western Shoshone, Northern Paiute, and Bannock Tribes occupied the region now known as the Great Basin from times immemorial. The land that comprises Parcel 1 falls within these Tribes' aboriginal territory. These Tribes' way of life is a dynamic, living culture in which they continue to gather, hunt, and fish their traditional homelands, including Parcel 1, and rely on traditional resources including animals, fish, birds, plants and other resources.

White settlers discovered gold and silver in the streams near Parcel 1 in 1869. Over the next several years, many mining claims were staked, a large number of mines were established, and the population of Mountain City rose drastically. Water from the East Fork Owyhee River was appropriated in 1869 and 1870 to support mining operations. The boom ended within a few years though smaller mining operations were conducted over the decades that followed. The last mining boom occurred between 1932 and 1947 with the discovery of copper near Mill Creek, approximately 2.5 miles south of Parcel 1. The Rio Tinto Mine along nearby Mill Creek, was established on 280 acres to mine this discovery. It employed over 300 people at its peak, and used conventional underground mining methods to extract copper-sulfide ore. High-grade ores and concentrate were shipped off-site while low-grade ores were milled at the mine. Mill tailings were placed on the hillside above Mill Creek and in the original portion of the Mill Creek channel (NDEP 2010). The Rio Tinto and two associated mines closed in 1947 (Hickson 2004), but several

operators began re-working the tailings piles in 1965 by leaching the ore stockpiles and underground workings; and exploring for additional mineral deposits. Mining activity ceased in 1976, though clean-up activities have continued to this day.

The area was homesteaded in the mid-1870s with the establishment of many family farms in the valleys surrounding Parcel 1. The descendants of some of these homesteaders still operate their family ranches on these same homesteads. More ranchers moved into the area following the decline of the mining boom and established a productive ranching industry which survives to this day.

A number of historic structures remain on Parcel 1 which may date back to the original homesteaders. A meat locker, two storage buildings, and the remnants of a root cellar are located immediately below the treatment area in the vicinity of the ranch house. The meat locker and storage buildings are in good condition given their age (100+ years). The root cellar has collapsed, with only remnants visible today. A chicken coop was destroyed in the 2012 fire.

### **3.7.2 Environmental Effects on Cultural and Historic Resources**

#### **3.7.2.1 Proposed Action**

The Proposed Action includes no ground-disturbing activities and does not propose changes to existing structures. There is thus no potential to affect historic structures.

There will be an effect on plant and animal resources, as discussed in the Sections above, and those effects may impact tribal members' opportunity to use this area for traditional hunting or gathering. It is reasonably to anticipate the treated area would be avoided during the years of treatment and perhaps for a few years after. This area is small, however, and the loss of native sagebrush-steppe habitat in this area from the wildfire and cheatgrass expansion may already have produced that effect. Though there could be an effect to the ShoPai's traditional uses of the treatment area, this small area is within a much larger landscape of many thousands of acres of untreated lands providing ample opportunity for such use. The overall impact of the Proposed Action on cultural resources would be low.

#### **3.7.2.2 No Action Alternative**

There would be no herbicide or inoculant impact to cultural resources from the No Action Alternative, since no applications would occur.

### **3.7.3 Cumulative Effects**

There are no ground-disturbing activities as part of this proposed action, so physical cultural resources are not affected in the short term or cumulatively. As discussed above, however, the Tribes' value the resources traditionally hunted or gathered in this area, and that opportunity may be impacted in the short-term by the application of Imazapic and MB-906. This effect, however, is short-term, and would not contribute cumulatively to any spatial or temporal long-term loss of cultural hunting and gathering opportunities for the tribes in this area.

## **3.8 Public Health and Safety**

### **3.8.1 Affected Environment**

Public safety infrastructure in Mountain City consists of a volunteer fire department, with one engine available for emergency response. Additional emergency services are provided by resources available on the Duck Valley Indian Reservation 4.5 miles to the north. The single most important safety feature for this community is likely Highway 225 which links this community to readily available medical, fire, and law enforcement resources in Owyhee to the north and more comprehensive services in Elko to the south.

### **3.8.2 Environmental Effects on Public Health and Safety**

#### **3.8.2.1 Proposed Action**

Imazapic has very low toxicity if individuals accidentally eat, touch, or inhale residues (WSDOT 2015). It did not result in skin sensitization when tested on guinea pigs or skin or eye irritation when tested on rabbits (WSDOT 2015); and does not seem to be toxic to experimental rodents at relatively high concentrations in the diet (WSDOT 2015). In several standard tests required for pesticide registration, Imazapic has failed to show any indication of adverse effects on reproduction or development. Also, studies suggest that Imazapic is rapidly excreted in the urine, principally as the parent compound (i.e., Imazapic) and does not build up in tissues (WSDOT 2015). The U.S. Environmental Protection Agency thus classifies Plateau as category IV (Low Toxicity) for oral and dermal exposures (EPA 2006).

In 2-year feeding studies in rats and mice, no evidence of carcinogenicity was found. Imazapic was also negative in four assays for mutagenicity. Imazapic is classified by U.S. EPA as “not likely” to be carcinogenic in humans and is not regulated as such (EPA 2006).

Application of Imazapic and MB906 inoculant as proposed would not result in spray hitting local residents, water sources, gardens, etc. Human behavior, however, cannot be controlled, and even with proper application there is potential for humans to come in contact with the compounds. It is possible people may walk into the area during or after application even if adequate signage and other measures are taken to prevent such exposure. The health effects of such accidental exposure have been assessed for the USDA Forest Service by Durkin and Follansbee in 2004. In their studies, a reasonable variety of worker and general public exposure scenarios were identified, assumptions regarding dermal exposures and dose estimates were made, and conclusions on risk to workers and the general public, including repeated and long-term exposure, were presented.

For workers handling and applying Imazapic, the report concluded that “*under a protective set of exposure assumptions, workers would not be exposed to levels of Imazapic that are regarded as unacceptable so long as reasonable and prudent handling practices are followed*”, and that “*even at the highest application rate that might be used in Forest Service programs, the upper range of hazard quotients is below the level of concern by a factor of 25* (Durkin and Follansbee 2004).

For the general public, the report concluded that “*under the foreseeable conditions of application, there is no route of exposure or scenario suggesting that the general public will be at any substantial risk from longer-term exposure to Imazapic*” and that “*even at the highest application rate that might be used, none of the exposure scenarios reach a level of concern*” (Durkin and Follansbee 2004).

The Washington State Department of Transportation (WSDOT) has also evaluated several human exposure scenarios, including workers applying herbicides, and the public (adults and children) picking and eating drift-contaminated berries, eating drift-contaminated garden vegetables, and

walking through sprayed vegetation. For each exposure scenario, WSDOT evaluated conditions of average exposure and extremely conservative conditions of maximum exposure and concluded that Imazapic would likely pose negligible potential risks, and would be unlikely to cause any adverse non-cancer effects to WSDOT workers and the public under conditions of average and maximum exposure (WSDOT 2015).

*P. fluorescens*, the active microbe in MB-906, is considered to be non-toxic, and some strains have even been cultured as antibiotics for creams, ointments, or sprays for treatment of skin, eye, and ear disorders (Fuller et al. 1971). One strain, however, was known to be an unusual cause of disease in cancer patients with compromised immune systems where it had contaminated their saline solutions (Gershman et al. 2008). No studies on the toxicity of the MB 906 formulation of *P. fluorescens* have been conducted.

The Proposed Action would have no effect on the public safety infrastructure or services in the immediate area. There is no action that would affect accessibility along state highway 225 or access to emergency services available in the towns of Owyhee or Elko.

Given the generally low toxicity of Imazapic and MB-906 and the lack of effect on safety infrastructure, the effect of the Proposed Action on public health and safety would be low to moderate. This is assuming the proper application of Imazapic and MB-906 label requirements; that mitigation measures identified in Section 2.3 would be applied; and that exposure scenarios would be consistent with the reasonable scenarios assessed by the Forest Service and WSDOT as described above.

### **3.8.2.2 No Action Alternative**

There would be no increased risk to human health or safety from the No Action Alternative since no aerial or hand application of herbicide or inoculant would occur. Thus, there would be no impact to this resource.

### **3.8.3 Cumulative Effects**

The public health and safety effects of the Propose Action are only short-term, and concern exposure risk to Imazapic was evaluated to pose negligible risk even during period of active treatment (see above). There is no long-term contribution to cumulative effects on public health.

## **3.9 Visual Resources**

### **3.9.1 Affected Environment**

The landscape in and around Parcel 1 is natural, rural, and agricultural. The visual character of the treatment area is natural, but the character of adjacent lands along the river is agricultural. Adjacent lands to the west and north support ranch structures and the small mining and ranching town of Mountain City, Nevada, which are both rural in visual character.

### **3.9.2 Environmental Effects on Visual Resources**

Neither the Proposed Action nor the No Action Alternative would make changes to any structures, land forms, or land uses, thus there would be no impact to the visual character of the area from either Alternative.

### **3.9.3 Cumulative Effects**

The Proposed Action would make no changes to any structures, land forms, or land uses; thus there would be no cumulative impact to the visual character of the area.

## **3.10 Air Quality**

### **3.10.1 Affected Environment**

Air quality is high in Mountain City based on measures of hazardous air pollutants from the EPA's National Air Toxics Assessment<sup>11</sup>. The data reveal an air quality index of 98 for Mountain City, with the US average being 58<sup>12</sup>.

### **3.10.2 Environmental Effects on Air Quality**

#### ***3.10.2.1 Proposed Action***

The Proposed Action would reduce air quality in the immediate area being treated during treatment and for a short period thereafter. Though properly applied, the smell may linger in the immediate application area for a few hours. There would be no effect on air quality outside of the immediate application area. The Proposed Action's effect on air quality would be low.

#### ***3.10.2.2 No Action Alternative***

There would be no herbicide or inoculant impact to air quality from the No Action Alternative, since no aerial or hand applications would occur.

### **3.10.3 Cumulative Effects**

The impacts of the Proposed Action are localized and short-term. There would be no long-term cumulative effect that might degrade the high air quality in this area.

## **3.11 Socioeconomics and Environmental Justice**

### **3.11.1 Affected Environment**

#### ***3.11.1.1 Socioeconomic Condition***

Adjacent to Parcel 1's northern border is the small mining and ranching town of Mountain City, Nevada. This is a community of approximately 28 year-round residents with two motels, a bar, the U.S. Post Office, a welcome center, a laundromat, the Raft River Electric Co. offices, and an RV park. Several closed businesses, including two bars and two grocery stores, are an indication of past, more prosperous times when mining was active (see Section 3.7.1). Highway 225 serves as the main road through town, running north/south and providing access to Owyhee, NV to the north and Elko, NV to the south.

Outside of town, small family ranches, interspersed among National Forest System lands, support several ranching families that have been raising cattle in the Mountain City area for well over a century.

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<sup>11</sup> <https://www.epa.gov/national-air-toxics-assessment>

<sup>12</sup> [https://www.bestplaces.net/health/zip-code/nevada/mountain\\_city/89831](https://www.bestplaces.net/health/zip-code/nevada/mountain_city/89831)

The Mountain City Ranger District of the Humboldt-Toiyabe National Forest surrounds much of Parcel 1. Mining, grazing, hunting, and recreation are the primary uses of these National Forest lands.

The ShoPai continue to gather, hunt, and fish their traditional homelands, including Parcel 1. Some tribal members are dependent on the animals, fish, birds, plants and other resources on these lands, though little, if any, use of the lands proposed for treatment are known to be so used.

### ***3.11.1.2 Environmental Justice***

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Supporting environmental justice, Executive Order 12898 directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

The population of the project area is predominately members of the ShoPai Indian Tribe. The Tribe has proposed this action on lands they own in support of their interest in restoring natural vegetation conditions to support their traditional uses.

## **3.11.2 Environmental Effects on Socioeconomics and Environmental Justice**

### ***3.11.2.1 Proposed Action***

Little economic benefit is anticipated to accrue to the local community from the Proposed Action. The duration of operations are short (one to two days) with limited time for the pilot or support personnel to use the motel or other businesses. No local residents would likely be employed. The spraying would have no effect on the land that could either generate new economic activity or detract from existing activity.

The use of the lands to be treated would likely be unavailable (undesirable) for traditional gathering or hunting by tribal members for a number of years following this action. The area, however, is small and surrounded by thousands of other acres readily available for such uses during these years.

This Proposed Action is sponsored by the ShoPai who desire this restoration of their native landscape, and though there may be a short-term impact to opportunities for traditional hunting or gathering on treated acres (Section 3.7.2.1), there is long term benefit in restoring native vegetative conditions (Section 3.1.2.1) and wildlife habitats (Section 3.5.2.1) that would support their traditional uses. There would be no adverse effect concerning environmental justice.

The effect of the spraying on socioeconomics and environmental justice would be low.

### ***3.11.2.2 No Action Alternative***

There would be no socioeconomic or environmental justice impact from the No Action Alternative since no aerial applications would occur. There would be no potential at all for local employment or local expenditures from the purchase of food and fuel. Since no herbicide would be applied, there would be no hindrance to the use of the proposed project site for hunting or gathering.

### **3.11.3 Cumulative Effects**

The socioeconomic impact of the Proposed Action is negligible and short-term. There would be no long-term beneficial or adverse cumulative effect.

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## **Chapter 4. Coordination, Consultation, and Compliance**

### **4.1 Agency Coordination and Public Involvement**

Input from nearby landowners and other members of the public who may have an interest in this Project have been contacted during the public scoping effort described in Section 1.5. Tribal members and landowners surrounding the Ranch were notified of this proposal, and would be kept informed as this assessment progresses. BPA has also contacted elected officials at the county and Federal levels.

### **4.2 Environmental Review and Coordination**

In conducting the spraying, the ShoPai and BPA would comply with applicable Federal laws, regulations, and executive orders. The following sections describe how the Proposed Action is in compliance with the various environmental laws and other relevant Federal executive orders.

#### **4.2.1 National Environmental Policy Act**

As Federal agencies, BPA must comply with provisions of the 1969 National Environmental Policy Act, as amended (42 USC 4321-4347). This environmental analysis (EA) was prepared to comply with NEPA and serve as the basis for determining whether implementation of the Proposed Action would constitute a major Federal action significantly affecting the quality of the human environment. The environmental assessment process included the involvement of tribes, government agencies, and the public.

In this EA, the agencies evaluated two alternatives to meet the purpose and need as described in Chapter 2: The Proposed Action and the No Action Alternative. The Proposed Action would aeri ally apply soil inoculant and herbicide to control cheatgrass to 139 acres on Parcel 1 of the Wilson/101 Ranch in the spring and fall of 2019 and repeated twice each year (spring and fall) for the following three years as needed.

#### **4.2.2 Endangered Species Act**

No species listed as either endangered or threatened under the Endangered Species Act (16 USC 1531 *et seq.*) are present on or near the Ranch. The Proposed Action would have no effect on listed species.

#### **4.2.3 National Historic Preservation Act**

This action has no potential to impact cultural resources since it has no ground-disturbing activities. However, the ShoPai would follow established procedures for protecting archaeological and cultural resources if encountered during aerial spraying. The ShoPai would avoid damaging cultural and historic resources and would comply with the National Historic Preservation Act (54 USC 300101 *et seq.*) and other cultural resource preservation laws.

#### **4.2.4 Federal Insecticide, Fungicide, and Rodenticide Act**

The Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 *et seq.*) regulates the manufacture and use of pesticides, including herbicide. Under the Proposed Action, the herbicide Imazapic, under the trade name “Plateau”, would be used to control the spread of unwanted vegetation (cheatgrass) on post-fire sagebrush-steppe vegetation. Only EPA-approved herbicides would be used, and only according to manufacturer’s label directions. All label instructions

pertaining to disposal would be followed. Herbicides would not be stored on the treatment area and would be applied by licensed applicators only.

#### **4.2.5 Comprehensive Environmental Response, Compensation, and Liability Act**

Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. 9601 *et seq.*), BPA has determined that the proposed project area is not on the Environmental Protection Agency's National Priority List.

#### **4.2.6 Migratory Bird Treaty Act**

The Migratory Bird Treaty Act, as amended, implements various treaties and conventions between the U.S. and other countries, including Canada, Japan, Mexico, and Russia, for the protection of migratory birds (16 USC 703-712). Under this Act, taking, killing, or possessing migratory birds, or their eggs or nests, is unlawful. The act classifies most species of birds as migratory, except for upland and nonnative birds.

Executive Order 13186, issued in January 2001, directs each federal agency undertaking actions that may negatively impact migratory bird populations to work with USFWS to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts, or other agreements; and the creation of or revisions to land management plans. This order also requires that the environmental analysis process include effects of federal actions on migratory birds. On August 3, 2006, USFWS and the U.S. Department of Energy signed a Memorandum of Understanding to complement the Executive Order. BPA (through the U.S. Department of Energy) and USFWS have a Memorandum of Understanding to address migratory bird conservation, which addresses how BPA and USFWS can work cooperatively to address migratory bird conservation and includes specific measures to consider implementing during project planning and implementation.

This action includes no ground-disturbing actions, and the action would occur outside of migratory bird nesting seasons and in habitats dominated by non-native species that do not provide nesting habitat for migratory birds. No actions specified by this Executive Order are necessary

### **4.3 Distribution and Availability**

A press release was sent to the ShoPai News and other media outlets nearest the Ranch announcing the availability of the Draft EA. Copies of the EA are available on the BPA website:

([www.bpa.gov/goto/CheatgrassControl](http://www.bpa.gov/goto/CheatgrassControl)). A copy of the EA is available on request from BPA by calling the toll-free document request line at 1-800-622-4520.

## Chapter 5. References

- American Cyanamid Company. 2000. Plateau herbicide, for weed control, native grass establishment and turf growth suppression on roadsides and other noncrop areas., PE- 47015. Parsippany, NJ.
- Barker C; Skorczynski S. 1998. Acute Toxicity of AC 263222 (Imazapic) to Sheepshead Minnow (*Cyprinodon variegatus*) Under Flow-through Test Conditions: Lab Project Number: CY 237: ECO 98-141: RES 98-409. Unpublished study prepared by Toxikon Corporation. 96 p. MRID No. 44817702.
- Barker C; Drottar K; Krueger H. 1998a. Toxicity of AC 263222 During the Early Life-Stages of the Fathead Minnow (*Pimephelas promelas*): Lab Project Number: 2CO 98-134: 954-98-134: 130A-120. Unpublished study prepared by Wildlife International, Ltd. 93 p. MRID No. 44728202.
- Barker, C.; Drottar, K.; Krueger, H. (1998b) Toxicity of AC 263222 During the Life-Cycle of the Cladoceran (*Daphnia magna*): Lab Project Number: ECO 98-133: 954-98-133: 130A-121. Unpublished study prepared by Wildlife International, Ltd. 81 p. MRID 44728201. Summarized in Overholt 1999.
- Durkin, P. and Follansbee, M. 2004. Imazapic - Human Health and Ecological Risk Assessment – Final Report. Prepared for: USDA, Forest Service, Forest Health Protection. GSA Contract No. GS-10F-0082K. December 23, 2004.
- Dykstra, T., Sellman, J. and Gossett, D. 2006. Environmental Assessment of Wildlife Resources as Related to the Proposed Expansion and Redevelopment at the Owyhee Airport, Duck Valley Indian Reservation. Prepared for Armstrong Consultants, Inc., Grand Junction, CO 18 pp.
- Fischer J. 1992. AC 263,222: A 13-week Dietary Toxicity Study in the Albino Rat: Lab Project Number: L-2293: AX92-2. Unpublished study prepared by American Cyanamid Co. 851 p. MRID No. 42711419.
- Fischer J. 1994a. AC 263,222: A Chronic Dietary Oncogenicity and Toxicity Study in the Albino Rat: Lab Project Number: T-0356: AX93-3. Unpublished study prepared by American Cyanamid Co. and Pathology Assoc., Inc. 1647 p. MRID No. 43320307.
- Fischer J. 1994b. A Chronic Dietary Toxicity and Oncogenicity Study in the Albino Mouse with AC 263,222: Lab Project Number: T-0391: AX93-5. Unpublished study prepared by American Cyanamid Co. 789 p. MRID No. 43320306.
- Fuller, AT; Mellows, G; Woolford, M; Banks, GT; Barrow, KD; Chain, EB (1971). "Pseudomonic acid: an antibiotic produced by *Pseudomonas fluorescens*". *Nature*. 234: 416-417
- Gershman MD, Kennedy DJ, Noble-Wang J, et al. (2008). "Multistate outbreak of *Pseudomonas fluorescens* bloodstream infection after exposure to contaminated heparinized saline flush prepared by a compounding pharmacy". *Clin Infect Dis*. 47 (11): 1372-1379.
- Haas, D.; Keel, C. (2003). "Regulation of antibiotic production in root-colonizing *Pseudomonas* spp. and relevance for biological control of plant disease". *Annual Review of Phytopathology*. 41: 117-153
- MacKenzie K. 1992. A Teratology Study with AC 263,222 in Rabbits: Lab Project Number: 6123-141: 987-86-170: HLA 6123-141. Unpublished study prepared by Hazleton Labs America, Inc. 261 p. MRID No. 42711423.
- Molloy, D. P.; Mayer, D. A.; Gaylo, M. J.; Burlakova, L. E.; Karatayev, A. Y.; Presti, K. T.; Sawyko, P. M.; Morse, J. T.; Paul, E. A. (2013). "Non-target trials with *Pseudomonas fluorescens* strain CL145A,

- a lethal control agent of dreissenid mussels (*Bivalvia: Dreissenidae*)". *Manag. Biol. Invasions*. 4 (1): 71–79.
- Montana State University. 2018. Avoiding Pesticide Drift. Pesticide Education Program,. Accessed on November 19, 2018 at <http://www.pesticides.montana.edu/reference/drift.html>
- Miller, R.F., S.T. Knick, D.A. Pyke, C.W. Meinke, S.E. Hanser, M.J. Wisdom, and A.L. Hild. 2011. Characteristics of Sagebrush Habitats and Key Limitations to Long Term Conservation. In *Studies in Avian Biology*, edited by S.T. Knick and J.W. Connelly, vol. 38, pp. 145–84. Berkeley: University of California Press.
- National Marine Fisheries Service (NMFS) 2012. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. Cottonwood BLM 10-year Noxious Weed Control Program (20 1 1 -2022). NMFS Consultation Number: 20 1 1 I 0 59 59.
- Tu M, Hurd C, Randall JM. 2001. *Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas*. The Nature Conservancy. (6 July 2006; <http://tncweeds.ucdavis.edu/handbook.html>)
- United States Environmental Protection Agency (EPA). 2006. Reregistration Eligibility Decision for Imazapyr. List C. Case Number 3078. [https://www3.epa.gov/pesticides/chem\\_search/reg\\_actions/reregistration/red\\_PC-128821\\_29-Sep-06.pdf](https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-128821_29-Sep-06.pdf)
- Washington State Department of Transportation (WSDOT). 2015. Herbicide Fact Sheets. Accessed on November 19, 2018 at <https://www.wsdot.wa.gov/NR/rdonlyres/7FFA2020-0B07-4A9F-AAEA-FDC026F9B21E/0/HerbicidesfactsheetImazapic.pdf>
- Wolford S. 1993. A One-year Dietary Toxicity Study of AC 263,222 in Dogs: Lab Project Number: 91117; TCR 91117-F; MASSII/AJ7-4. Unpublished study prepared by American Cyanamid Co. 1600 p. MRID No. 42711421.
- WSSA. 1994. AC 263,222. In: *Herbicide Handbook*, 7th Edition. Weed Science Society of America, Champaign, Illinois. 352 pp.
- Yurk J; Ward G; Wisk J. 1992a. Acute Toxicity of AC 263,222 to Bluegill (*Lepomis macrochirus*) under Static Test Conditions: Lab Project Number: 3923013-0400: 954-92-119. Unpublished study prepared by Environmental Science & Engineering, Inc. 67 p. MRID No. 42711434.
- Yurk J; Ward G; Wisk J. 1992b. Acute Toxicity of AC 263,222 to Channel Catfish (*Ictalurus punctatus*) under Static Test Conditions: Lab Project Number: 3923013-0500: 954-92-120. Unpublished study prepared by Environmental Science & Engineering, Inc. 68 p. MRID No. 42711436.

## **Appendix A - Species lists**

## Fish

The table, below provides a list of potential fish species on the Wilson/101 Ranch.

**Table 3 Wilson/101 Ranch Potential Fish Species**

Common Name	Scientific Name	Pollution Tolerance
Redband Trout	<i>Oncorynchus mykiss gairdneri</i>	S
Mountain Whitefish	<i>Prosopium williamsoni</i>	I
Brown Trout	<i>Salmo trutta</i>	I
Brook Trout	<i>Salvelinus fontinalis</i>	I
Rainbow Trout	<i>Oncorynchus mykiss</i>	S
Cutbow Hybrid	N/A	S
Mottled Sculpin	<i>Cottus bairdi</i>	I
Paiute Sculpin	<i>Cottus beldingi</i>	I
Chiselmouth	<i>Acrocheilus alutaceus</i>	I
Northern Pikeminnow	<i>Ptychocheilus oregonensis</i>	T
Longnose Dace	<i>Rhinichthys cataractae</i>	I
Speckled Dace	<i>Rhinichthys osculus</i>	I
Redside Shiner	<i>Richardsonius balteatus</i>	I
Tui Chub	<i>Gila bicolor</i>	I
Bridgelip Sucker	<i>Catostomus columbianus</i>	T
Largescale Sucker	<i>Catostomus macrocheilus</i>	T
Smallmouth Bass	<i>Micropterus dolomieu</i>	I
Yellow Perch	<i>Perca flavescens</i>	I

Pollution Tolerance: S = Sensitive, I = Intermediate, T = Tolerant

## Birds

The table, below provides a list of potential bird species on the Wilson/101 Ranch.

**Table 4 Wilson/101 Ranch Potential Bird Species**

Common Name	Scientific name	Confirmed sighting on Ranch
American Avocet	<i>Recurvirostra americana</i>	
American Crow	<i>Corvus brachyrhynchos</i>	X
American Goldfinch	<i>Spinus tristis</i>	X
American Kestrel	<i>Falco sparverius</i>	X
American Robin	<i>Turdus mgratorius</i>	X
American White Pelican	<i>Pelecanus erythrorhynchos</i>	
Barn Swallow	<i>Hirundo rustica</i>	X
Bald Eagle	<i>Haliaeetus leucocephalus</i>	
Black-billed Magpie	<i>Pica hudsonia</i>	X
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	X
Belted Kingfisher	<i>Megaceryle alcyon</i>	X
Black-headed Grosbeak	<i>Pheucticus melanocephlus</i>	X
Black Rosy-Finch	<i>Leucosticte atrata</i>	
Black Tern	<i>Chlidonias niger</i>	
Black-necked Stilt	<i>Himantopus mexicanus</i>	
Blue Grouse	<i>Dendragapus</i>	X
Bobolink	<i>Dolichonyx oryzivorus</i>	X
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	X
Brewer's Sparrow	<i>Spizella breweri</i>	X
Brown-headed Cowbird	<i>Molothrus ater</i>	X
Bullock's Oriole	<i>Icterus bullockii</i>	X
Bushtit	<i>Psaltriparus minimus</i>	X
California Quail	<i>Callipepla californica</i>	X
Canvasback	<i>Aythya valisineria</i>	
Cassin's Finch	<i>Haemorhous cassinii</i>	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	X
Chukar	<i>Alectoris chukar</i>	X
Cinnamon Teal	<i>Spatula cyanoptera</i>	
Clark's Grebe	<i>Aechmophorus clarkii</i>	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	X
Common Loon	<i>Gavia immer</i>	
Common Nighthawk	<i>Chordeiles minor</i>	X
Common Raven	<i>Corvus corax</i>	X

Common Yellowthroat	<i>Geothlypis trichas</i>	X
Dusky Flycatcher	<i>Empidonax oberholseri</i>	X
Eared Grebe	<i>Podiceps nigricollis</i>	
European Starling	<i>Sturnus vulgaris</i>	X
Ferruginous Hawk	<i>Buteo regalis</i>	
Flammulated Owl	<i>Psilosops flammeolus</i>	
Forster's Tern	<i>Sterna forsteri</i>	
Fox Sparrow	<i>Passerella iliaca</i>	X
Franklin's Gull	<i>Leucophaeus pipixcan</i>	
Golden Eagle	<i>Aquila chrysaetos</i>	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	X
Gray Catbird	<i>Dumetella carolinensis</i>	X
Gray Flycatcher	<i>Empidonax wrightii</i>	X
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>	
Green-tailed Towhee	<i>Pipilo chlorurus</i>	X
Green-winged Teal	<i>Anas carolinensis</i>	X
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	X
Greater Sandhill Crane	<i>Antigone canadensis</i>	X
Hermit Warbler	<i>Setophaga occidentalis</i>	
House Finch	<i>Haemorhous mexicanus</i>	X
House Wren	<i>Troglodytes aedon</i>	X
Juniper Titmouse	<i>Baeolophus ridgwayi</i>	
Killdeer	<i>Charadrius vociferus</i>	X
Lark Bunting	<i>Calamospiza melanocorys</i>	X
Lazuli Bunting	<i>Passerina amoena</i>	X
Least Bittern	<i>Ixobrychus exilis</i>	
Least Sandpiper	<i>Calidris minutilla</i>	
Lewis's Woodpecker	<i>Melanerpes lewis</i>	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	X
Long-billed Curlew	<i>Numenius americanus</i>	X
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	
Long-eared Owl	<i>Asio otus</i>	X
Mallard	<i>Anas platyrhynchos</i>	X
MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	X
Mourning Dove	<i>Zenaida macroura</i>	X
Mountain Quail	<i>Oreortyx pictus</i>	
Norther Flicker	<i>Colaptes auratus</i>	X
Northern Goshawk	<i>Accipiter gentilis</i>	
Northern Harrier	<i>Circus cyaneus</i>	X

Northern Pintail	<i>Anas acuta</i>	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	X
Olive-sided Flycatcher	<i>Contopus cooperi</i>	
Peregrine Falcon	<i>Falco peregrinus</i>	
Pine Siskin	<i>Spinus pinus</i>	X
Prairie Falcon	<i>Falco mexicanus</i>	
Redhead	<i>Aythya americana</i>	
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	X
Red-necked Phalarope	<i>Phalaropus lobatus</i>	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	X
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	X
Rock Wren	<i>Salpinctes obsoletus</i>	X
Rufous Hummingbird	<i>Selasphorus rufus</i>	
Sage Sparrow	<i>Artemisospiza nevadensis</i>	
Sage Thrasher	<i>Oreoscoptes montanus</i>	
Sandhill Crane	<i>Grus canadensis</i>	X
Savannah Sparrow	<i>Passerculus sandwichensis</i>	X
Short-eared Owl	<i>Asio flammeus</i>	
Snowy Egret	<i>Egretta thula</i>	
Snowy Plover	<i>Charadrius nivosus</i>	
Sora	<i>Porzana carolina</i>	X
Song Sparrow	<i>Melospiza melodia</i>	X
Spotted Sandpiper	<i>Actitis macularius</i>	X
Spotted Towhee	<i>Pipilo maculatus</i>	X
Swainson's Hawk	<i>Buteo swainsoni</i>	
Tree Swallow	<i>Tachycineta bicolor</i>	X
Trumpeter Swan	<i>Cygnus buccinator</i>	
Turkey Vulture	<i>Cathartes aura</i>	X
Vesper Sparrow	<i>Pooecetes gramineus</i>	X
Violent-green Swallow	<i>Tachycineta thalassina</i>	X
Virginia's Warbler	<i>Oreothlypis virginiae</i>	
Warbling Vireo	<i>Vireo gilvus</i>	X
Western Burrowing Owl	<i>Athene cunicularia</i>	
Western Grebe	<i>Aechmophorus occidentalis</i>	X
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	X
Western Kingbird	<i>Tyrannus verticalis</i>	X
Western Meadowlark	<i>Sturnella neglecta</i>	X
Western Tanager	<i>Piranga ludoviciana</i>	X
White Faced Ibis	<i>Plegadis chihi</i>	

White-throated Swift	<i>Aeronautes saxatalis</i>	
Willet	<i>Tringa semipalmata</i>	
Willow Flycatcher	<i>Empidonax traillii</i>	X
Wilson's Snipe	<i>Gallinago delicata</i>	X
Yellow Warbler	<i>Setophaga petechia</i>	X
Yellow-breasted Chat	<i>Icteria virens</i>	X
Yellow Warbler	<i>Setophaga petechia</i>	X

## Mammals

The table, below provides a list of potential species from the Duck Valley Indian Reservation (DVIR) (Dykstra et. al 2006) and Nevada Department of Wildlife's (NDOW) Bruneau River Management Area (Bradley 2006).

**Table 5 Wilson/101 Ranch Potential Mammalian Species**

Common Name	Scientific Name	Dykstra Species List	NDOW Bruneau WMA
Merriam's Shrew	<i>Sorex merriami</i>	x	x
Dusky (Montane) Shrew	<i>Sorex monticolus</i>		x
Vagrant Shrew	<i>Sorex vagrans</i>	x	x
Water Shrew	<i>Sorex palustris</i>	x	x
Preble's Shrew	<i>Sorex preblei</i>		x
California Myotis	<i>Myotis californicus</i>		x
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	x	x
Long-eared Myotis	<i>Myotis evotis</i>	x	x
Little Brown Bat	<i>Myotis lucifugus</i>	x	x
Fringed Myotis	<i>Myotis thysanodes</i>	x	x
Long-legged Myotis	<i>Myotis volans</i>	x	x
Yuma Myotis	<i>Myotis yumanensis</i>	x	x
Hoary Bat	<i>Lasiurus cinereus</i>	x	x
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	x	x
Western Pipistrelle	<i>Pipistrellus hesperus</i>	x	x
Big Brown Bat	<i>Eptesicus fuscus</i>	x	x
Townsend's big-eared Bat	<i>Corynorhinus townsendii</i>	x	x
Spotted Bat	<i>Euderma maculatus</i>	x	x
Pallid Bat	<i>Antrozous pallidus</i>	x	x
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>		x
Black-tailed Jackrabbit	<i>Lepus californicus</i>	x	x
White-tailed Jackrabbit	<i>Lepus townsendi</i>	x	x
Mountain Cottontail	<i>Sylvilagus nuttalli</i>	x	x
Pygmy Rabbit	<i>Brachylagus idahoensis</i>	x	x
Yellow-pine Chipmunk	<i>Tamias amoenus</i>		x
Least Chipmunk	<i>Tamias minimus</i>	x	x
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	x	x
White-tailed Antelope Squirrel	<i>Ammospermophilus leucurus</i>	x	x
Belding's Ground Squirrel	<i>Spermophilus beldingi</i>	x	x
Wyoming Ground Squirrel	<i>Spermophilus elegans</i>	x	x
Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>	x	x

Piute Ground Squirrel	<i>Spermophilus mollis</i>	x	
Northern Pocket Gopher	<i>Thomomys talpoides</i>	x	x
Townsend's Pocket Gopher	<i>Thomomys townsendii</i>	x	x
Little Pocket Mouse	<i>Perognathus longimembris</i>		x
Great Basin Pocket Mouse	<i>Perognathus parvus</i>	x	x
Dark Kangaroo Mouse	<i>Microdipodops megacephalus</i>		x
Ord Kangaroo Rat	<i>Dipodomys ordii</i>	x	x
Chisel-toothed Kangaroo Rat	<i>Dipodomys microps</i>	x	x
American Beaver	<i>Castor canadensis</i>	x	x
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	x	x
Canyon Mouse	<i>Peromyscus crinitus</i>	x	x
Deer Mouse	<i>Peromyscus maniculatus</i>	x	x
Northern Grasshopper Mouse	<i>Onychomys leucogaster</i>	x	x
Desert Woodrat	<i>Neotoma lepida</i>	x	x
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	x	x
Montane Vole	<i>Microtus montanus</i>	x	x
Long-tailed Vole	<i>Microtus longicaudus</i>	x	x
Sagebrush Vole	<i>Lemmiscus curtatus</i>	x	x
Muskrat	<i>Ondatra zibethicus</i>	x	x
Western Jumping Mouse	<i>Zapus princeps</i>	x	x
Porcupine	<i>Erethizon dorsatum</i>	x	
Coyote	<i>Canis latrans</i>	x	x
Kit Fox	<i>Vulpes velox</i>		x
Red Fox	<i>Vulpes vulva</i>	x	x
Northern Raccoon	<i>Procyon lotor</i>	x	x
Ringtail	<i>Bassariscus astutus</i>		??
Short-tailed Weasel	<i>Mustela ermineae</i>	x	x
Long-tailed Weasel	<i>Mustela frenata</i>	x	x
Mink	<i>Mustela vison</i>	x	x
Northern River Otter	<i>Lutra Canadensis</i>	x	x
American Badger	<i>Taxidea taxus</i>	x	x
Striped Skunk	<i>Mephitis mephitis</i>	x	x
Western Spotted Skunk	<i>Spilogale gracilis</i>	x	x
Mountain Lion	<i>Felix concolor</i>	x	x
Bobcat	<i>Lynx rufus</i>	x	x
Rocky Mountain Elk	<i>Cervus elaphus</i>	x	x
Mule Deer	<i>Odocoileus hemionus</i>	x	x
Pronghorn	<i>Antilocapra americana</i>	x	x

## Reptile and Amphibian Species

The table, below provides a list of potential species from the Duck Valley Indian Reservation (DVIR) (Dykstra et. al 2006) and Nevada Department of Wildlife's (NDOW) Bruneau River Management Area (Bradley 2006).

**Table 6 Wilson/101 Ranch Potential Reptile and Amphibian Species**

Common Name	Scientific Name	Species List DVIR	NDOW Bruneau WMA
<b>Reptiles</b>			
Western Fence Lizard	<i>Sceloporus occidentalis</i>	x	x
Northern Sagebrush Lizard	<i>Sceloporus graciosus graciosus</i>	x	x
Side-Blotched Lizard	<i>Uta stansburiana</i>	x	x
Short-Horned Lizard	<i>Phrynosoma douglasii</i>	x	x
Short-Horned Lizard	<i>Phrynosoma hernandesi</i>	x	x
Northern Desert Horned Lizard	<i>Phrynosoma platyrhinos</i>	x	x
Leopard Lizard	<i>Gambelia wislizenii</i>	x	x
Great Basin Skink	<i>Eumeces skiltonianus utahensis</i>		x
Western Whiptail	<i>Cnemidophorus tigris</i>	x	x
Rubber Boa	<i>Charina bottae</i>	x	x
Striped Whipsnake	<i>Masticophis taeniatus</i>	x	x
Great Basin Gopher Snake	<i>Pituophis catenifer deserticola</i>	x	x
Ringneck Snake	<i>Diadophis punctatus</i>		x
Long-nosed Snake	<i>Rhinocheilus lecontei</i>		x
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	x	x
Ground Snake	<i>Sonora semiannulata</i>	x	x
Night Snake	<i>Hypsiglena torquata</i>	x	x
Western Yellow-Bellied Racer	<i>Coluber constrictor mormon</i>	x	
California Kingsnake	<i>Lampropeltis getula californiae</i>	x	
Great Basin Rattlesnake	<i>Crotalus viridis lutosus</i>	x	x
<b>Amphibians</b>			
Great Basin Spadefoot Toad	<i>Spea intermontanus</i>	x	x
Columbia Spotted Frog (Great Basin Pop.)	<i>Rana luteiventris</i>	x	x
Northern Leopard Frog	<i>Rana pipiens</i>	x	x
Bullfrog (Non-native)	<i>Lithobates catesbeiana</i>		
Boreal (Western) Toad	<i>Bufo boreas</i>	x	x
Pacific Chorus (Tree) Frog	<i>Hyla regilla</i>	x	x

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## **Appendix B – Plateau Herbicide Fact Sheet**

# Imazapic

## Roadside Vegetation Management Herbicide Fact Sheet



This fact sheet was developed by Oregon State University and Intertox, Inc. to assist interested parties in understanding the risks associated with pesticide use in Washington State Department of Transportation's (WSDOT) Integrated Vegetation Management program.

### Introduction

Imazapic is an imidazolinone herbicide used to control selected annual and perennial grasses and broadleaf weeds. Imazapic kills plants by inhibiting the production of branched chain amino acids, which are necessary for protein synthesis and cell growth. Imazapic is the only active ingredient in the herbicide product **Plateau** (23.6%). According to the product label, **Plateau** also contains 76.4% inert ingredients (unspecified). The Washington State Department of Transportation (WSDOT) uses **Plateau** for pre-emergent control of weeds and some grasses. **Plateau** also has uses on pastures and rangeland.

WSDOT assessed the potential risks to human, wildlife, and aquatic animals exposed to imazapic in their Integrated Vegetation Management (IVM) program. Evaluating potential risks takes into account both the toxicity of a pesticide and the characteristics of possible exposure.

### WSDOT Application Rates and Use Patterns on Highway Rights-of-Way

**Plateau** is applied at a maximum of 12 fluid ounces per acre per year, which is equivalent to 0.19 pounds of the active ingredient imazapic per acre per year. WSDOT's typical application rate of **Plateau** is equivalent to about 0.093 pounds of imazapic per acre per year. Applicators use truck mounted booms to make a single application of imazapic in the spring or early summer. WSDOT only anticipates using imazapic in limited areas and only in Eastern Washington.

**Laboratory Testing:** Before pesticides are registered by the U.S. Environmental Protection Agency (EPA), they must undergo laboratory testing for short-term (acute) and long-term (chronic) health effects. Laboratory animals are purposely fed doses high enough to cause toxic effects. These tests help scientists determine how chemicals might affect humans, domestic animals, or wildlife in cases of overexposure. Pesticide products used according to label directions are unlikely to cause toxic effects. The amount of pesticide that people and pets may be exposed to is low compared to the doses fed to laboratory animals.

### Human Health Effects

The U.S. Environmental Protection Agency (U.S. EPA) classifies **Plateau** as category IV (Low Toxicity) with a signal word of CAUTION (see "Toxicity Category and Signal Word" table).

*Acute toxicity:* Imazapic has very low toxicity if individuals accidentally eat, touch, or inhale residues. Imazapic did not result in skin sensitization when tested on guinea pigs or skin or eye irritation when tested on rabbits.

*Chronic toxicity:* Imazapic does not appear to be toxic to experimental rodents at relatively high concentrations in the diet. Dogs, however, appear to be more sensitive than rodents, and

**LD50/LC50:** Acute toxicity is commonly measured by the lethal dose (LD) or lethal concentration (LC) that causes death in 50 percent of treated laboratory animals. LD50 indicates the dose of a chemical per unit body weight of an animal and is expressed as milligrams per kilogram (mg/kg). LC50 is the concentration of a chemical per volume of air or water and is expressed as milligrams per liter (mg/L). Chemicals are highly toxic when the LD50 or LC50 value is small and practically nontoxic when the value is large. However, the LD50 and LC50 do not reflect potential health effects such as cancer, birth defects, or reproductive toxicity that may occur at levels of exposure below those that cause death.

the major signs of toxicity include adverse effects on the muscle, blood, and liver.

*Reproductive effects:* In several standard tests required for pesticide registration, imazapic has failed to show any indication of adverse effects on reproduction or development.

*Carcinogenic effects:* In 2-year feeding studies in rats and mice, no evidence of carcinogenicity was found. Imazapic was also negative in four assays for mutagenicity. Imazapic is classified by U.S. EPA as "not likely" to be carcinogenic in humans.

*Fate in humans and animals:* The metabolism and kinetics of imazapic have been studied in rats, hens, and goats. These studies suggest that imazapic is rapidly excreted in the urine, principally as the parent compound (*i.e.*, imazapic). Imazapic does not accumulate (build up) in tissues.

**Toxicity Category and Signal Word**

	High Toxicity (Danger)	Moderate Toxicity (Warning)	Low Toxicity (Caution)	Very Low Toxicity (Caution)
Oral LD50	Less than 50 mg/kg	50-500 mg/kg	500-5000 mg/kg	Greater than 5000 mg/kg
Dermal LD50	Less than 200 mg/kg	200-2000 mg/kg	2000-5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC50	Less than 0.05 mg/l	0.05-0.5 mg/l	0.5-2.0 mg/l	Greater than 2.0 mg/l
Eye Effects	Corrosive	Irritation persisting for 7 days	Irritation reversible in 7 days	Minimal effects, gone in 24 hrs
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation

Note: Highlighted categories specify the range for aminopyralid use cited in this fact sheet.

### Wildlife and Aquatic Effects

*Effects on mammals:* Imazapic is practically non-toxic to mammals based on an acute oral LD50 > 5,000 mg/kg in rats, an acute dermal LD50 > 5,000 mg/kg in rabbits, and acute inhalation LC50 values of 2.38 mg/L and 9.52 mg/L for 4 and 1 hours, respectively, in the rat.

*Effects on birds:* Imazapic is practically non-toxic to birds based on acute LC50s >5000 mg/kg for mallard duck and bobwhite quail following acute dietary exposures.

*Effects on fish:* Imazapic is practically non-toxic to fish based on acute toxicity tests. Acute 96-hour LC50 values for channel catfish, sunfish, trout, and sheepshead minnow were all >100 mg/L.

*Effects on aquatic insects:* Imazapic is practically non-toxic to aquatic invertebrates based on acute toxicity tests. The LC50 for water fleas (*Daphnia magna*) is > 100 mg/L.

### Environmental Fate

The half-life of imazapic in soils ranges from 31 to 410 days, with a typical time of 120 days (see "Half-life" text box). Microbes and sunlight break it down. Imazapic shows moderate to high mobility in the environment, with a

**Wildlife Toxicity Category**

Risk Category	Mammals	Birds	Fish or Aquatic Insects
	Acute Oral or Dermal LD <sub>50</sub> (mg/kg)	Acute Oral LD <sub>50</sub> (mg/kg)	Acute LC <sub>50</sub> (mg/L)
Practically nontoxic	>2,000	>2,000	>100
Slightly toxic	501-2,000	501-2,000	>10-100
Moderately toxic	51-500	51-500	>1-10
Highly toxic	10-50	10-50	0.1-1
Very highly toxic	<10	<10	<0.1

Note: Highlighted categories specify the range for imazapic use cited in this fact sheet.

moderate potential to leach through soils and contaminate groundwater. With sufficient rainfall, alkaline soils low in clay and organic matter are particularly susceptible to imazapic leaching. It does not bioconcentrate (build up) through the food chain. Imazapic is adsorbed through the leaves and the roots where it is transported to other parts of the plant.

### Human Health Risk Assessment

WSDOT evaluated several human exposure scenarios, including workers applying herbicides and the public (adults and children) picking and eating drift-contaminated berries, eating drift-contaminated garden vegetables, and walking through sprayed vegetation. For each exposure scenario, WSDOT evaluated conditions of average exposure and extremely conservative conditions of maximum exposure (see "Human Cancer/Non-cancer Risk Classification" text box and "Human Risk Classification for Average Exposure Scenarios" table).

Imazapic is expected to pose negligible potential risks of adverse non-cancer effects to WSDOT workers and the public under conditions of average and maximum exposure. All hazard quotients are below 1. Imazapic is not regulated as a carcinogen.

### Wildlife Risk Assessment

Wildlife risk assessment considers herbicide behavior in the environment and routes of exposure. Indirect exposure to mammals and birds can occur when they eat contaminated prey or vegetation. Direct exposure can occur when mammals and birds contact herbicide residues with their skin or eyes or when they inhale vapors or particulates. WSDOT's current application rates and use patterns for imazapic pose an insignificant risk to mammals and birds. The estimated dietary exposures to rats, mice, and meadow voles from maximum label application rates would be approximately 38,000, 4,500, and 5,900-fold lower, respectively, than the acute dietary LD50 for rats. The estimated dietary exposures to bobwhite quail, marsh wrens, and American robins from WSDOT's application practices would be approximately 24,000, 2,700, and 2,100-fold lower, respectively, than the acute dietary LD50 for bobwhite quail.

### Aquatic Risk Assessment

WSDOT takes extra precautions applying herbicides near open water, wetlands, and wellhead protection zones. However, contamination may result from application drift, rainfall runoff, or residue leaching through the soil into groundwater. Fish and aquatic insect exposure to imazapic occurs primarily through direct contact with contaminated surface waters. Due to its relatively low toxicity and low application rate, the estimated risks to fish and aquatic invertebrates from WSDOT's current use patterns for imazapic are estimated to be low in

Half-life is the time required for half of the compound to degrade.

- 1 half-life = 50% degraded
- 2 half-lives = 75% degraded
- 3 half-lives = 88% degraded
- 4 half-lives = 94% degraded
- 5 half-lives = 97% degraded

Remember: the amount of a chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

### Human Cancer/Non-cancer Risk Classification:

Scientists estimate non-cancer health risks by generating a hazard quotient (HQ). This number is the exposure divided by the toxicity. When the HQ is less than 1, exposures are unlikely to cause any adverse health effects. When the HQ is greater than 1, the potential for non-cancer health effects should be considered. Risk assessments for chemicals that cause cancer (carcinogens) estimate the probability of an individual developing cancer over a lifetime. Cancer risks estimated in this way are very conservative, and actual cancer risks are likely to be much lower. Cancer risk estimates of less than 1 in 100,000 are within the range considered negligible by most regulatory agencies.

Human Risk Classifications for Average Exposure Scenarios

Hazard Quotient (Non-cancer Risk)	Cancer Risk	Potential Risks and Management Priority
Less than 1	Less than 1 in 100,000	Negligible
Between 1 and 10	Between 1 in 10,000 and 1 in 100,000	Low
Between 10 and 100	Between 4 in 1,000 and 1 in 10,000	Moderate
Greater than 100	Greater than 4 in 1,000	High

Note: Highlighted categories specify the range of potential risk for specific exposure scenarios involving imazapic.

all areas of the state.

**Additional Resources**

- National Pesticide Information Center 1-800-858-PEST (7378) and <http://npic.orst.edu>
- Washington State Department of Transportation, Roadside Maintenance Branch 1-360-705-7865
- Washington Department of Agriculture, Pesticide Management Division 1-877-301-4555 (toll free)

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## **Appendix C - Plateau Herbicide Label**

# PLATEAU<sup>®</sup>

herbicide

**FOR WEED CONTROL, NATIVE GRASS ESTABLISHMENT AND TURF GROWTH SUPPRESSION ON PASTURES, RANGELAND AND NONCROP AREAS AND CONIFER PLANTATION SITE PREPARATION**

**Active Ingredient:**

Ammonium salt of imazapic (±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid\* . . . . . 23.6%

**Other Ingredients:** . . . . . 76.4%

**Total:** . . . . . 100.0%

\*Equivalent to 22.2% (±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid (1 gallon contains 2.0 pounds of active ingredient as the free acid)

EPA Reg. No. 241-365  
U.S. Patent No. 4,798,619

EPA Est. No.

**KEEP OUT OF REACH OF CHILDREN  
CAUTION/PRECAUCION**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.  
(If you do not understand the label, find someone to explain it to you in detail.)

See inside for complete **First Aid, Precautionary Statements, Directions for Use, Conditions of Sale and Warranty**, and state-specific crop and/or use site restrictions.

**In case of an emergency endangering life or property involving this product, call day or night 1-800-832-HELP (4357).**

**Net Contents:**

BASF Corporation  
26 Davis Drive  
Research Triangle Park, NC 27709



<b>FIRST AID</b>	
<b>If inhaled</b>	<ul style="list-style-type: none"> <li>• Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.</li> <li>• Call a poison control center or doctor for further treatment advice.</li> </ul>
<b>If on skin or clothing</b>	<ul style="list-style-type: none"> <li>• Take off contaminated clothing.</li> <li>• Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
<b>If in eyes</b>	<ul style="list-style-type: none"> <li>• Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.</li> <li>• Call a poison control center for treatment advice.</li> </ul>
<b>HOTLINE NUMBER</b>	
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact BASF Corporation for emergency medical treatment information: 1-800-832-HELP (4357).	

## PRECAUTIONARY STATEMENTS

### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

# CAUTION

Avoid breathing spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling.

#### Personal Protective Equipment (PPE):

Applicators and other handlers must wear:

- Long-sleeve shirt and long pants
- Chemical-resistant gloves made of waterproof material
- shoes plus socks

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

#### User Safety Recommendations:

Users Should:

- Wash hands before eating, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

## ENVIRONMENTAL HAZARDS

For terrestrial use only. **DO NOT** apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark.

**DO NOT** contaminate water when disposing of equipment washwaters or rinsate.

This chemical demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.

This product may contaminate water through drift of spray in wind. This product has a high potential for runoff for several months or more after application. Poorly draining soils and soils with shallow watertables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours.

## IMPORTANT

**Plateau® herbicide** may be applied to non-irrigation ditches and low lying areas when water has drained, but may be isolated in pockets due to uneven or unlevel conditions. **DO NOT** treat the inside of irrigation ditches. **DO NOT** rinse equipment on or near desirable trees or ornamental plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. **DO NOT** use on residential lawns.

## DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

**DO NOT** apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

This labeling must be in the possession of the user at the time of pesticide application.

**DO NOT** use **Plateau** on food or feed crops except as recommended by this label or supplemental labeling.

**DO NOT** cut treated area for hay within seven days after treatment.

**DO NOT** use organophosphate insecticides on newly seeded areas treated with **Plateau** unless severe injury or loss of stand can be tolerated.

Observe all cautions and limitations on this label and on the labels of products used in combination with **Plateau**. **DO NOT** use **Plateau** other than in accordance with the instructions set forth on this label. The use of **Plateau** not consistent with this label may result in injury to desired vegetation. Keep containers closed to avoid spills and contamination.

When making new plantings of prairiegrass or wildflowers, carry-over from persistent herbicides such as atrazine, urea, imidazolinone, triazine, substituted urea, dinitroaniline, and other herbicides applied the previous year may result in compounded injury or death of desirable vegetation when treated with **Plateau**.

When making applications around desirable trees or ornamental plants, small areas should be tested to determine the tolerance of a particular species to soil and/or foliar applications of **Plateau**. See "TOLERANCE OF TREES AND BRUSH TO PLATEAU HERBICIDE" section of this label.

**DO NOT** apply this product through any type of irrigation system.

**DO NOT** exceed 12 ounces of **Plateau** per acre in one year.

### AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

**DO NOT** enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- coveralls
- chemical-resistant gloves made of any waterproof material
- shoes plus socks

### NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Noncrop weed control is not within the scope of the Worker Protection Standard. See the GENERAL INFORMATION section of this label for a description of noncrop sites.

**DO NOT** enter treated areas without protective clothing until sprays have dried.

### STORAGE AND DISPOSAL

**DO NOT** contaminate water, food or feed by storage or disposal.

**PESTICIDE STORAGE:** KEEP FROM FREEZING. **DO NOT** store below 20°F.

**PESTICIDE DISPOSAL:** Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

#### CONTAINER DISPOSAL

**Nonrefillable Container. DO NOT** reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying; then offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures approved by state and local authorities.

**Triple rinse containers small enough to shake (capacity ≤ 5 gallons) as follows:** Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

**Triple rinse containers too large to shake (capacity > 5 gallons) as follows:** Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Repeat this procedure two more times.

**Pressure rinse as follows:** Empty the remaining contents into application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank, or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

### In Case of Spill

In case of large-scale spillage regarding this product, call:  
CHEMTREC 1-800-424-9300  
BASF Corporation 1-800-832-HELP (4357)

## GENERAL INFORMATION

**Plateau® herbicide** is an aqueous solution to be mixed with water and an adjuvant and applied as a spray solution to provide weed control and/or turf height suppression on pastures, rangeland (see "GUIDELINES FOR RANGELAND USE" section), Federal Conservation Reserve Program (CRP) land and noncropland areas including noncropland areas that may be grazed or cut for hay. Examples of noncropland areas include, but are not limited to railroad, utility, pipeline and highway rights-of-way, railroad crossings, utility plant sites, petroleum tank farms, pumping installations, non-agricultural fence rows, storage areas, non-irrigation ditchbanks, prairie sites, airports, industrial turf, golf courses, recreational and non-residential turf and other similar areas. **Plateau** may be used for the release of bermudagrass, bahiagrass, smooth bromegrass, wheatgrass, "wildtype" common Kentucky bluegrass, native prairiegrass, wildflowers, crown vetch, other grasses and certain legumes. **Plateau** can also be used for weed control during the establishment of native prairiegrasses and other grasses (see "REVEGETATION WITH PRAIRIEGRASSES AND OTHER FORAGE GRASSES" section). **Plateau** may also be used for conifer plantation site preparation.

**Plateau** is readily absorbed through leaves, stems, and roots and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is translocated into, and kills, underground storage organs which prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species for several weeks after application. Complete kill of plants may not occur for several weeks after application. Adequate soil moisture is important for optimum **Plateau** activity. When adequate soil moisture is present, **Plateau** will provide residual control of susceptible germinating weeds. Activity on established weeds will depend on the weed species and rooting depth. **Plateau** is rainfast one hour after application.

**Plateau** will control annual and perennial grasses and broadleaf weeds and vine species. **Plateau** will provide residual control of labeled weeds which germinate in the treated area. Certain brush species and ornamentals may be injured by direct application of **Plateau** to their foliage. This product may be applied either preemergence or postemergence to the weeds. However, postemergence application is the method of choice in most situations, particularly for perennial species. For maximum activity, weeds should be growing vigorously at the time of postemergence applications and the spray solution should include an adjuvant (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). These solutions may be applied as a broadcast or as a spot treatment using backpack, or ground equipment.

**Plateau** may be applied in the dormant or growing season for weed control.

Tolerance of desirable grass species to **Plateau** may be reduced when grasses are stressed due to insect damage, disease, environmental conditions, shade, poorly drained soils or other causes.

Depending on the turf type being treated, some yellowing of turf may occur with applications during the growing season. Decoloring on weather conditions, yellowing will usually disappear in 2 to 4 weeks.

**Plateau** should not be applied to newly seeded or sprigged grass stands, unless otherwise stated in this label (see "REVEGETATION WITH PRAIRIEGRASSES AND OTHER FORAGE GRASSES" section).

### MANAGING OFF-TARGET MOVEMENT

**Spray Drift:** Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

Spray drift from applying this product may result in damage to sensitive plants adjacent to the treatment area. Only apply this

product when the potential for drift to these and other adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, or non-target crops) is minimal. **DO NOT** apply when the following conditions exist that increase the likelihood of spray drift from intended targets: high or gusty winds, high temperatures, low humidity, temperature inversions.

To minimize spray drift, the applicator should be familiar with and take into account the following drift reduction advisory information. Additional information may be available from state enforcement agencies or the Cooperative Extension on the application of this product.

The best drift management strategy and most effective way to reduce drift potential are to apply large droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see **Wind, Temperature and Humidity and Temperature Inversions**).

### Controlling Droplet Size:

-Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.

-Pressure - **DO NOT** exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.

-Number of Nozzles - Use the minimum number of nozzles that provide uniform coverage.

-Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is recommended practice. Significant deflection from the horizontal will reduce droplet size and increase drift potential.

-Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift. **DO NOT** use nozzles producing a mist droplet spray.

**Application Height:** Making applications at the lowest possible height (aircraft, ground driven spray boom) that is safe and practical reduces exposure of droplets to evaporation and wind.

**Swath Adjustment:** When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

**Wind:** Drift potential is lowest between wind speeds of 3-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 3 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

**Temperature and Humidity:** When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

**Temperature Inversions:** Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud, which can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind

conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

**Wind Erosion:** Avoid treating powdery dry or light sandy soils when conditions are favorable for wind erosion. Under these conditions, the soil surface should first be settled by rainfall or irrigation.

**Aerial Application Methods and Equipment:** Use 2 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

**Managing spray drift from aerial applications:** Applicators must follow these requirements to avoid off-target drift movement: 1) boom length - the distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor, 2) nozzle orientation - nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees, and 3) application height - without compromising aircraft safety, applications should be made at a height of 10 feet or less above the crop canopy or tallest plants. Applicators must follow the most restrictive use cautions to avoid drift hazards, including those found in this labeling as well as applicable state and local regulations and ordinances.

**Ground Application (Broadcast):** Use 5 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

### MIXING INSTRUCTIONS

Fill the spray tank one-half to three-quarters full with clean water. Use a calibrated measuring device to measure the required amount of **Plateau® herbicide**. Add **Plateau** to the spray tank while agitating. Fill the remainder of the tank with water.

For postemergence applications, add a surfactant to the spray tank (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section of this label for specific recommendations). Maintain agitation while spraying to ensure a uniform spray mixture. An antifoaming agent may be added to the tank if needed.

When tank-mixing **Plateau** with recommended herbicides, add wettable powders, dispersible granules or other dry formulations first, then EC's, then **Plateau**, and then an adjuvant.

### SPRAYING INSTRUCTIONS

**DO NOT** apply during windy or gusty conditions unless applications are being made with a drift control agent and/or an enclosed or shielded spray system. **DO NOT** apply if rainfall is threatening. Rainfall within 1 hour after **Plateau** application may reduce weed control.

#### GROUND APPLICATIONS:

Uniformly apply with properly calibrated ground equipment in 2 or more gallons of water per acre. Application equipment, specially designed to make low volume application should be used when making applications using less than 10 gallons of water per acre. A spray pressure of 20 to 40 psi is recommended.

To achieve acceptable control of the target vegetation, good spray coverage of the weed foliage (postemergence) or soil surface (preemergence) is required. To achieve good spray coverage the sprayer must be calibrated to deliver the recommended spray volume and pressure and adjust the spray boom height to ensure proper coverage of weed foliage or soil surface (according to the manufacturer's recommendation). Avoid overlaps when spraying.

#### SPOT TREATMENTS:

To prepare the spray solution, thoroughly mix in water 0.25 to 1.5% (0.3 to 1.9 oz/gallon water) **Plateau** plus an adjuvant (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). A methylated seed oil at 1% v/v is the recommended spray adjuvant except when treating seedling prairiegrasses and wildflowers. When making spot applications, spray coverage should be sufficient to moisten the leaves of the target vegetation, but not to the point of run-off. See section on desired species and **DO NOT** exceed the recommended **Plateau** rate per acre. Also see "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections for specific rate and/or tank-mix recommendations.

#### AERIAL APPLICATION:

All precautions should be taken to minimize or eliminate spray drift. Fixed wing aircraft and helicopters can be used to apply **Plateau**<sup>®</sup> herbicide, however, when making applications by fixed wing aircraft maintain appropriate buffer zones to prevent spray drift out of the target area. Aerial equipment designed to minimize spray drift such as a helicopter equipped with a MICROFOIL<sup>™</sup> boom, or THRU-VALVE<sup>™</sup> boom or raindrop nozzles, must be used and calibrated. Except when applying with a MICROFOIL boom, a drift control agent may be added at the recommended label rate. To avoid drift, applications should not be made during inversion conditions, when winds are gusty, or under any other conditions that promote spray drift.

Uniformly apply recommended amount of **Plateau**, using enough water volume to provide adequate coverage of target area or foliage. Include an adjuvant in the spray solution (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). A foam reducing agent may be added at the recommended rate, if needed. Aerial application to target species growing under the canopy of trees and brush may not receive sufficient spray coverage for effective control. For weed species with a recommended fall application timing (see "SPECIAL WEED CONTROL" section), delaying the aerial application until trees and brush have dropped their leaves can improve weed control and reduce the potential for tree and brush injury (see "TOLERANCE OF TREES AND BRUSH TO PLATEAU HERBICIDE" section).

**IMPORTANT:** Thoroughly clean application equipment, including landing gear, immediately after use of this product. Prolonged exposure of this product to uncoated steel (except stainless steel) surfaces may result in corrosion and failure of the exposed part. The maintenance of an organic coating (paint) may prevent corrosion.

Avoid overlaps when spraying.

#### SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS

Postemergence applications of **Plateau** require a spray adjuvant. See "SPECIAL WEED CONTROL" section. Due to variations in surfactant contents, certain surfactants containing high amounts of alcohols, paraffin based petroleum oils, and other compounds which can increase phytotoxicity to desirable vegetation, it is recommended to choose a low phytotoxic surfactant.

**Methylated Seed Oils or Vegetable Oil Concentrates:** Instead of a surfactant, a methylated vegetable-based seed oil concentrate containing 5 to 20% surfactant and the remainder methylated vegetable oil is the preferred adjuvant for use with **Plateau** and may be used at the rate of 1.5 to 2 pints per acre. Methylated seed oils provide their greatest effects at 30 GPA or less. At spray volumes above 50 GPA, their advantage appears negated. When using spray volumes greater than 30 gallons per acre methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume or alternatively use a nonionic surfactant as described below. Research indicates these oils may aid in deposition and uptake of **Plateau** for hard-to-control perennials, waxy leaf species or when plants are under moisture or temperature stress. **DO NOT** use a methylated seed oil or vegetable oil concentrate when making applications to newly emerged seedling prairiegrasses or wildflowers as injury may occur.

**Nonionic Surfactants:** Use a nonionic surfactant at the rate of 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 and having at least 60% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements). Nonionic surfactants are the preferred adjuvant for use with **Plateau** in bermudagrass pastures and hay meadows.

**Silicone-Based Surfactants:** See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake and higher spray volumes may exhibit "run-off".

**Fertilizer/Surfactant Blends:** Nitrogen-based liquid fertilizers such as 28%N, 32%N, 10-34-0, or ammonium sulfate, may be added at the rate of 2 to 3 pints per acre in combination with the recommended rate of nonionic surfactant or methylated seed oil. Research indicates that nitrogen based fertilizers aid in the burndown of annual weeds and increase **Plateau** uptake through waxy leaf species. However, fertilizers may increase phytotoxicity to desired species and newly emerged seedling prairiegrasses and wildflowers. The use of liquid fertilizers at a rate of 2 to 3 pints per acre in a tank-mix without a nonionic surfactant or a methylated seed oil is not recommended and may result in herbicide failure. Only when liquid fertilizer is used as the spray carrier is no additional spray adjuvant required.

#### TANK MIXES

For use in noncrop areas, **Plateau** may be tank-mixed with PENDULUM<sup>®</sup> herbicide for additional control of late season annual grasses and certain broadleaves. For additional weed control in noncrop areas, **Plateau** may be tank-mixed with ACCORD<sup>®</sup>, ROUNDUP<sup>®</sup> PRO, glyphosate, ARSENAL<sup>®</sup> herbicide, SAHARA<sup>®</sup> DG herbicide, diuron, CAMPAIGN<sup>®</sup>, FINALE<sup>®</sup>, GARLON<sup>™</sup> 3A, MSMA, VANQUISH<sup>®</sup>, OUST<sup>®</sup>, ESCORT<sup>®</sup>, TORDON<sup>®</sup>, or other labeled products. A compatibility test is advised for products not listed. 2,4-D and other phenoxy type herbicides have resulted in reduced control of perennial grass weeds.

For tank mix recommendations for use in bermudagrass pastures, refer to the "DIRECTIONS FOR USE IN BERMUDAGRASS PASTURES AND HAY MEADOWS" section.

**DO NOT** tank mix with organophosphate insecticides or use the same year as **Plateau** when making applications to newly planted areas.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

#### FOR WEED CONTROL IN PASTURE AND RANGELAND

For the control of undesirable weeds in pasture and rangeland (see "GUIDELINES FOR RANGELAND USE" section), apply **Plateau** at 2 to 12 oz. per acre as a broadcast treatment or as a 0.25% to 1% solution with 1.0% MSO for spot treatments. See appropriate sections of this label for specific use directions.

#### GUIDELINES FOR RANGELAND USE

**Plateau** may be applied to rangeland for the control of undesirable vegetation in order to achieve one or more of the following vegetation management objectives:

1. The control of undesirable (non-native, invasive and noxious) plant species.
2. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland plant species.
3. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland vegetation following a fire.
4. The control of undesirable vegetation for purposes of wildfire fuel reduction.
5. The release of existing desirable rangeland plant communities from the competitive pressure of undesirable plant species.
6. The control of undesirable vegetation for purposes of wildlife habitat improvement.

To ensure the protection of threatened and endangered plants when applying **Plateau** to rangeland:

1. Federal agencies must follow NEPA regulations to ensure protection of threatened and endangered plants.
2. State agencies must work with the Fish and Wildlife Service or the Service's designated state conservation agency to ensure protection of threatened and endangered plants.
3. Other organizations or individuals must operate under a Habitat Conservation Plan if threatened or endangered plants are known to be present on the land to be treated.

Please see the appropriate section(s) of this label for specific use directions for the desired rangeland vegetation management objective.

**Plateau® herbicide** should only be applied to a given rangeland acre as specific weed problems arise. For the control of annual weed species such as cheatgrass, downy brome and medusahead rye, a single application of **Plateau** that coincides with the successful establishment and/or release of desirable rangeland vegetation and the use of available IPM can provide effective, sustainable control of the annual weed problem. For difficult to control perennial weed species such as leafy spurge, dalmatian toadflax and Russian knapweed, a single broadcast application of **Plateau** should be effective in most cases. If needed, spot treatments with **Plateau** can be used to control any remnant plants or new seedlings that may emerge. Long term control of undesirable weed species ultimately depends on the successful use of land management practices that promote the growth and sustainability of desirable rangeland plant species.

### DIRECTIONS FOR USE IN BERMUDAGRASS PASTURES AND HAY MEADOWS

**Plateau** may be used postemergence at a rate of 4 to 12 oz per acre for control of undesirable winter and summer annual and perennial grasses in bermudagrass pastures and hay meadows (see rate and timing recommendations below). **Plateau** may be used on common and coastal varieties of bermudagrass including, but not restricted to Tifton 44, 78 and 85, Alicia and Russell. Suppression of bermudagrass growth for 30 to 45 days or longer may occur, depending upon growth conditions after application. Jiggs bermudagrass in particular has shown greater sensitivity to **Plateau**. **DO NOT** use **Plateau** if this growth response is not acceptable.

In bermudagrass pastures and hay meadows, even and thorough spray coverage is necessary to achieve the desired level of weed control. To ensure proper spray coverage, the sprayer must be calibrated to deliver the recommended spray volume and pressure and the spray boom height adjusted to ensure proper coverage of weed foliage (according to the manufacturer's recommendation). The use of boomless or flood type nozzles is not recommended and may result in decreased weed control.

**DO NOT** apply **Plateau** to drought stressed bermudagrass.

**DO NOT** use **Plateau** for the establishment of sprigged or seeded bermudagrass.

**DO NOT** use **Plateau** on World Feeder varieties of bermudagrass.

**DO NOT** apply **Plateau** during transition from dormancy to full green-up.

Avoid applications of **Plateau** to newly aerated fields for 30 days after aeration.

**Spring Applications and Bermudagrass Tolerance:** Spring application of **Plateau** should only be made after bermudagrass has reached 100% green-up. **Plateau** applications to bermudagrass during transition from winter dormancy to 100% green-up will significantly delay green-up and growth of bermudagrass, resulting in the potential loss of one or more cuttings. Bermudagrass can be considered to have reached 100% green-up only when all stolons (runners) have developed new active growth. Partial green-up may be characterized by the green appearance of new bermudagrass growth in the field, but upon close inspection some of the stolons may not have begun to grow. **Plateau** applications made at this time can still cause significant reductions in bermudagrass growth and development and should be delayed until 100% green-up. To minimize bermudagrass response from spring applications, all applications should be made postemergence to the targeted summer annual or perennial weeds. See specific use directions below for appropriate postemergence timing for targeted weed species.

**General rate recommendations:** Most annual and some perennial weeds in bermudagrass pastures and hay meadows can be controlled with postemergent application of **Plateau** at 4 to 6 oz per acre. For early applications when target weeds are small and have not been subjected to multiple cuttings, the lower recommended rate should be used. For later applications as target weeds become older, larger or have been subjected to multiple cuttings, then the higher recommended rate should be used. Read and follow the specific rate recommendations below for the individual weed species.

**Postemergent Control of Summer Annual and Perennial Grass Weeds:** Apply **Plateau** after bermudagrass has reached full green-up and target grass weeds are at the desired growth stage (see recommended rates and growth stages below). Early Spring applications made during transition from dormancy to green-up will delay bermudagrass green-up and subsequent bermudagrass growth. Recommended **Plateau** applications may cause some stolon internode shortening and yellowing of the bermudagrass. The use of a nitrogen fertilizer (32-0-0 or 28-0-0) as the spray carrier will shorten recovery time.

For summer annual grass control apply 4 to 6 oz per acre of **Plateau** early postemergence (2 to 4 leaf stage) following full bermudagrass green-up. If target weeds are at or above boot stage, apply 6 to 8 oz per acre for control. Always add a surfactant when applying **Plateau** unless liquid fertilizer is being used as the spray carrier. **Plateau** will provide some preemergence annual grass control, however initial applications need to be made postemergence to target weed species.

For summer perennial grass control apply 6 to 12 oz per acre of **Plateau** postemergence following bermudagrass green-up. If higher rates (8 to 12 oz per acre) are needed for control of target species, **Plateau** can be applied in the fall before killing frost occurs. When making a fall application, if bermudagrass has been cut for hay, allow sufficient regrowth of target species before making application. Always add a surfactant when applying **Plateau** unless liquid fertilizer is being used as the spray carrier.

**Postemergent Control of Winter Annual and Perennial Grass Weeds:** Apply **Plateau** when bermudagrass is dormant prior to green-up. If bermudagrass has green tissue at the root crown or stolons, applications of **Plateau** may delay green-up of bermudagrass and subsequent bermudagrass growth. During mild winters, bermudagrass in the deep South may not be completely dormant. Applications in these areas should be avoided if delayed green-up cannot be tolerated.

For winter annual and perennial grass control, apply 6 to 12 oz per acre of **Plateau** postemergent, when bermudagrass is dormant. The addition of 16 to 24 oz per acre of ROUNDUP® ULTRA or glyphosate equivalent will increase control of larger winter annual and cool season perennial grasses. Always add a surfactant when applying **Plateau** unless liquid fertilizer is being used as the spray carrier.

**Recommended Plateau Rates for Postemergent Summer Annual Grass Control**

Common Name	Genus Species	Weed Height (inches)	Rate per Acre (fluid oz)
Large Crabgrass	<i>Digitaria sanguinalis</i>	≤4	4
		>4	6
Southern Crabgrass	<i>Digitaria ciliaris</i>	≤4	4
		>4	6
Smooth Crabgrass	<i>Digitaria ischaemum</i>	≤4	4
		>4	6
Giant Foxtail	<i>Setaria faberi</i>		6
Green Foxtail	<i>Setaria viridis</i>	≤4	4
		>4	6
Yellow Foxtail	<i>Setaria glauca</i>	≤4	4
		>4	6
Texas Panicum	<i>Panicum texanum</i>		6
Fall Panicum	<i>Panicum dichotomiflorum</i>		6
Broadleaf Signalgrass	<i>Bracharia platyphylla</i>	≤4	4
		>4	6
Annual Jewgrass	<i>Microstegium vimineum</i>	≤4	4
		>4	6
Barryardgrass	<i>Echinochloa crus-galli</i>	≤4	4
		>4	6
Sandbur	<i>Cenchrus</i> spp.	≤4	4
		>4	6

<sup>1</sup> Summer annual grasses that are older, larger or have been subjected to multiple cuttings should be treated with the higher rate.

Applications made to summer annual grasses should be done after bermudagrass green-up. Applications of **Plateau**<sup>®</sup> herbicide made during bermudagrass transition will delay green-up and subsequent bermudagrass growth. Avoid applications to bermudagrass during green-up transition if delayed green-up cannot be tolerated.

**Recommended Plateau Rates for Postemergent Summer Perennial Grass Control**

Common Name	Genus Species	Weed Height (inches)	Rate per Acre (fluid oz)
Johnsongrass	<i>Sorghum halepense</i>	18-24	8
		>24	12
Vaseygrass	<i>Paspalum urvillei</i>	4-8	6-8
Nutsedge	<i>Cyperus</i> spp.	≤4	4
		>4	6
Bahiagrass	<i>Paspalum notatum</i>	4-8	6-8
Deilsgrass <sup>2</sup>	<i>Paspalum dilatatum</i>	4-8	8-12
Smutgrass <sup>2</sup>	<i>Sporobolus indicus</i>	4-8	8-12

<sup>1</sup> Summer annual grasses that are older, larger or have been subjected to multiple cuttings should be treated with the higher rate.

<sup>2</sup> Suppression

**Recommended Plateau Rates for Postemergent Winter Annual and Cool Season Perennial Grass Control**

Common Name	Genus Species	Weed Height (inches)	Rate per Acre (fluid oz)
Annual Ryegrass*	<i>Lolium multiflorum</i>	≤6	6
		>6	10
Tall Fescue	<i>Festuca arundinacea</i>	—	12
Wild Oats	<i>Avena fatua</i>	≤6	6
		>6	10
Little Barley	<i>Hordeum pusillum</i>	≤6	4
		>6	6

\*AHAS and ALS resistant annual ryegrass has been documented across the Southeastern United States. To minimize this problem, tank mix 16 to 24 oz per acre of ROUNDUP<sup>®</sup> ULTRA or glyphosate equivalent when making applications to annual ryegrass.

**Spray Adjuvants:** The addition of 10 to 20 gallons per acre of 32-0-0 or 28-0-0 liquid fertilizer as part of the spray carrier will promote the recovery of the bermudagrass from any growth reduction caused by the herbicide application. No additional spray adjuvant is required if liquid fertilizer is used as the spray carrier.

See "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section for additional spray adjuvant recommendations.

**DO NOT** use crop oil concentrates (COC) as spray adjuvant for control of weeds with **Plateau**.

**Tank Mixtures:** For broadleaf weed control the addition of a broadleaf herbicide such as WEEDMASTER<sup>®</sup> is recommended. **Plateau** may also be tank mixed with GRAZON<sup>®</sup>, REMEDY<sup>®</sup>, REDEEM<sup>®</sup>, ALLY<sup>®</sup>, 2,4-D and ROUNDUP<sup>®</sup> ULTRA or glyphosate equivalent. Applications with tank mixes of 2,4-D that exceed 1 pound active ingredient per acre and applications with tank mixes of triclopyr amine that exceed 1.5 pounds active ingredient per acre may reduce efficacy on target grass weed species.

**USE OF PLATEAU HERBICIDE ON FEDERAL CONSERVATION RESERVE PROGRAM (CRP) LAND**

**Plateau** may be used on Federal Conservation Reserve Program (CRP) land at rates up to 12 oz. per acre per year (see minimum plant-back intervals below). See appropriate section of this label for specific instructions for the intended use.

**ROTATIONAL CROP RESTRICTIONS**

The following rotational crops may be planted after applying **Plateau**. Planting rotational crops earlier than the recommended interval may result in crop injury.

Plateau Use Rate (oz/A)	Minimum Plant Back Interval (Months After Plateau Herbicide Application)				
	≤4	5-8	9-12	12	18
≤4	12	12	18	26	40
5-8	12	14	22	30	44
9-12	12	18	24	36	48

Rotational Crops	Bahiagrass	Snapbeans	Barley	Field corn <sup>1</sup>	Canola <sup>2</sup>
	CLEARFIELD <sup>®</sup>	Southern	Cotton <sup>1</sup>	All crops not	Potatoes <sup>2</sup>
	corn hybrids	peas	Grain	otherwise list-	Red table
	Peanuts	Soybeans	sorghum	ed or included	beets <sup>2</sup>
	Rye	Tobacco	Oats	for use on this	Sugar
	Wheat			label <sup>2</sup>	beets <sup>2</sup>

<sup>1</sup> For Arizona, New Mexico, Oklahoma, and Texas only: Depending on the **Plateau** use rate, cotton may be planted 18 to 24 months after **Plateau** application in the states of Arizona, New Mexico, Oklahoma, and Texas unless drought conditions develop the year of **Plateau** application. **DO NOT** rotate to cotton at 18 to 24 months after **Plateau** application if less than 15 inches of rainfall or irrigation is received from the time of **Plateau** application through November 1 of the same year. If drought conditions develop the year of **Plateau** application, cotton may be planted 26, 30 and 40 months after **Plateau** application.

<sup>2</sup> After the recommended rotational interval listed for these selected crops and for all crops not otherwise listed or included for use on this label, a successful field bioassay must be completed. The field bioassay consists of a test strip of the intended rotational crop planted across the previously treated field and grown to maturity. The test strip should include low areas and knolls, and include variations in soil such as type and pH. If no crop injury is evident in the test strip, then the intended rotational crop may be planted the following year.

Use of **Plateau** in accordance with label directions is expected to result in normal growth of plant-back crops in most situations; however, various environmental and agronomic factors make it impossible to eliminate all risks associated with the use of this product and, therefore, plant-back crop injury is always possible. If crop injury is a concern then a bioassay with the desired crop is recommended prior to planting.

**FOR FOLIAR AND SEEDHEAD SUPPRESSION OF BAHIAGRASS, COOL SEASON GRASSES AND SUPPRESSION OF SOME ANNUAL WEEDS**

**Bahiagrass:** Plateau® herbicide may be used at the rate of 2 to 6 oz per acre to suppress growth and seedhead development of bahiagrass in unimproved areas. In North and South Carolina it is recommended to use Plateau at the rate of 2 oz or 3 oz per acre respectively, as higher rates may cause turf thinning. Depending on rate of Plateau used, surfactant and environmental conditions, temporary turf discoloration may occur. For optimum performance, application should be made after green-up. Applications may be made before or after mowing. If applied prior to mowing, raise mowing height to leave adequate existing foliage as new growth will be suppressed. If applied after mowing, allow adequate foliage to remain by increasing mower height or allowing time for foliar regrowth prior to application. **DO NOT** apply to turf under stress (drought, cold, insect, disease, etc.) or severe injury may occur. **DO NOT** use a methylated seed oil adjuvant.

PLATEAU	PHYTOTOXICITY	LENGTH OF SUPPRESSION
2 oz	none to low	partial to season long
3 to 6 oz	low to moderate	season long

For winter annual weed control, apply 8 oz of Plateau when bahiagrass is dormant, but when weeds are actively growing. This can be followed by 3 to 4 oz of Plateau in the spring after bahiagrass green-up for the suppression of seedheads and foliage.

**Cool Season Grasses:**

**KY31 Tall Fescue and "Wildtype Common" Kentucky**

**Bluegrass:** Apply Plateau at 2 to 4 oz per acre for foliar and seedhead suppression of certain cool season grasses such as "KY31" tall fescue and "wildtype common" Kentucky bluegrass. **DO NOT** use a methylated seed oil adjuvant. Add a surfactant to the 2 oz rate of Plateau for optimum performance. The addition of a surfactant to 4 oz of Plateau may cause excessive turf injury or mortality of tall fescue. Application to turf type tall fescue or Kentucky bluegrass may result in severe injury or loss of stand.

**Wheatgrass:** Apply Plateau at 6 to 10 oz. per acre for foliar and seedhead suppression of crested wheatgrass, and 6 to 12 oz. per acre for foliar and seedhead suppression of intermediate wheatgrass. Other wheatgrass species may also be suppressed, however, apply Plateau to a limited area to determine effectiveness. Tank-mixes with 2,4-D or products containing 2,4-D may decrease the effectiveness of Plateau. Tank-mixes with GARLON®, TORDON®, TRANSLINE™ and VANQUISH® may decrease the potential of turf injury. **DO NOT** apply to turf under stress or severe injury may occur.

**FOR THE CONTROL OF UNDESIRABLE WEEDS IN BERMUDAGRASS NOT BEING GROWN FOR FORAGE OR HAY**

Plateau may be used on bermudagrass turf such as roadsides, utility rights-of-way, railroad crossings, airports, non-irrigation drainage ditches and other noncropland sites. There is a differential tolerance between bermudagrass types (see below paragraphs). Depending on bermudagrass type, timing of application, and Plateau rate, some foliar, stolon, and seedhead suppression may occur. **IMPORTANT:** Apply Plateau after bermudagrass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying Plateau. **DO NOT** apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to Plateau application as some internode suppression may prevent bermudagrass from quickly recovering from mowing.

**Common Bermudagrass:** Common bermudagrass is the most tolerant bermudagrass to Plateau. Tank-mixes with ROUNDUP PRO, ACCORD or glyphosate will improve the weed control spectrum, but may increase turf phytotoxicity. Some stolon internode shortening and seedhead suppression may occur for the first 8 weeks.

**Established Coastal Bermudagrass:** Plateau at 2 to 12 oz per acre will provide control of labeled weeds as well as foliar and seed head suppression of established coastal bermudagrass. **DO NOT** use on World Feeder varieties of bermudagrass. Depending on environmental conditions and weed pressure, the longevity of suppression and weed control increases as the Plateau rate increases. Tank-mixes with ROUNDUP PRO, ACCORD, or glyphosate may result in death or excessive injury of coastal bermudagrass.

**Turf Type Bermudagrass:** Turf type bermudagrass varieties show a high degree of variation in tolerance to Plateau. Plateau at rates of 2 to 6 oz per acre will provide some annual weed control and foliar & seedhead suppression. Rates above 6 oz per acre may result in excessive injury or death of turf type bermudagrass.

**SEE ABOVE SECTIONS FOR PLATEAU HERBICIDE RATES AND TIMINGS FOR SPECIFIC BERMUDAGRASS TYPES WITH REGARD TO WEED CONTROL AND TURF TOLERANCE.**

**Winter Annual Weed Control:** Apply Plateau at the rate of 4 to 12 oz. per acre prior to winter weed germination or while winter weeds are actively growing. Early spring applications may delay green-up of bermudagrass turf.

**Summer Annual Weeds:** For best results, apply Plateau at the rate of 4 to 12 oz per acre preemergence or early postemergence before weeds have reached 6 inches in height. Larger weeds may be controlled depending on susceptibility, growing conditions, tank-mix partner and adjuvant selection.

**Perennial Weeds:** Apply Plateau at the rate of 8 to 12 oz per acre postemergence after weeds have produced adequate foliage for herbicide uptake. For a particular weed see "SPECIAL WEED CONTROL" section below. The addition of ACCORD or ROUNDUP PRO herbicide may increase control.

**Bahiagrass Control:** Apply Plateau at the rate of 8 to 12 oz per acre postemergence. See "SPECIAL WEED CONTROL" section below for recommendations. The addition of ROUNDUP PRO or ACCORD herbicide at 12 to 16 oz per acre may increase control.

**FOR THE CONTROL OF UNDESIRABLE WEEDS IN UNIMPROVED CENTIPEDE GRASS**

Plateau may be applied at a rate of 4 to 8 oz per acre to established centipede grass for the control of annual broadleaf and grass weeds. Apply Plateau after centipede grass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying Plateau. **DO NOT** apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to Plateau application as some internode suppression may prevent centipede grass from quickly recovering from mowing.

**FOR CONTROL OF UNDESIRABLE WEEDS IN SMOOTH BROMEGRASS, WILDTYPE COMMON KENTUCKY BLUEGRASS AND WHEATGRASSES**

Plateau may be used on smooth brome grass, "wildtype" common Kentucky bluegrass and wheatgrass. Plateau provides control of labeled grass and broadleaf weeds (see "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections). Treatment of smooth brome grass and wheatgrass with Plateau may result in foliar height and seedhead suppression.

**Smooth Brome grass and "Wildtype" Common Kentucky Bluegrass:** Use Plateau at 4 to 8 oz per acre in the spring for weed control and growth suppression after smooth brome grass and "wildtype" common Kentucky bluegrass have reached 100% green-up. Applications prior to 100% green-up may delay green-up. Rates from 8 to 12 oz per acre may be applied in the spring but may result in excessive growth suppression. For fall applications (see "SPECIAL WEED CONTROL" section). Plateau may be used at 8 to 12 oz per acre for control of perennial weeds.

**Wheatgrass:** To control undesirable weeds in wheatgrasses apply Plateau at 4 to 12 oz. per acre.

## FOR CONTROL OF UNDESIRABLE WEEDS IN CROWN VETCH

**Plateau® herbicide** may be applied at the rate of 4 oz per acre to newly seeded crown vetch beds to aid in the establishment of vetch and reduce weed competition.

**Plateau** at 8 to 12 oz per acre may be used on unimproved established crown vetch in noncropland areas. **Plateau** provides control of labeled grass and broadleaf weeds (refer to the "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections for specific rates). Treatment of crown vetch beds with **Plateau** may cause internode shortening and some minor tip chlorosis depending on timing of application.

**Plateau** should be applied during winter dormancy or early spring to reduce potential injury. Applications made after May, may result in increased injury or defoliation. Addition of surfactants such as dilimnene based or crop oil concentrates will increase injury. Fall applications during the period of active crown vetch growth may result in severe injury or loss of stand.

## REVEGETATION WITH PRAIRIEGRASSES AND OTHER FORAGE GRASSES

**Plateau** may be applied at the rate of 2 to 12 oz per acre to newly established or existing stands of labeled species (see below for details) in such areas as pasture, rangeland (see "GUIDELINES FOR RANGELAND USE" section), Conservation Reserve Program (CRP) land and noncropland sites such as roadsides, industrial sites, prairie restoration sites, drainage ditch banks, and other similar areas. Certain local ecotypes or varieties may be suppressed by **Plateau**. Many factors such as poor seedling vigor, cool temperatures, poor soil, planting depth, excessive moisture, disease, insects and dry weather after emergence can all result in poor stands. Additional stress of herbicide residue, poor soils and other factors contributing to poor seedling vigor can also increase injury and could result in mortality. BASF can not be held responsible for such unforeseen factors. It is suggested to try **Plateau** on a small area if tolerance is not known. **Plateau** controls many annual and perennial grass and broadleaf weeds. Weed competition is reduced allowing grass seedlings to establish. **Plateau** is also effective for control of noxious weeds in established grass stands and must be applied postemergence as a foliar treatment to perennial weeds. **IMPORTANT: ALWAYS ADD AN ADJUVANT** when applying **Plateau**. To maximize weed control always use a methylated seed oil when treating established grass stands. Use a nonionic surfactant when treating newly emerged seedling grasses. The addition of liquid fertilizer will decrease grass tolerance and should not be used when treating newly emerged seedling grasses.

**Plateau** may be applied at a rate of up to 12 oz per acre to Federal Conservation Reserve Program (CRP) land for the establishment or release of certain grass species (see "TOLERANT GRASS SPECIES" table).

**Establishment:** For optimum results in establishing mixed grass stands with **Plateau**, make application at planting before grass seedlings emerge. Newly emerged grasses can be sensitive to **Plateau** and/or the adjuvant used. If grasses have begun to emerge, it is best to wait until they have reached the five leaf stage to make a **Plateau** application and use a nonionic or silicone surfactant. **DO NOT** use a methylated seed oil at this time as some grass species tolerance will be lost. **Plateau** will control annual weeds preemergence or early postemergence. See "WEEDS CONTROLLED" section for maximum height of weeds and see below for more details on best rate and timing for grass and wildflower species. Postemergence applications may result in stand thinning due to variability in seedling grass tolerance to the use of spray adjuvants. Seedling grasses are generally more tolerant to the use of spray adjuvants after they have reached the five leaf stage. When planting into a field which was row cropped the previous year, compounded injury may occur from herbicide carry-over (see "DIRECTIONS FOR USE" section).

**Rates and Control:** Apply **Plateau** at 2 to 6 oz per acre to fields cropped the previous year, when annual weeds are the target and/or if grass/forb mixtures are used. **Plateau** at 2 to 6 oz per acre will provide control and/or suppression of many annual grass and broadleaf weeds. Use lower rates when in the northern most U.S., dry climates or for late season plantings into clean seedbeds. **Plateau** rates as low as 2 oz. per acre may be used on soils with a

pH > 7, a low CEC and a coarse texture containing a minimum of clay and organic matter. Use higher rates in heavy weed pressure, heavy residue, high organic matter, high rainfall and long growing season (southern portions of Illinois, Indiana, Missouri and Ohio, etc.). Apply **Plateau** at 8 to 12 oz per acre for giant ragweed or for perennial weed control/suppression. **Plateau** rates of 8 to 12 oz per acre may result in stunting or stand thinning. The duration and intensity of suppression are directly related to weed pressure, chemical residue, soil type and environmental conditions. See below for details for particular grass tolerances and timings.

**Established Stands:** For optimum results, apply **Plateau** as an early postemergence application to annual grasses and broadleaf weeds. For perennial weed control, see "SPECIAL WEED CONTROL" section. The use of high rates may result in foliar and/or seed head height suppression of established grass stands. This effect is more likely to occur under conditions of light soils, low weed pressure, low rainfall, and short growing seasons. Use the lower rates for light weed infestations or when applying to grass stands containing desirable wildflowers and legumes (see "WILDFLOWER ESTABLISHMENT AND MAINTENANCE" section for rate tolerance). Use higher rates to broaden and lengthen weed control spectrum.

**Big Bluestem, Little Bluestem and Indiangrass:** **Plateau** may be applied at the rate of 2 to 12 oz per acre at planting, or any time thereafter, including after seedling grasses have emerged or to perennial stands (dormant or actively growing). See "WEEDS CONTROLLED" section for desired rate. Use the lower rates in Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, Kansas, Oklahoma, Texas and Nebraska and higher rates as rainfall and/or growing season increases.

**Switchgrass (*Panicum virgatum*):** **Plateau** is not recommended for the establishment of pure switchgrass stands as severe injury or death may result. **Plateau** may be applied at a rate of 2 to 4 oz per acre if switchgrass is planted in mixed stands with tolerant species, but only if some stand thinning or loss of stand can be tolerated. Mature switchgrass planting can be reclaimed from certain perennial weeds such as tall fescue, leafy spurge, johnsongrass, etc., with **Plateau** at rates of 10 to 12 oz per acre. However, severe stunting and injury is imminent. **DO NOT** apply **Plateau** to switchgrass if such severe injury can not be tolerated.

**Sideoats and Blue Grama:** Apply **Plateau** to monoculture stands of sideoats and blue grama only if some stand thinning or loss of stand can be tolerated. **Plateau** may be applied at the rate of 2 to 4 oz/A plus an adjuvant to aid in the establishment of sideoats and blue grama after new seedlings have emerged and reached the five (5) leaf stage. When using **Plateau** at 4 oz per acre it is not recommended to use in combination with a methylated seed oil adjuvant as stand thinning may occur. The lower rates may provide adequate weed suppression in early summer plantings in the states of Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, Kansas, Oklahoma, Texas and Nebraska and other states where growing degree days are short. Sideoats and blue grama have shown tolerance to **Plateau** at 2 to 4 oz/A, applied preemergence at planting, however, some stand thinning may occur. For weed control in established stands use 4 to 10 oz/A of **Plateau**. Up to 12 oz/A of **Plateau** may be applied, but may result in foliar and/or seedhead suppression, or in the injury of sideoats and blue grama, depending on surfactant choice, soil type, variety, weed pressure and environmental conditions.

**Buffalograss:** Apply **Plateau** at the rate of 2 to 4 oz/A for control or suppression of labeled weeds and to aid in the establishment of newly sprigged buffalograss. Apply **Plateau** immediately after planting prior to spring growth or seed germination. New growth and small seedlings can be severely injured or killed. If applying after emergence it is best to wait until buffalograss has at least five true leaves and use a nonionic or silicone surfactant. **DO NOT** use a methylated seed oil. For established stands, **Plateau** may be applied at the rate of 2 to 8 oz/A for weed control. Higher rates may cause some turf discoloration and stunting. **Plateau** may be applied to dormant buffalograss to control winter annual weeds. Turf type buffalograss may express different tolerance level to **Plateau** than wild type buffalograss. Some turf types can tolerate low rates of **Plateau** at seeding. Consult seed dealer for details.

**Eastern Gamagrass:** **Plateau** should only be used for the establishment or maintenance of eastern gamagrass if some stand thinning or loss can be tolerated. Apply **Plateau** at 2 to 6 oz per acre at planting prior to gamagrass emergence. Stand thinning and stunting is imminent. Adverse conditions, poor soils, or added stress to the gamagrass could result in stand mortality.

Postemergence application to seedlings will cause mortality. On established eastern gamagrass, apply **Plateau**<sup>®</sup> herbicide at 2 to 8 oz per acre prior to gamagrass breaking dormancy. Some stunting will occur and increases as the **Plateau** rate increases. Applications made during or after green-up may result in foliar and seedhead suppression and possible mortality of weak plants.

**Tall Fescue Control:** (Not for use in California unless directed otherwise in supplemental labeling.) Tall fescue can be controlled by using **Plateau** at the rate of 12 oz per acre plus methylated seed oil at 2 pints per acre in established stands of or to prepare a seed bed for big bluestem, little bluestem, and indiangrass. The addition of nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached the boot stage or has reached summer dormancy, control may be poor. For improved control of tall fescue, **Plateau** may be tank mixed with ACCORD<sup>®</sup>, ROUNDUP<sup>®</sup> PRO, or glyphosate. Fall applications of **Plateau** at 8 to 12 oz/A plus 24 to 64 oz/A ACCORD<sup>®</sup> or ROUNDUP<sup>®</sup> PRO will result in best control of existing tall fescue and new germinating seedlings. With spring applications of **Plateau** at 8 to 12 oz/A, plus a ACCORD<sup>®</sup> or ROUNDUP<sup>®</sup> PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower **Plateau** rates when planting forbs. When using 8 oz/A of **Plateau** in the fall with a glyphosate product, it is recommended to apply 4 oz/A **Plateau** in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both **Plateau** and glyphosate products need foliage present for herbicide uptake and satisfactory control.

#### TOLERANT GRASS SPECIES<sup>1</sup>

Common Name	Genus Species	Plateau Rate (oz/A) <sup>2</sup>	
		Newly Seeding	Established
Big Bluestem	<i>Andropogon gerardii</i>	2-12	2-12
Little Bluestem	<i>Schizachyrium scoparium</i>	2-12	2-12
Indiangrass	<i>Sorghastrum nutans</i>	2-12	2-12
Bushy Bluestem	<i>Andropogon glomeratus</i>	— <sup>3</sup>	2-12
King Ranch Bluestem	<i>Bothriochloa ischaemum</i>	—	2-12
Silver Beard Bluestem	<i>Bothriochloa saccharoides</i>	—	2-12
Broomsedge	<i>Andropogon virginicus</i>	—	2-12
Fingergrass, Rhodes grass	<i>Choris</i> spp.	—	2-12
Needlegrass	<i>Stipa</i> spp.	—	2-12
Needleandthread	<i>Stipa comata</i>	—	2-12
Kearny (Plains) Threawn	<i>Aristida longespica</i>	—	2-12
Prairie Threawn	<i>Aristida oligantha</i>	—	2-12
Prairie Sandreed	<i>Calamovilfa longifolia</i>	—	2-12
Smooth Bromegrass	<i>Bromus inermis</i>	—	2-12
Kentucky Bluegrass	<i>Poa pratensis</i>	—	2-12 <sup>4</sup>
Sandberg's Bluegrass	<i>Poa sandbergii</i>	—	2-12
Wheatgrasses	<i>Agropyron</i> spp.	—	2-12
Bottlebrush Squirreltail	<i>Sitanian hystrix</i>	—	2-12
Russian Wild Ryegrass	<i>Elymus junceus</i>	2-6 <sup>5</sup>	2-12
Sidecoats Grama	<i>Bouteloua curtipendula</i>	2-8 <sup>6</sup>	2-8
Blue Grama	<i>Bouteloua gracilis</i>	2-8 <sup>6</sup>	2-8
Buffalograss	<i>Buchloe dactyloides</i>	2-4	2-8
Eastern Gamagrass	<i>Tripsacum dactyloides</i>	2-6 <sup>7</sup>	2-8

<sup>1</sup> See individual grass sections for application timing.

<sup>2</sup> High rates may result in stunting and growth suppression.

<sup>3</sup> **Plateau** preemergence applications to newly seeded sidecoats, blue grama and Eastern gamagrass may result in thinning or loss of stand.

<sup>4</sup> Some bluegrass varieties are sensitive to **Plateau**. Drought can delay recovery and may result in overgrazing of treated area.

<sup>5</sup> Tolerance unknown

#### TOLERANCE OF ESTABLISHED GRASSES TO 8 TO 12 OZ/A OF PLATEAU APPLIED IN THE FALL

Grass Species	Tolerant	Suppressed <sup>2</sup>	Not Tolerant	Tolerance Unknown
Bermudagrass	X			
Bluegrass, Kentucky		X		
Bluegrass, Sandberg's	X			
Bluestem, big	X			
Bluestem, bushy	X			
Bluestem, King Ranch	X			
Bluestem, little	X			
Bluestem, silver beard	X			
Bromegrass, meadow		X	X	
Bromegrass, smooth		X		
Broomsedge	X			
Buffalograss	X	X		
Cheatgrass			X	
Creeping foxtail, Garrison				X
Downey brome			X	
Fescue, Idaho	X			
Fescue, tall			X	
Gamagrass, eastern		X		
Grama, blue	X	X		
Grama, sidecoats	X	X		
Indiangrass	X			
Medusahead			X	
Needleandthread	X			
Needlegrass, green	X			
Orchardgrass		X		
Prairie cordgrass		X		
Prairie dropseed				X
Prairie sandreed	X			
Prairie threawn	X			
Quackgrass		X		
Redtop		X	X	
Reed canarygrass		X	X	
Rhodes grass/Fingergrass	X			
Ryegrass, annual or Italian			X	
Ryegrass, perennial		X	X	
Squirreltail, bottlebrush	X			
Switchgrass		X	X	
Timothy			X	
Wheatgrass, bluebunch	X	X		
Wheatgrass, crested	X	X		
Wheatgrass, intermediate	X	X		
Wheatgrass, pubescent	X	X		
Wheatgrass, siberian	X			
Wheatgrass, slender	X	X		
Wheatgrass, stream-bank	X	X		
Wheatgrass, western	X	X		
Wild ryegrass, Basin	X			
Wild ryegrass, Canada		X		
Wild ryegrass, Russian	X			
Wild ryegrass, Virginia		X		

<sup>1</sup> Species with an X in more than one column means tolerance will vary depending on variety, use rate and environmental conditions.

<sup>2</sup> Suppression may be expressed as reduction in number of seedheads, seedhead height suppression or foliage height reduction; however, full recovery of the grass can be expected.

#### WILDFLOWER ESTABLISHMENT AND MAINTENANCE

Due to high degree of variation in genotypes, ecotypes and varieties of wildflowers, tolerances to **Plateau** can vary dramatically and may be reduced under certain soil types and environmental conditions. Apply **Plateau** only if some stand thinning or loss can be tolerated. Preemergence applications of low use rates (2 oz/A)

to tolerant species, result in the least amount of injury, but may not eliminate it. Postemergence applications of **Plateau<sup>®</sup> herbicide** can result in injury or death of some genotypes, and should be used only as a rescue treatment when weed competition threatens the stand. Use of certain spray adjuvants can also increase wildflower injury and loss of stand. Although most legumes listed in the tolerance table are tolerant to 4 oz/A of **Plateau** preemergence, some stand thinning may occur. Legumes are more tolerant to post applications, but chlorosis or stunting is possible. Recommendations listed in the tables below are designed for mixed grass/wildflower stands. Less than satisfactory results may occur from applications to monoculture stands. It is recommended to try on a small scale to determine degree of satisfaction on monoculture stands.

**For prairiegrass/wildflower mixtures:** Where some wildflower injury (phytotoxicity, height suppression) can be tolerated, apply **Plateau** at the rate to achieve desired weed control, but not to exceed tolerance rate listed in the table below. Wildflower injury can be reduced or eliminated with preemergence applications. To minimize injury, apply **Plateau** at 2 to 4 oz per acre at planting to tolerant species listed below. Use the 2 oz per acre rate under cool dry conditions and in low rainfall areas. If postemergence application is made to established prairiegrass/wildflower mixtures, use the lowest rate of **Plateau** necessary to achieve desired weed control (see "WEEDS CONTROLLED" section). Postemergence application can result in stand thinning or death due to vast variation in seed sources, varieties and genotypes. It is recommended that a small area be tested prior to full application for tolerance of desired species. The rates listed below are for those species in which acceptable tolerance has been confirmed on the varieties/genotypes being treated.

Application of **Plateau** in conjunction with an organophosphate insecticide may cause an increase in wildflower injury.

**Seeding Wildflower and Legume Tolerance to Plateau (4 oz/A)<sup>1</sup> in Mixed Grass/Forb Stands.**

Common Name	Genus Species	PRE	POST
Alfalfa	<i>Medicago sativa</i>	No	Yes
Aster, New England	<i>Aster novae angliae</i>	No	Yes
Aster, Prairie	<i>Aster tanacetifolius</i>	No	Yes
Baby Blue Eyes	<i>Nemophila menziesii</i>	No	Yes
Beggar ticks	<i>Bidens frondosa</i>	No	Yes
Bird's Eyes	<i>Gilia tricolor</i>	No	Yes
Bishop's Flower	<i>Anuri majus</i>	No	Yes
Blackeyed Susan	<i>Rudbeckia hirta</i>	Yes	Yes
Blanketflower	<i>Gaillardia aristata</i>	No	Yes
Bundleflower, Illinois	<i>Desmanthus illinoensis</i>	Yes	Yes
Catchfly	<i>Silene armeria</i>	No	Yes
Chicory	<i>Cichorium intybus</i>	Yes	Yes
Clover, Crimson	<i>Trifolium incarnatum</i>	Yes	Yes
Clover, White	<i>Trifolium repens</i>	No	Yes
Coneflower, Purple	<i>Echinacea purpurea</i>	Yes	Yes
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	Yes	Yes
Coreopsis, Dwarf Red Plains	<i>Coreopsis tinctoria</i> var. Gay Feather	Yes	Yes
Coreopsis, Lance Leaved	<i>Coreopsis lanceolata</i>	Yes	Yes
Coreopsis, Plains	<i>Coreopsis tinctoria</i>	Yes	Yes
Cornflower	<i>Centaurea cyaneus</i>	No	Yes
Cosmos, Garden	<i>Cosmos bipinnatus</i>	Yes	Yes
Cosmos, Yellow	<i>Cosmos sulphureus</i>	Yes	Yes
Daisy, Ox-eye	<i>Chrysanthemum leucanthemum</i>	Yes	Yes
Daisy, Shasta	<i>Chrysanthemum maximum</i>	Yes	Yes
Five Spot	<i>Nemophila maculata</i>	No	Yes
Flax, Blue	<i>Linum perenne</i>	No	Yes
Indian Blanket	<i>Gaillardia pulchella</i>	No	Yes
Indigo, Blue False	<i>Baptisia australis</i>	Yes	No
Johnny Jump-ups	<i>Viola cornuta</i>	Yes	Yes
Lemon Mint	<i>Monarda citriodora</i>	No	Yes

**Seeding Wildflower and Legume Tolerance to Plateau (4 oz/A)<sup>1</sup> in Mixed Grass/Forb Stands. (CONT):**

Common Name	Genus Species	PRE	POST
Lespedeza, Bicolor	<i>Lespedeza</i>	Yes	Yes
Lespedeza, Korean	<i>Lespedeza stipulacea</i>	No	Yes
Lespedeza, Sericea	<i>Lespedeza cuneata</i>	No	Yes
Lupine, Perennial	<i>Lupinus perennis</i>	Yes	Yes
Mexican Hat	<i>Ratibida columnifera</i>	Yes	Yes
Partridgepea	<i>Cassia fasciculata</i>	Yes	Yes
Pea, Calico	<i>Pisum viganashensis</i>	Yes	Yes
Pea, Flat	<i>Lathyrus sylvestris</i>	Yes	Yes
Pea, Perennial	<i>Lathyrus latifolius</i>	Yes	Yes
Phlox, Drummond	<i>Phlox drummondii</i>	Yes	No
Poppy, California	<i>Eschscholzia californica</i>	Yes	No
Poppy, Corn	<i>Papaver rhoeas</i>	Yes	Yes
Poppy, Red Corn	<i>Papaver sp.</i>	Yes	Yes
Prairieclover, Purple	<i>Dalea purpurea</i>	Yes	Yes
Prairieclover, White	<i>Dalea candidum</i>	Yes	Yes
Tick-trefoil, Showy	<i>Desmodium canadense</i>	No	Yes
Trefoil, Birdfoot	<i>Lotus corniculatus</i>	No	Yes
Vetch, Crown	<i>Coronilla varia</i>	Yes	—
Vetch, Hairy	<i>Vicia villosa</i>	Yes	—
Yarrow, Gold	<i>Achillea filpendulina</i>	No	Yes

<sup>1</sup> For legumes, at least three true leaves should be present before a postemergence application.

**Established Wildflower and Legume Tolerance to Plateau (maximum rate<sup>1</sup>, oz/A) in Mixed Grass/Forb Stands.**

Common Name	Genus Species	PRE	POST
Flax, Blue	<i>Linum perenne</i>	0	6
Indian Blanket	<i>Gaillardia pulchella</i>	0	6
Blanketflower	<i>Gaillardia aristata</i>	0	8
Chicory	<i>Cichorium intybus</i>	4	6
Daisy, Shasta	<i>Chrysanthemum maximum</i>	4	8
Prairieclover, Purple	<i>Dalea purpurea</i>	4	12
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	6	6
Mexican Hat	<i>Ratibida columnifera</i>	6	6
Poorjoe	<i>Diodia feres</i>	8	—
Lupine, Perennial <sup>2</sup>	<i>Lupinus perennis</i>	8	12
Coneflower, Purple	<i>Echinacea purpurea</i>	8	8
Daisy, Ox-eye <sup>2</sup>	<i>Chrysanthemum leucanthemum</i>	8	8
Leadplant	<i>Amorpha canescens</i>	8	8
Lespedeza, Bicolor	<i>Lespedeza</i>	8	8
Milkweed, Common	<i>Asclepias syriaca</i>	8	—
Pea, Prairie Scurf	<i>Psoralea esculenta</i>	8	8
Yarrow, Gold <sup>3</sup>	<i>Achillea filpendulina</i>	8	8
Blackeyed Susan	<i>Rudbeckia hirta</i>	8	10
Johnny Jump-ups	<i>Viola cornuta</i>	8	12
Sweetclover	<i>Melilotus sp.</i>	12	8
Alfalfa	<i>Medicago sativa</i>	12	12
Bundleflower, Illinois	<i>Desmanthus illinoensis</i>	12	12
Lespedeza, Sericea	<i>Lespedeza cuneata</i>	12	12
Partridgepea	<i>Cassia fasciculata</i>	12	12
Sensitive vine	<i>Mimosa strigillosa</i>	12	12
Vetch, Crown	<i>Coronilla varia</i>	12	12
Violet, Wild	<i>Viola spp.</i>	12	12

<sup>1</sup> Height suppression or stand reduction may occur at maximum use rate. For legumes, some yellowing and stunting can occur at higher use rates.

<sup>2</sup> Postemergence application should be made early post on the flowers to reduce injury and increase flower set.

<sup>3</sup> Will not flower.

<sup>4</sup> Most native rangeland lupines are tolerant to **Plateau** at 12 oz/A postemergence.

**Wildflower Establishment with Plateau® herbicide  
4 oz/A + PENDULUM herbicide 2 lbs a.i./A<sup>1</sup>**

Common Name	Genus Species	PRE	POST
Blackeyed Susan	<i>Rudbeckia hirta</i>	Yes	Yes
Blanketflower	<i>Gaillardia pulchella</i>	No	Yes
Bundleflower, Illinois	<i>Desmanthus illinoensis</i>	>50% thinning	Yes
Clover, Crimson	<i>Trifolium incarnatum</i>	>50% thinning	Yes
Coneflower, Clasping	<i>Dracopis amplexicaulis</i>	Yes	Yes
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	No	OK
Coneflower, Purple	<i>Echinacea purpurea</i>	Yes	Yes
Coreopsis, Dwarf Red Plains	<i>Coreopsis tinctoria</i> var. <i>Gay Feather</i>	OK stunting	OK stunting
Coreopsis, Plains	<i>Coreopsis tinctoria</i>	OK stunting	Yes
Coreopsis, Lance Leaved	<i>Coreopsis lanceolata</i>	25% thinning	Yes
Cornflower	<i>Centaurea cyanus</i>	No	OK 20% thinning
Cosmos, Garden	<i>Cosmos bipinnatus</i>	OK 10% thinning	OK stunting
Cosmos, Yellow	<i>Cosmos sulphureus</i>	Yes	Yes
Daisy, Ox-eye	<i>Chrysanthemum leucanthemum</i>	25% thinning	Yes
Daisy, Shasta	<i>Chrysanthemum maximum</i>	marginal-OK 20% thinning	Yes
Lupine, Perennial	<i>Lupinus perennis</i>	Yes	≤50% thinning
Partridgepea	<i>Cassia fasciculata</i>	25% thinning	Yes
Poppy, California	<i>Echscholzia californica</i>	Yes	25% injury stunting, thinning
Yarrow, Gold	<i>Achilles filipendulina</i>	OK thinning	OK

<sup>1</sup> 2 lbs a.i./A = 2.4 qts of PENDULUM herbicide 3.3 EC or 3.3 lbs of PENDULUM herbicide WDG

<sup>2</sup> Preemergence at planting

<sup>3</sup> Postemergence to seedlings

Yes = no injury

No = results in no wildflower germination or unacceptable injury to seedling flowers.

OK = can be used if thinning and/or stunting can be tolerated or if establishment is threatened by weed competition.

Due to the diversity of species and varieties that exist in areas where wildflowers are grown, the response to **Plateau** may vary greatly. Careful testing on desirable species is recommended to determine if area-wide applications can be made. Try on a limited area to verify tolerance in a specific area.

The suitability of **Plateau** use on wildflower species not listed, should be determined by treating a small number of such wild flowers at an appropriate rate, not to exceed 12 oz per acre per year. Treated wildflowers should be evaluated 1 to 2 months following application for possible injury. THE USER ASSUMES RESPONSIBILITY FOR ANY DAMAGE OR OTHER LIABILITY.

**SPECIAL WEED CONTROL**

(Not for use in California unless directed otherwise in supplemental labeling.)

ALWAYS ADD AN ADJUVANT to **Plateau** (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). Research has shown Methylated Seed Oil (MSO) surfactants provide **Plateau** with superior control of perennial weeds. This effect is not always observed and is most prevalent on waxy leaf species, perennials and weeds under stress conditions. For the weeds listed below, it is recommended to use a MSO for best results. The use of nonionic surfactants or silicone based surfactants may result in less than acceptable control.

**Johnsongrass & Itchgrass:** For best results, apply **Plateau** at the rate of 8 to 12 oz per acre after johnsongrass or itchgrass has

reached 18 to 24 inches in height at the whorl. The addition of ACCORD® or ROUNDUP® PRO at the rate of 8 to 16 oz per acre may improve control after culm elongation or in dense stands. Use higher herbicide rates as density increases. Larger grass than specified above can be controlled.

**Dallisgrass, Bahiagrass, Vaseygrass, Paspalum spp., Smutgrass:**

For dallisgrass, bahiagrass and smutgrass control, apply **Plateau** postemergence at the rate of 10 to 12 oz per acre, after grass has reached 100% green-up. For dallisgrass and smutgrass, activity may range from suppression to control depending upon grass growth stage and growing conditions at the time of application. For vaseygrass apply **Plateau** at the rate of 4 to 6 oz per acre postemergence after grass has reached 100% green-up and is from 3 to 8 inches in height. The addition of ACCORD® or ROUNDUP® PRO at the rate of 12 to 18 oz per acre will improve efficacy. Use higher herbicide rates as target grass weed densities and/or maturity increase. The addition of PENDULUM® will provide increased preemergence control of these grasses from seed.

**Leafy Spurge:** For best results, apply **Plateau** at 8 to 12 oz per acre in late summer or fall (August through October, but timing may vary by state and/or altitude). Consecutive year applications will optimize long term control. **Plateau** at 12 oz/A applied spring or fall, or 4 oz/A in the spring following an 8 oz/A fall treatment may result in excessive injury to cool season grasses in some areas. For best results, always use a methylated seed oil at 2 pints per acre. Two pints per acre of nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) may also be added to the spray tank to increase leafy spurge control, however, this may increase injury to desired species of grasses and forbs.

The use of nonionic and silicone based surfactants have resulted in little or no control of leafy spurge. Approximate dates for fall timing in North and South Dakota is late August through September; for Nebraska and Iowa is mid-September through mid-October. This application should be made after good soil moisture is present but prior to the leafy spurge losing its milky sap flow due to a killing frost. To check and see if the milky sap flow has been affected by a frost simply break the main stem of the leafy spurge and if milky sap flows from the break then **Plateau** can still be applied.

**Tall Fescue Control:** Tall fescue can be controlled by using **Plateau** at the rate of 12 oz plus Methylated Seed Oil at 2 pints per acre. The addition of ACCORD, glyphosate or ROUNDUP PRO and/or nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached summer dormancy, control may be poor.

Fall applications of **Plateau** at 8 to 12 oz/A plus a ACCORD® or ROUNDUP® PRO at 24 to 64 oz/A will result in best control of existing tall fescue and new germinating seedlings. With spring applications of **Plateau** at 6 to 12 oz/A, plus ACCORD or ROUNDUP PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower **Plateau** rates when planting forbs. When using 8 oz/A of **Plateau** in the fall with ACCORD or ROUNDUP PRO, it is recommended to apply 4 oz/A **Plateau** in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application, will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both **Plateau** and ROUNDUP products need foliage present for herbicide uptake and satisfactory control.

**Russian Knapweed:** Apply 12 oz/A of **Plateau** plus 1 quart per acre of methylated seed oil during Russian knapweed senescence in the fall. Control improves as senescence progresses and may still be obtained with applications made after full senescence. Applications made prior to the initiation of senescence will result in reduced control.

**Dalmatian Toadflax:** Apply 12 oz/A of **Plateau** plus 1 quart per acre of methylated seed oil in the fall when the top 25% of the plant is necrotic, usually after a hard frost (late October through November). The addition of ammonium sulfate at a rate of 2 to 3 pints per acre may improve control. As long as there is some green stem and/or leaf tissue remaining, good control can be achieved. This timing usually corresponds to fall basal growth. Applications made prior to this will result in poor control.

**Resistant Biotypes:** Naturally occurring biotypes (a plant within a given species that has a slightly different, but distinct genetic

makeup from other plants of the same species) of some weeds listed on this label may not be effectively controlled by this and/or other herbicides (OUST<sup>®</sup>) with the ALS/AHAS enzyme inhibiting mode of action. If naturally occurring ALS/AHAS resistant biotypes are present in an area, **Plateau<sup>®</sup> herbicide** should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

### RESIDUAL BAREGROUND WEED CONTROL

For sensitive areas and use around desirable vegetation **Plateau** at 12 ounces per acre may be tank mixed with PENDULUM<sup>®</sup> herbicide, ROUNDUP<sup>®</sup> PRO, ESCORT<sup>®</sup>, KARMEK<sup>®</sup>, 2,4-D, diuron, ENDURANCE<sup>®</sup> or other labeled products to provide total vegetation control. For other bareground areas **Plateau** at 12 oz per acre may be tank mixed with ARSENAL<sup>®</sup> herbicide, SAHARA<sup>®</sup> DG herbicide, KROVAR<sup>®</sup>, OUST<sup>®</sup>, TORDON<sup>®</sup>, VANQUISH<sup>®</sup> or other labeled products to provide total bareground weed control. For maximum weed control, use 2 pints per acre of methylated seed oil as an adjuvant.

**Spot Treatments:** **Plateau** may be used to control weed encroachment in bareground or total vegetation control situations. To prepare the spray solution, thoroughly mix in each gallon of water 0.25 to 5% volume/volume (0.3 oz to 5.4 oz per gallon) **Plateau** plus a methylated seed oil adjuvant.

### USE UNDER PAVED SURFACES

Applications should be made to the soil surface only when final grade is established. **DO NOT** move soil following **Plateau** application. Apply **Plateau** in sufficient water to ensure thorough and uniform wetting of the soil surface, including the shoulder area. Add **Plateau** at a rate of 12 oz. per acre to clean water in the spray tank during the filling operation. Agitate before spraying. If soil is not moist prior to treatment, incorporation of **Plateau** will improve control. **Plateau** can be incorporated into the soil to a depth of two inches using a rototiller or disc. Rainfall or irrigation totaling one inch is also sufficient to incorporate **Plateau** into the soil surface. **DO NOT** allow treated soil to wash or move into untreated area.

### CONIFER PLANTATION SITE PREPARATION

**Plateau** may be applied as a site preparation treatment prior to establishing conifer plantations to provide residual weed control of herbaceous weeds. Apply **Plateau** at 12 ozs per acre.

**DO NOT** apply more than 12 ozs per acre per year.

**DO NOT** use in forests. Only for use on sites that are managed as conifer plantations.

### TOLERANCE OF TREES AND BRUSH TO PLATEAU

The following tolerance information is provided as a general guideline when it is desirable or necessary to make **Plateau** applications in and around desirable tree and brush species. **DO NOT** use **Plateau** on nursery, orchard, ornamental plantings, new plantings, seedling trees or fiber farms except as specified on supplemental labeling. It is suggested that **Plateau** be tried on a limited basis to determine tolerance in your area. **Plateau** may be used at rates up to 12 oz per acre for weed control in and around established trees on pasture, rangeland (see "GUIDELINES FOR RANGELAND USE" section) and noncropland areas such as roadsides, prairies and similar areas used for wildlife cover, erosion control, wind breaks, etc. Tree and brush species known to have acceptable tolerance to **Plateau** when applied under the canopy and/or to the foliage are listed below. Tolerance is based upon trees with a minimum of 2 inch DBH. Application to tree and brush species that are under stress due to drought, disease, insect damage or other factors may be more susceptible to injury from **Plateau** and may result in severe injury or death. Some species may exhibit tip chlorosis and minor necrosis. Foliar contact may increase injury to include defoliation and terminal death. Application methods that minimize foliar contact with desirable tree and brush species can improve tolerance.

When making fall applications of **Plateau**, potential injury to tree and brush species from foliar contact may be minimized by making the application after the leaves have begun to senesce (fall color) or after leaf drop. Conifer species are generally tolerant to fall applications. **Plateau** applications in and around tree and brush species should be made at the recommended timing for the target weed species.

### Brush and Tree Species Tolerance to Plateau at 12 oz per Acre<sup>1</sup>

Common Name	Genus Species	Tolerance by Application Method <sup>2</sup>	
		Directed Below Foliage	To Foliage
Apple (Var. Winesap) <sup>3</sup>	<i>Malus sylvestris</i>	Yes	NR
Ash, Blue	<i>Fraxinus quadrangulata</i>	Yes	NR
Ash, Green	<i>Fraxinus pennsylvanica</i>	No	No
Azalea	<i>Rhododendron</i> spp.	No	No
Basswood	<i>Tilia heterophylla</i>	No	No
Boxelder	<i>Acer negundo</i>	Yes	Injury <sup>4</sup>
Buckeye, Ohio	<i>Aesculus glabra</i>	Yes	NR
Cedar-juniper, Western	<i>Thuja plicata</i>	Yes	Yes
Cherry, Black <sup>5</sup>	<i>Prunus serotina</i>	No	No
Cherry, Choke	<i>Prunus virginiana</i>	No	No
Cherry, Sweet <sup>6</sup>	<i>Prunus avium</i>	No	NR
Cottonwood	<i>Populus deltoides</i>	Yes	Injury <sup>4</sup>
Cottonwood, narrow leaf	<i>Populus</i> spp.	Yes	Injury <sup>4</sup>
Currant species	<i>Ribes</i> spp.	Injury <sup>4</sup>	No
Dogwood, Flowering	<i>Cornus</i> spp.	Yes	Yes
Dogwood, Grey	<i>Cornus racemosa</i>	Yes	Injury <sup>4</sup>
Dogwood, Red Trig	<i>Cornus</i> spp.	Yes	Yes
Douglas Fir	<i>Pseudotsuga menziesii</i>	Yes	Yes <sup>4</sup>
Elm, American	<i>Ulmus americana</i>	Yes	Yes
Elm, Siberian	<i>Ulmus pumila</i>	Yes	No
Elm, Slippery	<i>Ulmus rubra</i>	Yes	Yes
Gooseberry	<i>Ribes</i> spp.	Injury <sup>4</sup>	Injury <sup>4</sup>
Hackberry	<i>Celtis occidentalis</i>	Yes	Yes
Hawthorn	<i>Crataegus</i> spp.	Yes	Injury <sup>4</sup>
Juniper, Chinese	<i>Juniperus chinensis</i>	Yes	Yes
Juniper, Western	<i>Juniperus osteosperma</i>	Yes	Yes
Lilac	<i>Syringa</i> spp.	No	No
Linden, American	<i>Tilia americana</i>	No	No
Locust, Black	<i>Robinia pseudoacacia</i>	Yes	Yes
Locust, Honey	<i>Gleditsia triacanthos</i>	Yes	Yes
Maple, Red	<i>Acer rubrum</i>	Yes	Yes
Maple, Sugar	<i>Acer saccharum</i>	Yes	Yes
Mulberry, Red	<i>Morus rubra</i>	Yes	NR
Mulberry, White	<i>Morus alba</i>	Yes	NR
Oak, Black	<i>Quercus velutina</i>	Yes	NR
Oak, Live	<i>Quercus virginiana</i>	Yes	Yes
Oak, Southern Red	<i>Quercus falcata</i>	Yes	NR
Oak, White	<i>Quercus alba</i>	Yes	NR
Olive, Russian	<i>Elaeagnus angustifolia</i>	Yes	No
Osage Orange	<i>Maclura pomifera</i>	Yes	NR
Peach (Var. Elberta) <sup>7</sup>	<i>Prunus persica</i>	Yes	NR
Photinia, Red Tip	<i>Photinia Fraseri</i>	Yes	Yes
Pine, Lodgepole	<i>Pinus contorta</i>	Yes	Injury <sup>4</sup>
Pine, White <sup>8</sup>	<i>Pinus strobus</i>	Yes	Yes
Pittosporum, Japanese	<i>Pittosporum tobira</i>	Yes	Yes
Plum species	<i>Prunus</i> spp.	Yes	No
Poplar, Yellow (Tulip)	<i>Liriodendron tulipifera</i>	Yes	NR
Privet, Common	<i>Ligustrum vulgare</i>	Yes	Yes
Rabbitbrush species	<i>Chrysothamnus</i> spp.	Yes	Yes
Redbud	<i>Cercis canadensis</i>	Yes	Yes
Redcedar, Eastern	<i>Juniperus virginiana</i>	Yes	Yes
Rose, Multiflora	<i>Rosa multiflora</i>	Yes <sup>6</sup>	No
Sage, Big	<i>Artemisia tridentata</i>	Yes	Yes
Sage, Fringe	<i>Artemisia frigida</i>	Yes	Yes
Sage, Silver	<i>Artemisia cana</i>	Yes	Yes
Sagebrush, Big	<i>Artemisia tridentata</i>	Yes	Yes

**Brush and Tree Species Tolerance to Plateau® herbicide at 12 oz per Acre<sup>1</sup> (CONT):**

Common Name	Genus Species	Tolerance by Application Method <sup>2</sup>	
		Directed Below Foliage	To Foliage
Sagebrush, Fringed	<i>Artemisia frigida</i>	Yes	Yes
Saltcedar	<i>Tamarix</i> spp.	Yes	No
Serviceberry	<i>Amelanchier alnifolia</i>	Yes	NR
Snowberry, Western	<i>Symphoricarpos occidentalis</i>	Yes	Injury <sup>3</sup>
Spruce species	<i>Picea</i> spp.	Yes <sup>4</sup>	Yes <sup>4</sup>
Sugarberry	<i>Celtis laevigata</i>	Yes	Yes
Sweetgum	<i>Liquidambar styraciflua</i>	Yes	Yes <sup>5</sup>
Sycamore	<i>Plantanus occidentalis</i>	Yes	No
Tree-of-Heaven	<i>Ailanthus altissima</i>	Yes	Yes
Walnut, American Black	<i>Juglans nigra</i>	Yes	No
Willow	<i>Salix</i> spp.	Yes	Injury <sup>6</sup>

<sup>1</sup> Not intended for nursery, orchard, ornamental plantings, new plantings or seedling trees.  
<sup>2</sup> Yes = Tolerant  
 No = Not Tolerant, Severe injury or death  
 NR = Not Recommended due to insufficient tolerance data  
<sup>3</sup> Not for use on ornamental or fruit bearing trees.  
<sup>4</sup> Applications made just before or during candling may cause candle injury or death.  
<sup>5</sup> Possible defoliation and/or death. Some species may exhibit tip chlorosis and minor necrosis. If spray contacts foliage then defoliation and terminal death may occur. Injury can be reduced or eliminated if applied in fall after color change or leaf drop.  
<sup>6</sup> See supplemental label. \*For Use In Sweetgum (*Liquidambar styraciflua*) Grown on Fiber Farms.\*

**WEEDS CONTROLLED**

(Not for use in California unless directed otherwise in supplemental labeling.)

**Plateau, 4 to 6 oz per acre**

Common Name	Genus Species	PRE	POST	Annual/Biennial/Perennial <sup>1</sup>
<b>BROADLEAVES</b>				
Bedstraw, Catchweed	<i>Galium aparine</i>	C	4	WA
Beggarweed, Florida	<i>Desmodium tortuosum</i>	C	2	SA
Buffalobur	<i>Solanum rostratum</i>	—	C	SA
Buttercup, Bur	<i>Ranunculus testiculatus</i>	C	C	WA
Cocklebur, Common	<i>Xanthium strumarium</i>	S	6	SA
Lambsquarters, Common	<i>Chenopodium album</i>	C	2	SA
Halogeton	<i>Halogeton glomeratus</i>	C	C	SA
Morningglory				
Entireleaf	<i>Ipomoea hederacea</i>	S	3	SA
Ivyleaf	<i>Ipomoea hederacea</i>	S	3	SA
Tall	<i>Ipomoea purpurea</i>	S	3	SA
Mustard, Garlic	<i>Alliaria petiolata</i>	C	C	SA
Mustard, Wild	<i>Brassica kaber</i>	C	C	WA
Pigweed	<i>Amaranthus</i> sp.	C	6	SA
Queen Anne's Lace	<i>Daucus carota</i>	—	4	B
Radish, Wild	<i>Raphanus raphanistrum</i>	S	4	WA
Yellow Rocket	<i>Barbarea vulgaris</i>	C	4	WA
Sicklepod	<i>Senna obtusifolia</i>	C	4	SA
Sida, Prickly	<i>Sida spinosa</i>	C	2	SA
Smartweed				
Ladysthumb	<i>Polygonum persicaria</i>	C	C	SA
Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	C	SA
Swamp	<i>Polygonum coccineum</i>	C	C	SA
Starbur, Bristly	<i>Acanthospermum hispidum</i>	C	2	SA
Velvetleaf	<i>Abutilon theophrasti</i>	C	6	SA

**Plateau, 4 to 6 oz per acre (CONT):**

Common Name	Genus Species	PRE	POST	Annual/Biennial/Perennial <sup>1</sup>
<b>GRASS WEEDS</b>				
Brome, Downy	<i>Bromus tectorum</i>	C	—	WA
Cheat	<i>Bromus secalinus</i>	C	—	WA
Crabgrass				
Large (Hairy)	<i>Digitaria sanguinalis</i>	C	4	SA
Smooth	<i>Digitaria ischaemum</i>	C	4	SA
Foxtail,				
Giant	<i>Setaria faberi</i>	C	6	SA
Green	<i>Setaria viridis</i>	C	4	SA
Yellow	<i>Setaria glauca</i>	C	4	SA
Goatgrass, Jointed	<i>Aegilops cylindrica</i>	C	C	WA
Goosegrass	<i>Echinochloa indica</i>	S	2	SA
Johnsongrass (Seedling)	<i>Sorghum halepense</i>	C	12	SA
Medusahead	<i>Taeniatherum caput-medusae</i>	C	2	WA
Panicum, Fall	<i>Panicum dichotomiflorum</i>	S	6	SA
Sandbur	<i>Cenchrus</i> sp.	S	C	A/P
Shattercane	<i>Sorghum bicolor</i>	C	12	SA
Signalgrass, Broadleaf	<i>Brachiaria platyphylla</i>	C	C	SA
Stiltgrass, Japanese	<i>Microstegium vimineum</i>	C	4	A
Vaseygrass	<i>Paspalum urvillei</i>	—	8	P
<b>SEDGES</b>				
Nutsedge				
Yellow	<i>Cyperus esculentus</i>	S	4S	P
Purple	<i>Cyperus rotundus</i>	S	4S	P
Sedge	<i>Juncus</i> sp.	S	4S	A/P

<sup>1</sup> C = control, S = suppression in northern United States only  
<sup>2</sup> Maximum plant height in inches at time of application  
<sup>3</sup> Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial, P=Perennial

**Plateau, 8 to 12 oz per acre**

Common Name	Genus Species	PRE	POST	Annual/Biennial/Perennial <sup>1</sup>
<b>BROADLEAVES</b>				
Anoda, Spurred	<i>Anoda cristata</i>	C	6	SA
Baby's Breath <sup>2</sup>	<i>Gypsophila paniculata</i>	—	C	P
Bedstraw, Catchweed	<i>Galium aparine</i>	C	C	WA
Bedstraw, Marsh	<i>Galium</i> spp.	C	C	WA
Beggarweed, Florida	<i>Desmodium tortuosum</i>	C	6	SA
Bindweed, Field	<i>Convolvulus arvensis</i>	—	C	P
Buffalobur	<i>Solanum rostratum</i>	—	C	SA
Burdock	<i>Medicago</i> sp.	—	4	SA
Chickweed, Common	<i>Stellaria media</i>	C	6	SA
Cocklebur, Common	<i>Xanthium strumarium</i>	C	6	SA
Cornsalad, Common	<i>Valerianella locusta</i>	—	C	WA
Crownbeard, Golden	<i>Verbena enceloides</i>	C	2	SA
Dandelion	<i>Taraxacum officinale</i>	—	C	P
Dock, Curly	<i>Rumex crispus</i>	C	6	B
Fiddleneck	<i>Amsinckia</i> sp.	—	C	SA
Flax, Spurge	<i>Thymelea passerina</i>	C	C	A
Reabane, Annual	<i>Erigeron annuus</i>	—	C	A
Geranium, Carolina	<i>Geranium carolinianum</i>	—	C	WA/B
Geranium, Cranesbill	<i>Geranium maculatum</i>	C	C	WA/B
Ground Cherry	<i>Physalis heterophylla</i>	—	C	P
Hemlock, Poison	<i>Conium maculatum</i>	C	6	B
Henbit	<i>Lamium amplexicaule</i>	C	3	WA/B

Plateau® herbicide, 8 to 12 oz per acre (CONT):

Common Name	Genus Species	PRE	POST	Annual/ Biennial/ Perennial <sup>1</sup>
<b>BROADLEAVES</b>				
Houndstongue, Bristly	<i>Cynoglossum officinale</i>	C	C	B
Indigo, Hairy	<i>Indigofera hirsuta</i>	C	2	P
Jimsonweed	<i>Datura stramonium</i>	C	6	SA
Knapweed, Russian <sup>2</sup>	<i>Centaurea repens</i>	—	C*	P
Knotweed, Prostrate	<i>Polygonum aviculare</i>	C	C	SA
Kochia*	<i>Kochia scoparia</i>	C	3	SA
Lambsquarters, Common	<i>Chenopodium album</i>	C	3	SA
<b>Morningglory</b>				
Cypressvine	<i>Ipomoea quamoclit</i>	C	6	SA
Entireleaf	<i>Ipomoea hederacea</i>	C	6	SA
Ivyleaf	<i>Ipomoea hederacea</i>	C	6	SA
Pitted	<i>Ipomoea lacunosa</i>	C	6	SA
Smallflower	<i>Jacquemontia tamnicifolia</i>	C	6	SA
Tall	<i>Ipomoea purpurea</i>	C	6	SA
Mustard, Wild	<i>Brassica kaber</i>	C	C	WA
Onion, Wild	<i>Allium canadense</i>	C	C	P
Pepperweed, Perennial	<i>Lepidium latifolium</i>	—	C	P
Pigweed <sup>4</sup>	<i>Amaranthus</i> sp.	C	6	SA
Plantain, Narrowleaf	<i>Plantago lanceolata</i>	C	C	B
Poinsettia, Wild	<i>Euphorbia heterophylla</i>	C	6	SA
Puncture Vine	<i>Tribulus terrestris</i>	—	C	SA
Purslane, Common	<i>Portulaca oleracea</i>	C	4	SA
Pusley, Florida	<i>Richardia scapra</i>	C	4	SA
Queen Anne's Lace	<i>Daucus carota</i>	C	C	B
<b>Ragweed</b>				
Common	<i>Ambrosia artemisiifolia</i>	C	3	SA
Giant	<i>Ambrosia trifida</i>	S	6	SA
Western	<i>Ambrosia psilostachya</i>	—	C	A/P
Rocket, Yellow	<i>Barbarea vulgaris</i>	C	C	WA
Senna, Coffee	<i>Cassia occidentalis</i>	C	4	SA
Sicklepod	<i>Senna obtusifolia</i>	C	6	SA
Sida, Prickly	<i>Sida spinosa</i>	C	6	SA
<b>Smartweed</b>				
Ladysthumb	<i>Polygonum persicaria</i>	C	C	SA
Pennsylvania	<i>Polygonum pennsylvanicum</i>	C	C	SA
Swamp	<i>Polygonum coccleum</i>	C	C	SA
<b>Spurge</b>				
Leafy	<i>Euphorbia esula</i>	—	FALL*	P
Spotted	<i>Euphorbia maculata</i>	C	4	SA
Toothed	<i>Euphorbia dentata</i>	C	4	SA
Starbur, Bristly	<i>Acanthospermum hispidum</i>	—	6	SA
Sunflower	<i>Helianthus annuus</i>	—	1B	SA
Tansymustard	<i>Descurainia pinnata</i>	C	C	WA
Teasel, Common	<i>Dipsacus fulorum</i>	—	C	B
<b>Thistle</b>				
Bull	<i>Cirsium vulgare</i>	S	C	WA/B
Musk	<i>Carduus nutans</i>	S	C	B
Platt	<i>Cirsium canescens</i>	S	C	P
Russian <sup>2</sup>	<i>Salsola iberica</i>	C	3	A
Toadflax, Dalmatian	<i>Linaria dalmatica</i>	—	C*	P
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	A
Vervain, Blue	<i>Verbena hastata</i>	—	S	WA
Vervain, prostrate	<i>Verbena bracteata</i>	—	C	P
Whitetop	<i>Cardaria</i> spp.	—	C	P
Willowherb	<i>Epilobium</i> spp.	—	C	P
Woodsorrel, Yellow	<i>Oxalis stricta</i>	C	C	P

Plateau, 8 to 12 oz per acre (CONT):

Common Name	Genus Species	PRE	POST	Annual/ Biennial/ Perennial <sup>1</sup>
<b>GRASS</b>				
Bahiagrass	<i>Paspalum nutatum</i>	S	C*	P
Barley, Little	<i>Hordeum pusillum</i>	C	4	WA
Barley, Squirrel Tail	<i>Hordeum jubatum</i>	—	C	P
Barryardgrass	<i>Echinochloa crus-galli</i>	C	6	SA
Canarygrass, Reed	<i>Phalaris arundinacea</i>	—	C	P
Cheat	<i>Bromus secalinus</i>	C	—	WA
Crabgrass	<i>Digitaria</i> sp.	C	6	SA
Crowfootgrass	<i>Dactyloctenium aegyptium</i>	C	C	SA
Dalisgrass	<i>Paspalum dilatatum</i>	S	C*	P
Downy Brome	<i>Bromus tectorum</i>	C	—	WA
Dropseed, Tall	<i>Sporobolus cryptandrus</i>	S	C	A/P
Fescue, Tall	<i>Festuca arundinacea</i>	C	C*	P
<b>Foxtail</b>				
Giant	<i>Setaria faberi</i>	C	C	SA
Green	<i>Setaria viridis</i>	C	C	SA
Knotroot	<i>Setaria geniculatus</i>	S	6	SA
Purple Robust	<i>Setaria viridis</i>	S	S	SA
Yellow	<i>Setaria glauca</i>	C	4	SA
Garlic, Wild	<i>Allium vineale</i>	C	C	P
Goosegrass	<i>Elymus indica</i>	C	3S	SA
Itchgrass	<i>Rottboellia cochinchinensis</i>	—	C*	SA
<b>Johnsongrass</b>				
Seedling	<i>Sorghum halepense</i>	C	C	SA
Rhizome	<i>Sorghum halepense</i>	—	C*	P
Medusahead	<i>Tenoltherum caput-medusae</i>	C	C	WA
<b>Panicum</b>				
Fall	<i>Panicum dichotomiflorum</i>	C	C	SA
Texas	<i>Panicum texanum</i>	C	C	SA
Ryegrass, Annual (Italian)	<i>Lolium multiflorum</i>	C	C	WA
Ryegrass, Perennial	<i>Lolium perenne</i>	—	C	P
Sandbur	<i>Cenchrus</i> sp.	S	C	A/P
Shattercane	<i>Sorghum bicolor</i>	C	C	SA
Signalgrass, Broadleaf	<i>Brachiaria platyphylla</i>	C	C	SA
Smutgrass	<i>Sporobolus indicus</i>	—	C	P
Stiltgrass, Japanese	<i>Microstegium vimineum</i>	C	C	A
Stinkgrass, Annual	<i>Eragrostis cilianensis</i>	C	2	SA
Torpedograss	<i>Panicum repens</i>	—	C	P
Vaseygrass	<i>Paspalum urvillei</i>	—	C	P
Wild Oats	<i>Avena fatua</i>	—	C	WA
<b>SEDGES/RUSHES</b>				
<b>Nutsedge</b>				
Yellow	<i>Cyperus esculentus</i>	C	C	P
Purple	<i>Cyperus rotundus</i>	C	C	P
Rush	<i>Juncus</i> sp.	S	4	A/P

<sup>1</sup> C = control, S = suppression  
<sup>2</sup> Maximum plant height in inches at time of application  
<sup>3</sup> Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial, P=Perennial  
<sup>4</sup> Some species are tolerant and resistant biotypes are possible.  
<sup>5</sup> For annual control. The addition of 1-2 pints of 2,4-D will aid in burndown.  
<sup>6</sup> For best control apply in the fall.  
<sup>7</sup> See "SPECIAL WEED CONTROL" section

### Conditions of Sale and Warranty

The **Directions For Use** of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and must be followed carefully. However, it is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or use of the product in a manner inconsistent with its labeling, all of which are beyond the control of BASF CORPORATION ("BASF") or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by the Buyer.

BASF warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the **Directions For Use**, subject to the inherent risks, referred to above.

To the extent consistent with applicable law, BASF makes no other express or implied warranty of fitness or merchantability or any other express or implied warranty.

To the extent consistent with applicable law, Buyer's exclusive remedy and BASF's exclusive liability, whether in contract, tort, negligence, strict liability, or otherwise, shall be limited to repayment of the purchase price of the product.

To the extent consistent with applicable law, BASF and the Seller disclaim any liability for consequential, special or indirect damages resulting from the use or handling of this product.

BASF and the Seller offer this product, and the Buyer and User accept it, subject to the foregoing **Conditions of Sale and Warranty** which may be varied only by agreement in writing signed by a duly authorized representative of BASF.

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### USES WITH OTHER PRODUCTS (TANK-MIXES)

If this product is used in combination with any other product except as specifically recommended in writing by BASF, then to the extent consistent with applicable law, BASF shall have no liability for any loss, damage, or injury arising out of its use in any such combination not so specifically recommended. If used in combination recommended by BASF, to the extent consistent with applicable law, the liability of BASF shall in no manner extend to any damage, loss or injury not directly caused by the inclusion of the BASF product in such combination use, and in any event, to the extent consistent with applicable law, shall be limited to return of the amount of the purchase price of the BASF product.

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NVA 2004-04-126-0214

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The Chemical Company

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## **Appendix D – Plateau Material Safety Data Sheet**

## Safety Data Sheet PLATEAU

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### 1. Identification

Product identifier used on the label

**PLATEAU**

Recommended use of the chemical and restriction on use

Recommended use\*: herbicide

\* The "Recommended use" identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:  
BASF CORPORATION  
100 Park Avenue  
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

CHEMTREC: 1-800-424-9300  
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification

Substance number: 63415  
EPA Register number: 241-365  
Molecular formula: C14 H16 N3 O3.N H4  
Chemical family: imidazole derivative  
Synonyms: imazapic ammonium salt

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### 2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

No need for classification according to GHS criteria for this product.

Label elements

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The product does not require a hazard warning label in accordance with GHS criteria.

### Hazards not otherwise classified

#### Labeling of special preparations (GHS):

The following percentage of the mixture consists of components(s) with unknown hazards regarding the acute toxicity: 5 - 7 % dermal

The following percentage of the mixture consists of components(s) with unknown hazards regarding the acute toxicity: 0 - 1 % oral

The following percentage of the mixture consists of components(s) with unknown hazards regarding the acute toxicity: 5 - 7 % Inhalation - vapour

The following percentage of the mixture consists of components(s) with unknown hazards regarding the acute toxicity: 5 - 7 % Inhalation - mist

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

### Emergency overview

CAUTION:  
KEEP OUT OF REACH OF CHILDREN.  
KEEP OUT OF REACH OF DOMESTIC ANIMALS.  
Avoid inhalation of mists/vapours.  
Avoid contact with the skin, eyes and clothing.  
Wash thoroughly after handling.

## 3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

<u>CAS Number</u>	<u>Content (W/W)</u>	<u>Chemical name</u>
104098-49-9	23.6 %	imazapic, ammonium salt

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

<u>CAS Number</u>	<u>Content (W/W)</u>	<u>Chemical name</u>
104098-49-9	23.6 %	imazapic, ammonium salt
	76.4 %	Proprietary ingredients

## 4. First-Aid Measures

### Description of first aid measures

#### General advice:

First aid providers should wear personal protective equipment to prevent exposure. Remove contaminated clothing. Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or physician for treatment advice. Have the product container or label with you when calling a poison control center or doctor or going for treatment.

#### If inhaled:

Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary.

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### If on skin:

Rinse skin immediately with plenty of water for 15 - 20 minutes.

### If in eyes:

Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing.

### If swallowed:

Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

### Most important symptoms and effects, both acute and delayed

Symptoms: No significant reaction of the human body to the product known.

### Indication of any immediate medical attention and special treatment needed

#### Note to physician

Antidote: No known specific antidote.  
Treatment: Treat symptomatically.

---

## 5. Fire-Fighting Measures

### Extinguishing media

Suitable extinguishing media:  
foam, dry powder, carbon dioxide, water spray

### Special hazards arising from the substance or mixture

Hazards during fire-fighting:  
carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons,  
If product is heated above decomposition temperature, toxic vapours will be released. The substances/groups of substances mentioned can be released if the product is involved in a fire.

### Advice for fire-fighters

Protective equipment for fire-fighting:  
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

### Further information:

Evacuate area of all unnecessary personnel. Contain contaminated water/firefighting water. Do not allow to enter drains or waterways.

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## 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

Take appropriate protective measures. Clear area. Shut off source of leak only under safe conditions. Extinguish sources of ignition nearby and downwind. Ensure adequate ventilation. Wear suitable personal protective clothing and equipment.

### Environmental precautions

Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/groundwater. Contain contaminated water/firefighting water.

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### Methods and material for containment and cleaning up

Dike spillage. Pick up with suitable absorbent material. Place into suitable containers for reuse or disposal in a licensed facility. Spilled substance/product should be recovered and applied according to label rates whenever possible. If application of spilled substance/product is not possible, then spills should be contained, solidified, and placed in suitable containers for disposal. After decontamination, spill area can be washed with water. Collect wash water for approved disposal.

---

## 7. Handling and Storage

### Precautions for safe handling

RECOMMENDATIONS ARE FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS. PESTICIDE APPLICATORS & WORKERS must refer to the Product Label and Directions for Use attached to the product for Agricultural Use Requirements in accordance with the EPA Worker Protection Standard 40 CFR part 170. Ensure adequate ventilation. Provide good ventilation of working area (local exhaust ventilation if necessary). Keep away from sources of ignition - No smoking. Keep container tightly sealed. Protect contents from the effects of light. Protect against heat. Protect from air. Handle and open container with care. Do not open until ready to use. Once container is opened, content should be used as soon as possible. Avoid aerosol formation. Avoid dust formation. Provide means for controlling leaks and spills. Do not return residues to the storage containers. Follow label warnings even after container is emptied. The substance/ product may be handled only by appropriately trained personnel. Avoid all direct contact with the substance/product. Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapours. Wear suitable personal protective clothing and equipment.

### Protection against fire and explosion:

The relevant fire protection measures should be noted. Fire extinguishers should be kept handy. Avoid all sources of ignition: heat, sparks, open flame. Sources of ignition should be kept well clear. Avoid extreme heat. Keep away from oxidizable substances. Electrical equipment should conform to national electric code. Ground all transfer equipment properly to prevent electrostatic discharge. Electrostatic discharge may cause ignition.

### Conditions for safe storage, including any incompatibilities

Segregate from incompatible substances. Segregate from foods and animal feeds. Segregate from textiles and similar materials.

Further information on storage conditions: Keep only in the original container in a cool, dry, well-ventilated place away from ignition sources, heat or flame. Protect containers from physical damage. Protect against contamination. The authority permits and storage regulations must be observed.

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## 8. Exposure Controls/Personal Protection

Users of a pesticidal product should refer to the product label for personal protective equipment requirements.

### Advice on system design:

Whenever possible, engineering controls should be used to minimize the need for personal protective equipment.

### Personal protective equipment

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

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### Respiratory protection:

Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas and vapours. For situations where the airborne concentrations may exceed the level for which an air purifying respirator is effective, or where the levels are unknown or Immediately Dangerous to Life or Health (IDLH), use NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

### Hand protection:

Chemical resistant protective gloves, Protective glove selection must be based on the user's assessment of the workplace hazards.

### Eye protection:

Safety glasses with side-shields. Tightly fitting safety goggles (chemical goggles). Wear face shield if splashing hazard exists.

### Body protection:

Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

### General safety and hygiene measures:

Wear long sleeved work shirt and long work pants in addition to other stated personal protective equipment. Work place should be equipped with a shower and an eye wash. Handle in accordance with good industrial hygiene and safety practice. Personal protective equipment should be decontaminated prior to reuse. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. No eating, drinking, smoking or tobacco use at the place of work. Keep away from food, drink and animal feeding stuffs.

## 9. Physical and Chemical Properties

Form:	liquid	
Odour:	odourless	
Odour threshold:		not applicable, odour not perceivable
Colour:	pale yellow green, clear	
pH value:	6.4 - 7	
Melting point:	approx. 0 °C	Information applies to the solvent.
Boiling point:	approx. 100 °C	( 1,013 hPa) Information applies to the solvent.
Flash point:		Non-flammable.
Flammability:	not flammable	
Lower explosion limit:		As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Upper explosion limit:		As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Autoignition:		not determined
Vapour pressure:	approx. 23.4 hPa	(approx. 20 °C) Information applies to the solvent.

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Density:	1.07 - 1.09 g/cm <sup>3</sup> ( 20 °C) approx. 8.9296 - ( 68 °F) 9.0965 Lb/USg
Vapour density:	not applicable
Thermal decomposition:	carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons Stable at ambient temperature. If product is heated above decomposition temperature toxic vapours may be released.
Viscosity, dynamic:	approx. > 1 ( 20 °C) mPa.s
Solubility in water:	fully soluble
Molar mass:	292.34 g/mol
Evaporation rate:	not applicable
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.

## 10. Stability and Reactivity

### Reactivity

No hazardous reactions if stored and handled as prescribed/indicated.

### Corrosion to metals:

Corrosive effect on: zinc iron mild steel

### Oxidizing properties:

Not an oxidizer.

### Chemical stability

The product is stable if stored and handled as prescribed/indicated.

### Possibility of hazardous reactions

The product is chemically stable.

Hazardous polymerization will not occur. No hazardous reactions if stored and handled as prescribed/indicated.

### Conditions to avoid

Avoid all sources of ignition: heat, sparks, open flame. Avoid prolonged storage. Avoid electro-static discharge. Avoid contamination. Avoid prolonged exposure to extreme heat. Avoid extreme temperatures.

### Incompatible materials

strong bases, strong acids, strong oxidizing agents

### Hazardous decomposition products

#### Decomposition products:

Hazardous decomposition products: No hazardous decomposition products if stored and handled as prescribed/indicated., Prolonged thermal loading can result in products of degradation being given off.

#### Thermal decomposition:

Possible thermal decomposition products:

carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons

Stable at ambient temperature. If product is heated above decomposition temperature toxic vapours may be released.

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### 11. Toxicological information

#### Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

#### Acute Toxicity/Effects

##### Acute toxicity

Assessment of acute toxicity: Relatively nontoxic after single ingestion. Relatively nontoxic after short-term inhalation. Relatively nontoxic after short-term skin contact.

##### Oral

Type of value: LD50  
Species: rat  
Value: > 5,000 mg/kg

##### Inhalation

Type of value: LC50  
Species: rat  
Value: > 2.38 mg/l  
Exposure time: 4 h

Type of value: LC50  
Species: rat  
Value: > 9.52 mg/l  
Exposure time: 1 h

##### Dermal

Type of value: LD50  
Species: rabbit  
Value: > 5,000 mg/kg

##### Irritation / corrosion

Assessment of irritating effects: May cause slight but temporary irritation to the eyes. May cause slight irritation to the skin.

##### Skin

Species: rabbit  
Result: non-irritant  
Method: Primary skin irritation test

##### Eye

Species: rabbit  
Result: non-irritant

##### Sensitization

Assessment of sensitization: There is no evidence of a skin-sensitizing potential.

##### Skin sensitization test

Species: guinea pig  
Skin sensitizing effects were not observed in animal studies.

#### Chronic Toxicity/Effects

##### Repeated dose toxicity

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Assessment of repeated dose toxicity: The product has not been tested. The statement has been derived from the properties of the individual components. No substance-specific organotoxicity was observed after repeated administration to animals.

### Genetic toxicity

Assessment of mutagenicity: The product has not been tested. The statement has been derived from the properties of the individual components. Mutagenicity tests revealed no genotoxic potential.

### Carcinogenicity

Assessment of carcinogenicity: The product has not been tested. The statement has been derived from the properties of the individual components. The results of various animal studies gave no indication of a carcinogenic effect.

### Reproductive toxicity

Assessment of reproduction toxicity: The product has not been tested. The statement has been derived from the properties of the individual components. The results of animal studies gave no indication of a fertility impairing effect.

### Teratogenicity

Assessment of teratogenicity: The product has not been tested. The statement has been derived from the properties of the individual components. Animal studies gave no indication of a developmental toxic effect at doses that were not toxic to the parental animals.

### Other Information

Misuse can be harmful to health.

## Symptoms of Exposure

No significant reaction of the human body to the product known.

### Medical conditions aggravated by overexposure

Individuals with pre-existing diseases of the respiratory system, skin or eyes may have increased susceptibility to excessive exposures.

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## 12. Ecological Information

### Toxicity

#### Aquatic toxicity

Assessment of aquatic toxicity:

There is a high probability that the product is not acutely harmful to aquatic invertebrates. Acutely harmful for aquatic plants. There is a high probability that the product is not acutely harmful to fish.

#### Toxicity to fish

*Information on: Imazapic*

*LC50 (96 h) > 98.7 mg/l, Cyprinodon variegatus*

#### Aquatic invertebrates

*Information on: Imazapic*

*LC50 (48 h) > 97.7 mg/l, Mysisidopsis bahia*

#### Aquatic plants

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*Information on: Imazapic*  
*EC50 (14 d) 0.0061 mg/l, Lemna gibba*  
*No observed effect concentration (14 d) 0.00258 mg/l, Lemna gibba*

---

Assessment of terrestrial toxicity  
With high probability not acutely harmful to terrestrial organisms.

#### Other terrestrial non-mammals

*Information on: imazapic*  
*LC50, Anas platyrhynchos*  
*With high probability not acutely harmful to terrestrial organisms.*  
*LD50 > 100 ug/bee, Apis mellifera*  
*With high probability not acutely harmful to terrestrial organisms.*

---

#### **Mobility in soil**

Assessment transport between environmental compartments  
The product has not been tested. The statement has been derived from the properties of the individual components.

*Information on: Imazapic*

*The substance will not evaporate into the atmosphere from the water surface.*  
*Following exposure to soil, the product trickles away and can - dependant on degradation - be transported to deeper soil areas with larger water loads.*

---

#### **Additional information**

Other ecotoxicological advice:  
The ecological data given are those of the active ingredient. Do not release untreated into natural waters.

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### **13. Disposal considerations**

#### **Waste disposal of substance:**

Pesticide wastes are regulated. Improper disposal of excess pesticide, spray mix or rinsate is a violation of federal law. If pesticide wastes cannot be disposed of according to label instructions, contact the State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

#### **Container disposal:**

Rinse thoroughly at least three times (triple rinse) in accordance with EPA recommendations. Consult state or local disposal authorities for approved alternative procedures such as container recycling. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

#### **RCRA:**

This product is not regulated by RCRA.

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### 14. Transport Information

#### Land transport

USDOT

Not classified as a dangerous good under transport regulations

#### Sea transport

IMDG

Hazard class: 9  
Packing group: III  
ID number: UN 3082  
Hazard label: 9, EHS  
Marine pollutant: YES  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains IMAZAPIC)

#### Air transport

IATA/ICAO

Hazard class: 9  
Packing group: III  
ID number: UN 3082  
Hazard label: 9, EHS  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains IMAZAPIC)

### 15. Regulatory Information

#### Federal Regulations

##### Registration status:

Crop Protection TSCA, US released / exempt

Chemical TSCA, US blocked / not listed

EPCRA 311/312 (Hazard categories): Acute;

#### State regulations

##### CA Prop. 65:

There are no listed chemicals in this product.

##### NFPA Hazard codes:

Health : 2 Fire: 1 Reactivity: 1 Special:

#### Labeling requirements under FIFRA

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from

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the classification criteria and hazard information required for safety data sheets, and workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label.

CAUTION:  
KEEP OUT OF REACH OF CHILDREN.  
KEEP OUT OF REACH OF DOMESTIC ANIMALS.  
Avoid inhalation of mists/vapours.

Avoid contact with the skin, eyes and clothing.  
Wash thoroughly after handling.

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### 16. Other Information

SDS Prepared by:  
BASF NA Product Regulations  
SDS Prepared on: 2014/09/12

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

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END OF DATA SHEET

**Appendix E - MB-906 Label**



# MB 906

BioWest Ag Solutions™ MB 906 is a soil inoculant with a proprietary blend of beneficial microorganisms that may enhance biodiversity in the soil.

## MICROBIOLOGICAL PRODUCT

### ACTIVE INGREDIENTS:

*Pseudomonas fluorescens*\* .....0.20%

OTHER INGREDIENTS: .....99.80%

TOTAL 100.00%

### NON-PLANT FOOD INGREDIENT(S):

\**Pseudomonas fluorescens*

Contains a minimum of 30 million total CFU (colony forming units) per mL.

### DESCRIPTION:

MB 906 contains naturally occurring soil inoculant, *Pseudomonas* bacterium. MB 906 may enhance the biodiversity of the soil and does not hurt agricultural crops, turf, or rangeland plants.

### WARRANTY:

Since weather, crops, soil and other conditions may vary, neither BioWest Ag Solutions™, nor the Seller make a warranty of any kind, expressed or implied, concerning the use of this product. The user assumes all risk of use and handling whether or not in accordance with directions or suggestions.

### KEEP OUT OF REACH OF CHILDREN CAUTION

Harmful if swallowed. May be harmful or irritating to eyes, skin and respiratory system. Avoid contact with skin, eyes and clothing. In case of contact immediately flush skin, eyes or clothing with plenty of water. Do not ingest.

This product is intended for AGRICULTURE USE

### PRECAUTIONS:

Non-toxic, viable microbial culture. Wear eye protection and rubber gloves when handling. Avoid contact with eyes and open wounds. Rinse contacted areas with water. If ingested, give water and call a physician.

### STORAGE AND HANDLING:

Do not contaminate water, food or feed by storage or disposal. Store in original container in cool, dry area and out of direct sunlight. Store in area not accessible to children. Keep container closed when not in use. Mix before use. Expiration Date: Approximately 3 months after batch date.

### DIRECTIONS FOR USE:

Consult with your crop consultant for specific application recommendations.

### Application Recommendations:

- **Conditions:** Apply as a spray solution to the soil surface. Optimum application conditions are cool (<50°F) and wet. For best results, apply before rain in the fall or spring before germination and with daytime temperatures below 50°F.
- **Application rate:** Use 1 gallon of product per 1 acre in 1-30 gallons of water per 1 acre.
- **Volume of water:** Dependent on coverage of application equipment.
- **Avoid spray drift.**

### COMPATIBILITY:

Do not tank mix with toluene, copper, antibacterials or surfactants that are used to reduce microbial growth. This product is compatible with most fertilizers, adjuvants, surfactants and herbicides. Check with your crop consultant about other tank mixes or co-application.

MB 906

Net Weight: 8.4 Lbs per gallon (1.0 kg per liter)

Net Contents: [ ] 2.5 Gallon [ ] 250 Gallons  
[ ] 275 Gallons [ ] \_\_\_\_\_ Gallons/Bulk tanker

Batch Date: \_\_\_\_\_



