National Park Service
U.S. Department of the Interior

Palo Alto Battlefield National Historic Site
Texas

Integrated Vegetation Management Plan and Environmental Assessment

December 2010

Palo Alto Battlefield National Historical Park
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Executive Summary

Palo Alto Battlefield National Historic Site (PAAL) was established in its current configuration in 1992 in order to preserve the site of the first battle of the U.S.-Mexican War for the education, benefit, and inspiration of present and future generations. The battle of Palo Alto was fought on the afternoon of May 8, 1846 on the open prairie known as Palo Alto. The prairie of Palo Alto is situated along the western terminus of the coastal marsh and mud-flat zone of the Rio Grande Delta. Vegetation resources are especially important to the ecological and cultural significance of Palo Alto Battlefield. Historically the prairie was dominated by sacahuiste (*Spartina spartinae*) and other coastal grasses, with woody vegetation limited to small rises and along the levees of the abandoned channels or tributary channels of the Rio Grande, locally termed resacas. Cultural and natural resources at the site are strongly interrelated, with the natural environment playing integral roles in both the unfolding of the battle and the present-day interpretation of the site. Because of this interrelationship, factors guiding management decisions and activities must also be strongly integrated in considering impacts to both cultural and natural resource values.

The primary administrative function of the park is to manage the natural and cultural resources within the 3,400 boundary in such a manner as to protect and maintain the historic character and nature of the site, therefore providing the public with an opportunity to understand, appreciate, and connect to its significance in perpetuity. PAAL's establishing legislation, Palo Alto Battlefield National Historic Site Act of 1991 Public Law 102-304, charges the park to provide a well-balanced interpretation, presenting perspectives from both countries for the battle and the war considering the political, diplomatic, military and social causes and consequences.

Over the past century and a half, the prairie of Palo Alto has undergone dramatic changes. Although the archeological record associated with the battle is relatively intact, the cultural landscape and physical environment have been severely altered. Local and regional land-use and environmental control activities have altered the hydrological regime of the Prairie of Palo Alto, causing changes in the various vegetation communities, including the introduction of non-native species. Despite these noted alterations, much of the natural integrity of the site remains with distinct opportunities to restore or mitigate altered landscape situations. In order for PAAL to fulfill its primary mission of protecting and maintaining the historic character of the site for the public, the park needs to restore the cultural landscape through vegetation management. This need will be met through the development of a comprehensive and environmentally sensitive plan for managing the vegetation throughout the site. This will allow the park to consistently and efficiently manage the modern landscape in order to provide the public with an opportunity to better understand and appreciate the historic character of the site, and in turn facilitate their connecting to its significance. As such, this vegetation management plan will address vegetation management issues related to (1) altered landscape restoration; (2) non-native and invasive plant management, (3) management of plant species of special concern (including ethno-botanical resources), (4) vegetation monitoring, and (5) interpretation of vegetation resources.

This Integrated Vegetation Management Plan and Environmental Assessment has been developed to help guide NPS long-term management of vegetation resources at the Palo Alto Battlefield Unit. The VMP-EA will provide a long-term management framework for protecting, enhancing, restoring, and rehabilitating the native vegetation of PAAL. The park's general management plan (GMP) divided the park into three management zones to increase the efficiency of management within the park. These management zones are the Development Zone, Core Battlefield Preservation Zone, and Resource Protection Zone. Under this plan they are treated as distinct vegetation management units.

Development Zone The Development Zone contains the park facilities and infrastructure. Vegetation is managed to facilitate the operations of the park and provide visitors with safe and meaningful access to the park. The main area of the Development Zone, which includes a large Living History Demonstration area, is fairly compact and contained within the southwest quadrant of the park. The trail component of this zone extends out into the other zones, serving as corridors that provide visitors with access to the park's other resources.

Core Battlefield Preservation Zone The Core Battlefield Preservation Zone encompasses the entire battlefield where combat was staged during the 1846 battle at Palo Alto. During the mid-nineteenth century this area was an open coastal prairie grassland, with dense brush (or chaparral) adhering to the natural levees of the resaca meanders and on other slight rises. Cultural activities during the twentieth century – namely, flood control measures, crop cultivation, and livestock grazing – have substantially altered the vegetation community in this traditional grassland.

Resource Protection Zone The Resource Protection Zone encompasses the park owned land surrounding the battlefield and areas not within the development zone. This zone is managed less intensively than the other zones. Management focuses on control of invasive species while allowing native vegetation to develop without much active management of the natural resources. This zone provides potential habitat for endangered and threatened species and other indigenous wildlife. This zone also serves as a visual and aural barrier for park visitors.

Three alternatives have been identified for consideration in the development of a comprehensive vegetation management program for the Palo Alto Battlefield Unit of PAAL. These alternatives have been developed with input from local agencies (U.S. Fish and Wildlife Service, Nature Conservancy, U.S. Department of Agriculture, and Texas Department of Parks and Wildlife) and the general public. Under each of the presented alternatives some level of altered landscape restoration (including non-native and invasive plant management) will be implemented. However, the intensity of the restoration actions and the types of methods available for use will vary between the three alternatives as summarized below.

Alternative A: No Action Under the no action alternative, previously defined weed management will continue. Weed management activities will remain limited and focused on listed noxious weed species (exotic grasses) and to only a few species of specific concern to the park. The current weed management program is not fully developed to include prevention and early detection methodologies and will not effectively restore the cultural landscape. Altered landscape restoration actions would remain limited and would not be expanded to eliminate or

improve other visual intrusions on the landscape. Currently, vegetation monitoring is limited to predominantly observational assessments with no true quantitative means of assessing and obtaining feedback information on the effects of visitor use and management actions on park vegetation resources. Interpretation of vegetation resources is minimal. Under alternative A, natural biological diversity (including species of ethnological importance) and the cultural landscape of the park will remain compromised and the park will not fully meet the legislated mandate of restoring and maintaining the historic character of the 1846 battle.

Alternative B: Proactive Vegetation Management – Under Alternative B, a complete weed management program (with expanded herbicide use and cyclical burning) for the Resource Protection Zone and the Development Zone will be developed; altered landscape restoration actions (with expanded herbicide use and cyclical burning) will be implemented for the Core Battlefield Preservation Zone; and vegetation monitoring and interpretation programs will be developed. This alternative would provide the park with the widest range of tools for achieving stated vegetation management goals and objectives and would result in the greatest level of site restoration in meeting the mandate of the park's enabling legislation. Weed management efforts would be expanded to include a full range of mechanical, cultural, chemical, and biological treatments to ensure the highest level of invasive and non-native plant eradication and/or control. Non-native and invasive species would be reduced to restore a more open viewshed as was present during the 1846 battle. Herbicide use would include chemicals that are both generalized and species-specific, to allow for more efficient (one-time application versus several repeated applications) and effective weed control. Altered landscape restoration actions for the compromised core battlefield area (to restore the cultural landscape) will include mechanical and chemical treatment of woody vegetation, cyclical controlled burning to kill woody species and promote grass germination, re-introduction of native sacauhiste grasses, and chemical treatment of exotic grasses. In addition to restoring the cultural landscape, this Alternative will promote open prairie for the Northern Aplomado falcon (*Falco femoralis*), PAAL's single confirmed T&E animal species. For the Resource Protection Zone, strategies would be developed for allowing dense chaparral growth. This will provide aural and visual buffers, as well as create potential habitat for numerous species, including locally occurring T&E feline species. Both qualitative (e.g. photo-stations/repeat photography) and quantitative vegetation monitoring (e.g. nested frequency plots) will be established to provide the park continuous feedback on all vegetation and restoration management activities. Specific multi-purpose and targeted vegetation monitoring protocols will be identified and implemented in coordination with the NPS personnel of the Gulf Coast Inventory and Monitoring Network, Gulf Coast Exotic Plant Management, and fire ecologists to: (1) define the effectiveness of weed management treatments, (2) provide early detection of newly invading weed species, (3) determine fire effects on native and non-native vegetation, and (4) determine prairie and riparian habitat restoration success. Alternative B serves as both the NPS and environmentally preferred alternative.

Alternative C: Improved Vegetation Management Under Alternative C, weed management activities are restricted to mechanical treatment with limited herbicide application. Mechanical removal of non-native species and direct herbicide application to specific plants will be the primary tools for vegetation management within the Core Battlefield Preservation Zone, Development Zone and Resource Protection Zone. In comparison to Alternative A (no-action alternative), weed management efforts will be increased in the control of both invasive weeds

and selected native species. Weed management methods will be limited to mechanical and chemical control, with limited herbicide application to location-specific target species to prevent sprouting following mechanical removal. Efforts to re-establish native plants and grasses would be limited to native seed augmentations and non-native plant removals with no actions that will disturb the soil surface. Limited vegetation monitoring will be implemented to assess basic qualitative “change over time” analyses. No specific efforts will be made to restore or maintain culturally important native plant species. The visual and ecological quality of the site will be marginally improved above the no-action condition, but the park will not achieve maximum recovery of vegetation diversity and will remain compromised in the legislative goal of restoring the site to as close as possible to the 1846 landscape.

Public Comment

If you wish to comment on this Environmental Assessment, you may mail comments to the name and address below. This Environmental Assessment will be on public review for 30 days. Please note that names and addresses of people who comment become part of the public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

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SECTION 1: PURPOSE AND NEED

1.1 INTRODUCTION

Effectively established in 1992, Palo Alto Battlefield National Historic Site (PAAL) is a relatively new addition to the National Park Service (NPS). The park preserves and interprets the site of the first battle of the two year war between Mexico and the United States 1846-1848. The park serves an important role in commemorating the conflict which established the current US Mexico border, transferring a vast amount of Mexican territory to the United States.

In 2009 legislation passed that added the site of Resaca de la Palma Battlefield National Historic Landmark as a second unit of the park, and changed the name of the park from National Historic Site to National Historical Park. All that remains undeveloped of the site of the battle which took place the day after Palo Alto is a small 30 acre tract surrounded by residential and commercial development. However, this parcel has been highly altered during the 20th century and the historic character of the site has mainly been lost. The site is currently an open grassy field, which is locally known as the old polo field. Due to the suburban setting and the lack of integrity of the cultural landscape and the archeological record, the park has decided to maintain the current open urban park character of the site. In addition, this property is still in private hands and is considered as a lower priority for acquisition than the private holdings at the Palo Alto Unit. Therefore, this Vegetation Management Plan and Environmental Assessment will only treat the resources at the Palo Alto Unit.

Located in extreme south east Texas (Figure 1) and occupying a land base of 3418 acres, the Palo Alto Battlefield Unit of PAAL includes approximately 275 acres of resaca or former riparian-type and/or river corridor vegetation, 1,358 acres of mixed grass prairie (higher quality), 1375 acres of mixed brush grassland , and 418 acres of dense, old-growth brush thickets. Vegetation classification was determined by the interpreted signatures of these communities in 2009 and 2010 aerial imagery. The Palo Alto Battlefield Unit is situated in the western terminus of the coastal prairie; soils are predominantly clay soils high in salinity and are not productive. Consequently, the area has not been used extensively for agriculture and the landscape of the Palo Alto Battlefield Unit possesses a high degree of cultural and ecological integrity.

Vegetation resources are especially important to the ecological and cultural significance of Palo Alto Battlefield Unit of PAAL. Cultural and natural resources at the Palo Alto Battlefield Unit are strongly interrelated, since the natural environment strongly influenced how the battle unfolded. Therefore, factors guiding management decisions and activities must also be strongly integrated in considering impacts to both cultural and natural resource values.

The General Management Plan (GMP) for Palo Alto Battlefield (1998) has identified several statements regarding the integration of cultural and natural resource values that serve to guide vegetation management activities within the park:

- The native plant communities of the site provide a critical setting for interpreting the events of the battle; consequently, restoring the native vegetation will be an important objective for the park.
- The site should be restored to a state in keeping with the historic period.
- Features that interfere or do not contribute to an understanding of historical events should be removed.
- The resources should be managed to provide a visitor experience that will include a quiet and peaceful atmosphere ideal for contemplation and reflection.
- The park should strive to attain a sustainable historic landscape based on natural processes (such as fire) and with minimal need for intrusive methods.
- Restore the historic vegetation patterns while protecting archeological resources.

Additionally, the park's Resource Management Plan (RMP) (1994) identifies the following key objective for natural resources management at the Palo Alto Battlefield Unit.

> *To reestablish and promote native plants and animals that contribute to and create the park's historic scene and the natural values of the area while controlling or extirpating exotics species introduced after 1846.*

In response to those park values and objectives, a Vegetation Management Plan for Palo Alto Battlefield Unit has been prepared that reflects a scientifically credible land stewardship program for preserving the natural and cultural values associated with the park. Development of the Vegetation Management is guided by NPS mandates and policies. The Vegetation Management Plan strives to provide technical guidance on vegetation management issues significant to both the ecological and cultural landscape found within the Palo Alto Battlefield Unit. Specific vegetation related topic areas addressed within this plan include: (1) non-native and invasive plant management; (2) altered landscape restoration, (3) management of plant species of special concern (including ethno-botanical resources); (4) vegetation monitoring; and (5) interpretation of vegetation resources.

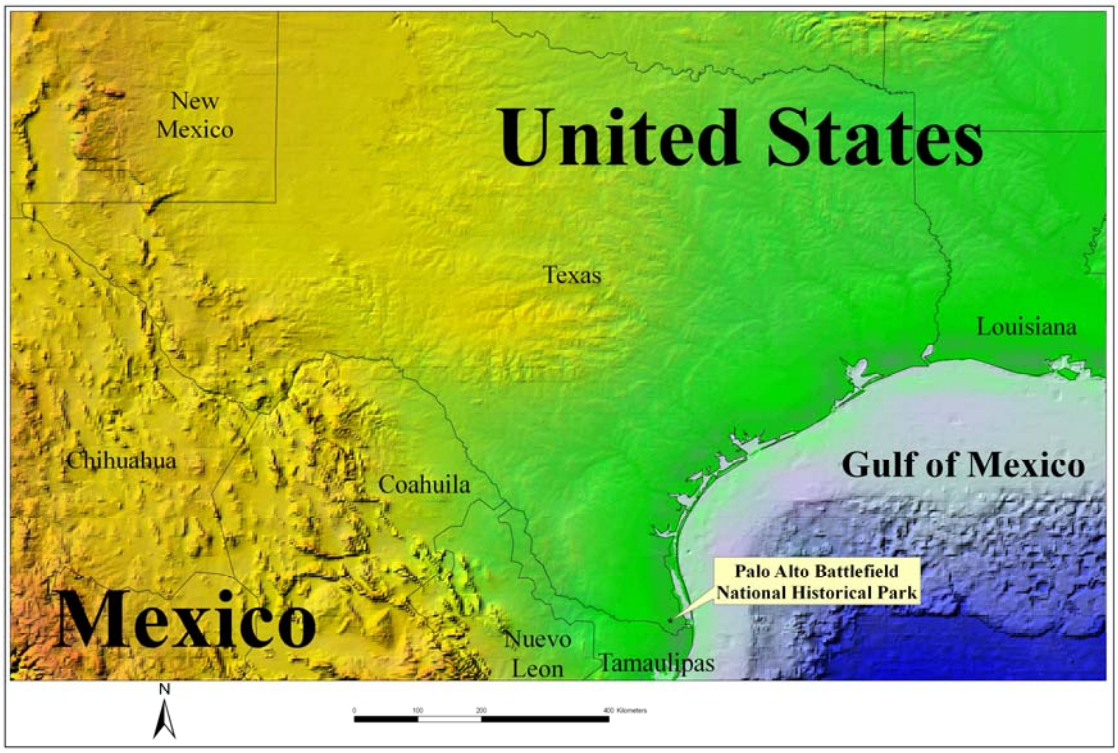

Figure 1. Palo Alto Battlefield National Historic Site – Vicinity Map.

1.2 PURPOSE AND OBJECTIVES

Palo Alto Battlefield National Historic Site (NHS) was established in June, 1992 (PL 102-304) in order to preserve for the education, benefit, and inspiration of present and future generations the nationally significant site of the first battle of the U.S.-Mexican War, and to provide for its interpretation in such manner as to portray the battle and the U.S.-Mexican War and its related political, diplomatic, military and social causes and consequences. The national historic site's enabling legislation specifically mandates that the park will be managed "to protect, manage, and administer the historic site for the purposes of preserving and interpreting the cultural and natural resources of the historic site and providing for public understanding and appreciation of the historic site in such manner as to perpetuate these qualities and values for future generations" (HR1642, 1992).

Based on Palo Alto Battlefield's enabling legislation and completed General Management Plan (1998), the following mission goals are applicable to vegetation management within the Palo Alto Battlefield Unit of PAAL:

- Natural and cultural resources and associated values of the Palo Alto Battlefield Unit are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context.
- Palo Alto Battlefield Unit contributes to knowledge about natural and cultural resources and associated values; management decisions about resources and visitors are based on adequate scholarly and scientific information.
- Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of the Palo Alto Battlefield Unit's facilities, services, and appropriate recreational opportunities.
- Park visitors and the general public understand and appreciate the preservation of Palo Alto Battlefield Unit and its resources for present and future generations.
- Palo Alto Battlefield Unit uses current management practices, systems and technologies to accomplish its mission.
- Palo Alto Battlefield National Historical Park increases its managerial capabilities through initiatives and support from other agencies, organizations, and individuals.

Although the Palo Alto Battlefield Unit has largely escaped heavy agricultural and commercial development, the park lands do display obvious human impacts on the natural and cultural resources. Those impacts that include more modern human disturbances and altered site hydrology have further allowed for the establishment of many non-native and invasive plant species within the park's designated boundaries.

The Palo Alto Battlefield Historic Parks Centennial Strategy (2007) lists improving the condition of park resources and assets as its primary stewardship responsibility. This improvement will be achieved through, "restoring native habitats by controlling invasive species and re-introducing key (native) plant and animal species."

1.3 NEED FOR A VEGETATION MANAGEMENT PLAN

The purpose of the Vegetation Management Plan is to provide a long-term management framework for protecting enhancing, restoring, and rehabilitating the cultural landscape of the Palo Alto Battlefield Unit. The park's GMP (1998) delineated the need to implement maintenance and restorative actions to the vegetation resources in order to meet the legislative mandate for returning and maintaining the historic character of the 1846 battle site. The GMP divided the Palo Alto Battlefield Unit into three management zones: Core Battlefield Preservation Zone; Development Zone; and Resource Protection Zone. These zones are presented in Figure 2 and will serve as the basis for defining specific vegetation management actions for the park unit.

Restoration of the current landscape is necessary to return Palo Alto Battlefield Unit to a more historically representative condition for several reasons. First, as indicated in the park's enabling legislation, a critical purpose of Palo Alto Battlefield is to restore the visual scene, including the natural resources of this site, as best as possible to the 1846 era. Additionally, the restoration and maintenance of the 1846 cultural landscape is crucial to the understanding, interpretation and appreciation of this sites' significance by park visitors. More modern human disturbances, including the presence of non-native and invasive vegetation, has caused degradation of the

“qualities and values” described for the Palo Alto Battlefield Unit. Unrestricted expansion of non-native and invasive plant species is of specific concern, and will lead to further degradation of the cultural and natural landscapes for which the park was established, and make it even more difficult to restore and preserve for future generations.

Vegetation management is necessary at Palo Alto Battlefield Unit of PAAL not only to meet the natural and cultural resources management goals of the park, but also to meet the more comprehensive resource protection, conservation, and preservation objectives of the National Park Service. Current vegetation management and restoration issues for the three management zones identified for Palo Alto Battlefield Unit are summarized in Table 1.

Table 1. Vegetation management and restoration needs at the Palo Alto Battlefield Unit.

Management Zone	Vegetation Management / Restoration Needs
Development Zone (ca. 37 acres)	This area includes the park's Visitor Center, maintenance yard, roads, parking lots, trails, battlefield overlook structure, picnic table pods, and living history demonstration area. The vegetation in this zone requires mowing, cutting, trimming, and occasional herbicide treatments to provide visitors with safe access to the site, in an effort to maximize visitor understanding and increase the opportunities to connect with the significance of the site.
Core Battlefield Preservation Zone (ca. 2,182 acres)	The majority of this zone is comprised of the remnants of a historic costal grassland prairie, which was dominated by sacahuiste grasses. This zone also contains abandoned channels or distributary channels of the Rio Grande System, with their associated low-lying natural levees and riparian vegetation, and a number of small rises or lomas that typically contain a Tamaulipan Brushland type vegetation community. The floodplain hydrology has been significantly altered due to historic flood control actions within the watershed and does not support the full range of floodplain species. This unit will require active weed management (using cultural, mechanical and chemical treatments). Use of prescribed fire and native seed augmentation(s), and transplanting of plugs to restore a native prairie habitat are recommended.
Resource Protection Zone (ca. 1,270 acres)	This zone contains vegetation elements identical to the Core Battlefield Zone. Active invasive plant management (using cultural, mechanical and chemical treatments) and restoration actions to increase native plant biodiversity and to assist in creating a stable and proper functioning natural ecosystem will be needed.

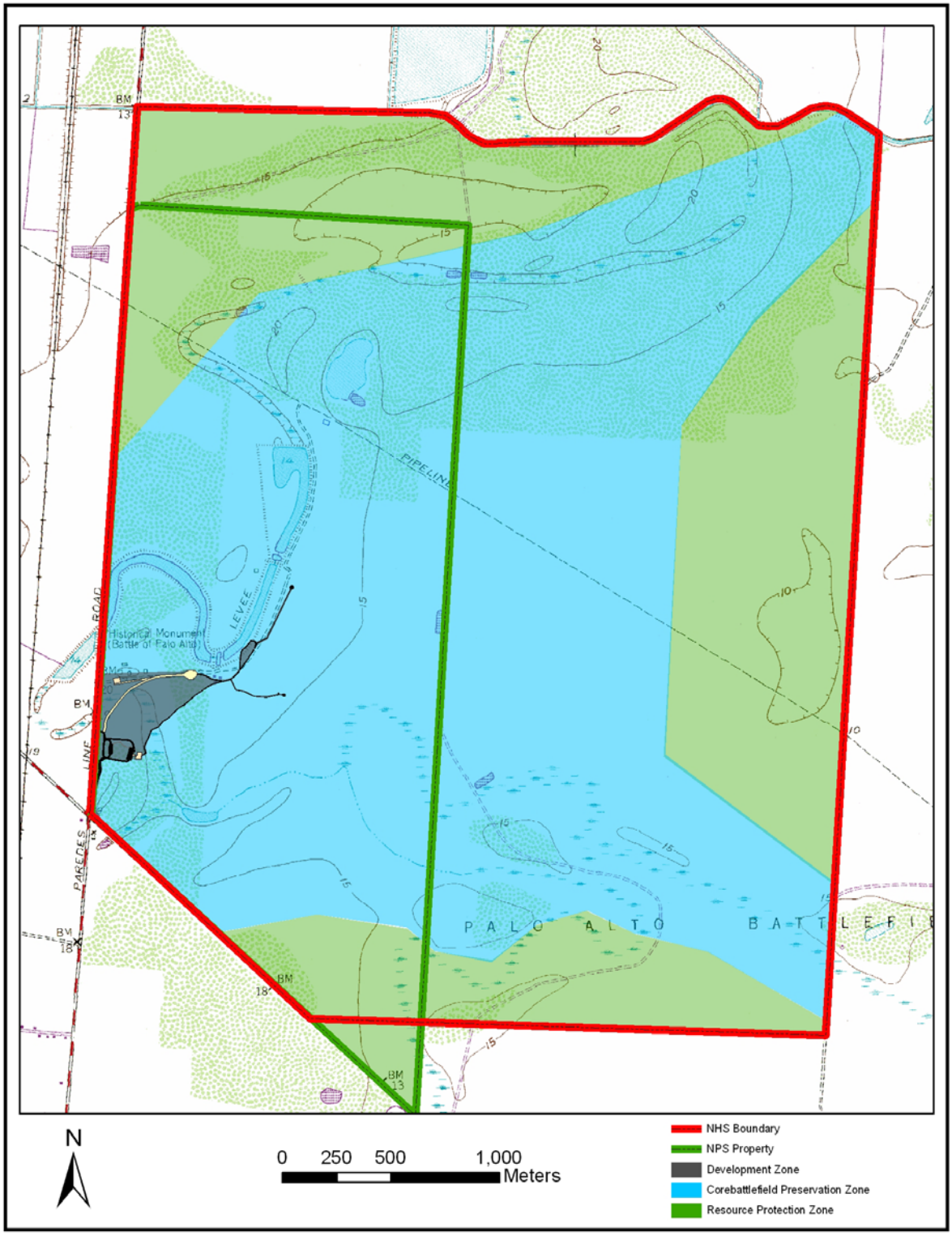

Figure 2. Palo Alto Battlefield National Historic Site – Vegetation Management Units.

1.3.1 General Concepts and Methods Associated with Non-Native and Invasive Plant Management

Successful non-native and invasive plant management requires the use of numerous types of tools. Most often the strategies identified to manage non-native and/or weed species follows an Integrated Pest Management (IPM) approach. IPM is typically defined as a decision-making process that combines knowledge of a pest's biology, the environment, and available technology to prevent unacceptable levels of pest damage, using the most cost-effective means while posing the least amount of risk to people, resources and the environment (NPS Management Policies, 2001). Tools used in applying IMP strategies to non-native plant management typically fall into four major categories: (1) Cultural Control Methods, (2) Mechanical Control Methods, (3) Chemical Control Methods, and (4) Biological Control Methods.

1.3.1.1 Reasons for Management of Non-Native Species

- Non-native species degrade cultural landscapes associated with the 1846 battle and diminish the understanding, interpretation, and appreciation of the significance of the site.
- Non-native species disrupt natural ecosystems, reduce biodiversity, jeopardize native plants and animals and degrade habitats.
- Non-native species can alter natural hydrological regimes and increase the potential for uncontrolled wildfire.
- Some non-native species can hybridize with native species, altering native genetic diversity and integrity.

1.3.2 General Concepts and Methods Associated with Altered Landscape Restoration

Restoration actions will be planned and evaluated on a site-specific basis by an interdisciplinary natural/cultural management team so that the impacts of management actions on soils, remaining natural resources, and the cultural landscape can be minimized. Specific actions to be taken prior to and during implementation of restoration actions include:

- A restoration action plan will be prepared to document existing conditions and the specific process/methods proposed for implementation and will be based on an on-site evaluation.
- All plant materials (i.e. seeds, cuttings, and whole plants) used for native community restorations will be derived, if at all possible, from populations of native specie found either on-site or as close to the local area as possible. Native plants should be salvaged from proposed disturbance areas and temporarily stored whenever possible for use in native plant restorations.

- Identify the extent of the area to be disturbed by restoration activities and, if necessary, delineate the boundaries of the work area with habitat fencing where needed to protect adjacent natural/cultural resources.
- Limit heavy equipment use to the minimum area needed to accomplish the restoration activities.
- Remove any unnecessary debris or slash from the restoration site.
- Control all potential soil erosion through use of re-vegetation, drainage control, surface stabilization, or other erosion control methods.
- Monitor restoration site for non-native plant establishment(s). Remove all non-native plants that establish near or encroach on the restoration site for at least 5 years after the restoration.

1.4 SUMMARY OF KEY LEGAL MANDATES

Legal mandates provide direction for what can and cannot be considered in this plan. Several of the provisions of key legal mandates and related regulations are summarized in this section.

1.4.1 Key Legislation

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA; PL 91-190)

This act sets forth the federal policy to preserve important historic, cultural, and natural aspects of our national heritage. Another purpose of NEPA is to help public officials make decisions that are based on an objective understanding of environmental consequences and to take actions that protect, restore, and enhance the environment. The act applies to all federal projects or projects that require federal involvement. All federal agencies are directed to use a systematic, interdisciplinary approach that integrates natural and social sciences in planning and decision making that may impact the human environment. NEPA and the Council on Environmental Quality implementing regulations describe the process a proposed federal action such as this plan must follow. Among the steps in the process, NEPA and the regulations require early coordination, called "scoping," to determine the scope and significance of issues to be addressed in an environmental assessment or an environmental impact statement, depending on the severity of the perceived environmental impacts associated with the project. A structured format for public involvement during the public review process is specified. When preparing an environmental impact statement, the regulations further require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives to the proposed action.

ENDANGERED SPECIES ACT OF 1973, AS AMENDED (16 USC 1531 ET SEQ.)

The purpose of this act is to provide protection for animal and plant species that are currently in danger of extinction (endangered) and those that may become so in the

foreseeable future (threatened). Section 7 requires all federal agencies to ensure that their activities do not have adverse impacts on the continued existence of threatened or endangered species or on designated areas (critical habitats) that are important in conserving those species. Thus, the National Park Service is required to fully integrate endangered species conservation planning into park system management. Agencies also are required to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (16 USC 470, ET SEQ.)

This act establishes as federal policy that the historical and cultural foundations of the nation's heritage be preserved. Section 106 requires that federal agencies that have direct or indirect jurisdiction over undertakings take into account the effect of those undertakings on properties eligible for or included in the National Register of Historic Places. The section also provides the Advisory Council on Historic Preservation and the State Historic Preservation Officer an opportunity to comment on the undertaking. Section 110 requires federal managers, in consultation with the state historic preservation officers, to establish programs to identify, evaluate, and nominate properties to the National Register of Historic Places. The 1992 amendments to the act have further defined the roles of American Indian tribes and the affected public in the section 106 consultation process. National register eligible or listed properties and National Historic Landmarks are afforded special protection in federal project federal project planning and implementation.

EXECUTIVE ORDER 13112 OF FEBRUARY 3, 1999 – INVASIVE SPECIES

This act establishes a national Invasive Species Council and identifies specific federal policy that requires the management of invasive, non-native plant and animals by most federal agencies. Invasive species are defined under this executive order as (1) non-native (or alien) to the ecosystem under consideration and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

1.4.2 Related Laws, Documents, and Plans

NATIONAL PARK SERVICE MANAGEMENT POLICIES (NPS 2001)

This management policy document sets the framework and provides direction for all management decisions within the NPS. This document establishes the NPS policies for all natural and cultural resource management.

NATIONAL PARK SERVICE-77, NATURAL RESOURCE MANAGEMENT GUIDELINES (NPS 1991) AND NPS-28, CULTURAL RESOURCE MANAGEMENT GUIDELINES (NPS 1994d)

These service wide guidelines establish the basic principles and objectives for natural and cultural resource management by the NPS and define the steps for developing an ecologically sound and historically sustainable vegetation management program. These documents provide the general guidance for NPS actions proposed under this plan as well as program guidance for future action plans that may be needed to address site-specific vegetation management activities (e.g. detailed restoration/revegetation plans).

PALO ALTO BATTLEFIELD NHS GENERAL MANAGEMENT PLAN (1998)

The General Management Plan for Palo Alto Battlefield NHS is the umbrella document guiding all resource management and visitor use activities within the park. This document (1) clearly states the parks legislatively mandated missions and (2) identifies the general management prescriptions needed for the various units of the park. These management prescriptions include the identification of desired resource conditions and visitor experiences, along with the definition of the kinds of management actions, visitor use and facilities development appropriate to each of the parks' identified management units.

PALO ALTO BATTLEFIELD NHS RESOURCE MANAGEMENT PLAN (2000)

The resources management plan (RMP) describes the natural and cultural resources of the park, states and evaluates current resources conditions and threats, and prescribes an integrated action program based on legislative and executive mandates, NPS management policies, and other related planning documents. This document serves as a long-term strategic plan for the management of resources located at Palo Alto Battlefield National Historic Site and identifies specific short-term projects to assist in achieving longer-term management goals.

PALO ALTO BATTLEFIELD NHS CULTURAL LANDSCAPE INVENTORY (2010)

A Cultural Landscape Inventory (CLI) was completed in August of 2010, updating the 1998 CLI. This document is currently undergoing the State Historic Preservation Officer's review for concurrence. The CLI is an inventory and evaluation of all of the cultural landscapes within the Palo Alto Battlefield Unit's legislative boundary. The purpose is to identify the cultural landscapes within the park unit and to provide information on their location, historical development, character defining features, and management. The CLI is designed to assist managers in planning, programming, and recording treatment and management decisions.

1.5 SUMMARY OF SCOPING PROCESS

Scoping is a process to identify the resources that may be affected by a project proposal, and to explore possible alternative ways of achieving the proposal while minimizing adverse impacts. Palo Alto Battlefield NHP initiated the internal scoping process by assembling a diverse

Interdisciplinary Team of professionals to guide the development of this Vegetation Management Plan, and to identify and assess the impacts on the human environment by the implementation of the proposed alternatives presented in this plan. A full summary of the scoping process and involved parties is provided in Section 4 of this Environmental Assessment.

1.6 IMPACT TOPICS ANALYZED

The consideration of impacts on cultural and natural resources, and visitor use and experience, are required by certain Federal laws, regulations, orders, and planning documents. These include the National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), and the NPS's Director's Order #28, "Cultural Resource Management Guideline" (1997), Management Policies 2001 (2000), and Director's Order #12, "Conservation Planning, Environmental Impact Analysis, and Decision Making" (2001). The following impact topics were identified by the Interdisciplinary Team as issues and concerns related to the proposed management action. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

1.6.1 Cultural Landscape and Archaeological Resources

1.6.1.1 Cultural Landscape

The cultural landscape at the Palo Alto Battlefield Unit has been included as an impact topic because cultural and natural resources at the site are strongly interrelated with the natural environment. The natural environment played an integral role in the battle, and plays a vital role in contemporary interpretation of the site. The management and restoration of native plant communities at Palo Alto Battlefield would restore the appearance of the site to one more historically representative of the 1846 time period. However, because the identified alternatives would cause various levels of alteration of the existing cultural landscape of the park, cultural landscapes have been included as an impact topic.

1.6.1.2 Cultural and Archeological Resources

Preliminary cultural and archaeological surveys have been completed at the park. However, since some of the proposed vegetation management activities may disturb the soil surface, especially in performing restoration of the historic battlefield, unknown sub-surface cultural artifacts or features may be disturbed. Therefore, cultural and archeological resources have been included as an impact topic.

1.6.2 Natural Resources

1.6.2.1 Water Resources

The NPS is directed to protect surface water, ground water, and water quality through both the NPS Management Policies (Section 4.6, 2001) and the Clean Water Act. There may be potential for minimal surface water and groundwater contamination due to runoff or drip in areas of herbicide application(s). Additionally, there is some potential for impacts to surface water resources from soil erosion caused by a change in the vegetation structure in proposed restoration

treatment areas. Water quantity and availability to other plants and wildlife may also be beneficially altered as an effect of vegetation management actions. Therefore, water resources will be considered as an impact topic.

1.6.2.2 Air Quality

Through its Management Policies, (Section 4.7.1, 2001), the NPS is charged to protect air quality in all park units, and to meet the air quality standards delineated in the Clean Air Act. Since Palo Alto Battlefield is a Class II air quality area, and because minimal potential for impacts to air quality from the spray drift or vaporization of herbicides may occur, air quality will be discussed as an impact topic. *Note: Air quality issues related to the use of prescribed fire have been analyzed under the park's Fire Management Plan (2005).*

1.6.2.3 Vegetation

Section 4.4 of the NPS Management Policies 2001 (2001) defines the management of plants in park units, including the preservation and restoration of natural populations and habitats, restoration of native plant populations and ecosystems, and minimization of human impacts on vegetation. The proposed level and intensity of vegetation management at Palo Alto Battlefield varies between the three alternatives and, thus, will influence the degree to which the park can to meet this guidance. Additionally, there may be short-term impacts to vegetation communities from the specific management actions taken to reduce weed densities and/or during restoration of visual intrusions within the park. Therefore, impacts to vegetation will be considered in this analysis.

1.6.2.4 Riparian Habitat and Floodplains

Executive Order 11988 Floodplain Management requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The NPS under 2001 Management Policies and Director's Order 77-2 Floodplain Management will strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 Floodplain Management, certain construction within a 100-year floodplain requires preparation of a Statement of Findings for floodplains. Some level of habitat restoration and weed management activities are proposed under all alternatives for floodplain and riparian habitats at the Palo Alto Battlefield Unit. Vegetation management actions in riparian and floodplain habitats will be considered in the impact analyses.

1.6.2.5 Wetlands

Currently, NPS and Colorado State University hydrologists are attempting to determine whether the grassland prairies at the Palo Alto Battlefield Unit should be classified as wetlands. A final determination on the classification of these grassland prairies has not been completed. There is little question that the historic hydrologic regime of the grasslands has been significantly altered, but it is beyond the park's ability to fully restore this ecosystem. However, efforts to restore the cultural landscape on this coastal prairie are compatible with practices that are designed to restore the prairie to its historical wetland condition.

1.6.2.6 Wildlife

Section 4.4 of the NPS Management Policies (2001) also addresses the management, preservation, and restoration of animal populations, habitats, and behaviors. Similar to the

impacts on vegetation at the Palo Alto Battlefield Unit, there may be some short-term impacts to native wildlife species depending on the vegetation management action. In the long term, the restoration of a more natural environment that is not dominated by non-native plants will allow for a more natural and diverse wildlife community than presently exists at the park. The effects of weed herbicide treatment on wildlife have been well-documented. In general, reported results do not indicate detrimental impacts on wildlife. Given that all alternatives include direct, application of herbicides to a targeted weed species it is likely that any potential for impacts to wildlife would be negligible. However, due to the potential for short-term minor adverse impacts on some wildlife species or individuals, primarily related to increased noise during weed management and restoration activities, wildlife will be considered as an impact topic in this analysis.

1.6.2.7 Natural Sound

Section 4.9 of the NPS Management Policies (2001) states that the NPS "will preserve, to the greatest extent possible, the natural soundscape…[that] is the aggregate of all the natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds." Since weed management and/or restoration of altered landscapes at the Palo Alto Battlefield Unit may include sounds from the use of chainsaws, trucks, or heavy equipment during identified treatment/restoration periods, natural sound will be considered as an impact topic.

1.6.3 Visitor Use

1.6.3.1 Public Health and Safety

Section 8.2.5 of the NPS Management Policies (2001) states that, "the Service and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees." Since the management of non-native and invasive weed species includes alternatives that rely on short-term chemical or mechanical treatment of vegetation, public health and safety will be considered as an impact topic.

1.6.3.2 Visitor Use and Experience

Section 8.2 and Section 7.1 of the NPS Management Policies (2001) define the Service's direction for and commitment to providing enjoyment of park resources for all visitors, and to provide education and interpretation of park resources and the values they represent. Restoration and weed management activities proposed under all alternatives may cause short-term, minor impacts on visitor use by limiting visitor access during restoration and other vegetation management actions. Therefore, visitor use will be considered as an impact topic.

1.6.4 Topics Dismissed from Further Analysis

1.6.4.1 Historic Structures

The term "historic structures" refers to both historic and prehistoric structures, which are defined as constructions that shelter any form of human habitation or activity. The Palo Alto Battlefield Unit does not contain any historic structures that are eligible for the National Register of Historic Places. Therefore, the topic of historic structures has been dismissed from further consideration.

1.6.4.2 Museum Collections

According to Director's Order 24 Museum Collections, the NPS requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. The proposed vegetation management actions do not affect the museum collections at Palo Alto Battlefield NHP. Therefore, the topic of museum collections has been dismissed from further consideration.

1.6.4.3 Prime and Unique Farmlands

All Federal agencies are charged to protect prime and unique farmlands, as directed by the Council on Environmental Quality and the Farmland Protection Policy Act (7 U.S.C. 4201 et seq.). As directed by this Act, Federal programs that contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses will be minimized. According to maps and data from the Natural Resource Conservation Service, U.S. Department of Agriculture, the Palo Alto Battlefield Unit is not situated in a part of Texas that contains prime farmland. However, the land at Palo Alto Battlefield is not currently being used as farmland, which is one of the qualifications for direction from the Farmland Protection Policy Act. Farmable areas at Palo Alto Battlefield will only undergo weed management and native vegetation restoration under the proposed alternatives. Coastal prairie soils are not well suited for crop cultivation or livestock grazing. None of the management alternatives would preclude the potential for future agricultural use. Therefore, prime and unique farmland status has been dismissed as an impact topic in this analysis.

1.6.4.4 Geologic Resources

The NPS Management Policies (Section 4.8, 2001) indicate the protection of geologic and topographic features, and geologic processes in park units. Since proposed restoration actions will have either no impact to geologic resources or beneficial impacts (e.g. restoring natural topography), impacts to the geology and topography at the Palo Alto Battlefield Unit have been dismissed from further analysis.

1.6.4.5 Environmental Justice

Presidential Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health of environmental effects of their programs and policies on minorities and low income populations and communities. None of the management alternatives would have disproportionate health or environmental effects on minorities or low-income populations and communities. Therefore, environmental justice has been dismissed as an impact topic.

1.6.4.6 Socioeconomics

The proposed action would neither change local and regional land use nor appreciably impact local businesses or other agencies. Implementation of the proposed action could provide a minor beneficial impact to the economies of Brownsville, TX as well as Cameron County due to some level of increased visitation at the park through an improvement of visitor use and experience.

Because the impacts to the socioeconomic environment would be minor and beneficial, this topic has been dismissed.

1.6.4.7 Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources at the Palo Alto Battlefield Unit. The lands comprising the Battlefield are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the project would have negligible effects on Indian trust resources, and this topic was dismissed as an impact topic.

1.6.4.8 Park Operations

This project will only have negligible effects on the overall park operations at Palo Alto Battlefield. Visitors will be restricted from accessing the certain vegetation management units during and immediately following weed management treatments and/or during use of motorized or heavy equipment during altered landscape restoration activities. Park staff will not experience disruptions of their work except for light to moderate, sporadic noise from chainsaws, trucks, and other equipment during vegetation management activities. Therefore, this topic was dismissed as an impact topic for analysis.

SECTION 2: MANAGEMENT ALTERNATIVES

2.1 VEGETATION MANAGEMENT PROGRAM GOALS

National Park Service Management Policies 2001 (Section 4.4.2, NPS 2001) dictates that "whenever possible, natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species." However, "the Service may intervene to manage individuals or populations of native species" when "a population occurs in an unnaturally high or low concentration as a result of human influences" and "to protect specific cultural resources." Intervention of this nature is currently warranted at the Palo Alto Battlefield Unit because more modern human disturbances (which resulted in the introduction and spread of numerous non-native plant species) have significantly altered the natural biological diversity of the site and are also compromising the cultural landscape mandated to be preserved at the park.

Based on the identified goals, objectives and strategies within the parks GMP (1998), and CLI (2010), the Vegetation Management Plan will provide direction and guidance for accomplishing the following vegetation management goals at the Palo Alto Battlefield Unit of Palo Alto Battlefield National Historical Park.

1) Utilize natural processes (e.g. prescribed fire, flooding), to the extent possible, to maintain and improve native plant community health and species diversity.
2) Control or eradicate non-native or undesirable plant species using the widest integration of cultural, biological, chemical and mechanical techniques as determined by appropriate compliance and public review.
3) Restore damaged habitats to reflect as best as possible the structure, function and composition of vegetation assemblages as were present at the time of the 1846 battle.
4) Develop monitoring for native plant communities and/or key species of interest.
5) Monitor and mitigate any visitor-use impacts to park vegetation resources.

2.2 ALTERNATIVES FOR VEGETATION MANAGEMENT

Vegetation management issues identified to be addressed by the parks vegetation management program include (1) non-native and invasive plant management, (2) management of plant species of special concern (3) vegetation monitoring, and (4) interpretation of vegetation resources.

The scoping process for this Environmental Assessment identified three alternatives for vegetation management at the Palo Alto Battlefield Unit. Under each of the presented alternatives, some level of altered landscape restoration (including non-native and invasive plant management) of the landscape would occur. However, treatment intensity, methodology, and effects vary between the three alternatives, as summarized in Table 2.

Table 2. Summary of vegetation management alternatives for the Palo Alto Battlefield Unit.

Management Alternative	Alternative A - No Action	Alternative B – Initiate Proactive Vegetation Management Program	Alternative C – Improved Vegetation Management
Summary of Potential Action and its Effects	Previously-defined weed activities will continue, including the minimal use of herbicides (primarily Remedy®, Roundup® and Habitat®). Native plant communities will be enhanced through minor weed management actions, however, cultural landscape restoration actions would not be expanded to eliminate or improve other visual intrusions on the battlefield. Weed management activities will remain limited and focused on listed noxious weed and invasive grass species only. Best Management Practices would not be developed to assist with prevention and early detection of weed species. Vegetation monitoring will remain limited to predominantly observational assessments with no means of obtaining feedback information on the effects of visitor use and management actions on park vegetation resources. Interpretation of vegetation resources is minimal.	Weed management efforts would be expanded to include a full range of mechanical, cultural, chemical, and biological treatments to ensure the highest level of invasive and non-native plant eradication and/or control. Best Management Practices will be defined to aid in the prevention and early detection of new weed infestations, allowing for more efficient and effective weed control. Cultural landscape restoration activities would be implemented to restore the core battlefield zone. Both qualitative and quantitative vegetation monitoring will be established to provide the park continual feedback on all vegetation and restoration management activities. Prescribed fire would be used within the core battlefield zone to restore natural process and vegetation communities present at the time of the 1846 battle.	Vegetation management activities will be expanded beyond actions identified under the "No Action" alternative. Weed management efforts will be increased to control both noxious weeds, invasive grasses, and selected non-native tree species. Weed management methods will be limited to mechanical and chemical control methods, with herbicide use remaining limited to Remedy® and Habitat®. Vegetation monitoring will be implemented, but will remain limited to more basic qualitative "change over time" analyses (e.g. establishment of photo-stations and repeat photography). Interpretation of vegetation resources will be minimally increased to assist park visitors with native plant identifications. Fire management will continue as defined by the park's Fire Management Plan, which does not allow for prescribed burning.
Does This Alternative Meet Park's Legislative Mandate?	Natural biological diversity (including species of ethnological importance) and the cultural landscape of the park will remain compromised and the park will not fully meet the legislated mandate of restoring and maintaining the historical scene of the 1846 battle.	Would provide the park with the widest range of tools for achieving stated vegetation management goals and objectives and would result in the greatest level of site restoration in meeting the mandate of the parks enabling legislation of restoring the visual scene of the 1846 battle.	The visual and ecological quality of the site will be improved beyond the no-action condition, but the park will not achieve maximum recovery of vegetation diversity and will remain compromised in the legislative goal of restoring the site to as close as possible to the 1846 scene.

2.2.1 Alternative A – No Action

Current vegetation management will continue without change under the no-action alternative. PAAL will continue to mow and manicure the vegetation immediately around the buildings, roadways and trails. PAAL will follow guidelines set forth in the Mesquite Eradication Environmental Assessment (National Park Service, 2004). Exotic plant species will be removed / reduced both mechanically and chemically, in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program. All other vegetative processes will be allowed to proceed undisturbed.

Under alternative A, natural biological diversity (including species of ethnological importance) and the cultural landscape of the park will remain compromised and the park will not fully meet the legislated mandate of restoring the historical scene of the 1846 battle.

2.2.1.1 Non-Native Plant/Weed Management Program

Weed management actions to date have included the use of mechanical removal techniques (chainsawing, hand removals, and to a more limited extent, mowing) and minimal use of herbicides, primarily related to the eradication or control of federal or state listed noxious weed species. Herbicide use is limited to **Remedy**®, **Roundup®** and **Garlon 4®. Remedy®** and **Garlon 4®** are used at PAAL to control broadleaved brush species encroaching on grasslands. Triclopyr is the active ingredient in these two herbicides. **Habitat**® is used to control non-native grasses. The active ingredient in **Habitat**® is imazapyr. The active ingredient in **Roundup®** is glyphosate, and this chemical is used to control common weeds along the park's roads, trails and parking facilities.

Triclopyr is a selective, systemic herbicide used to control broad leaved plants; it does not affect grass and coniferous trees. It controls weeds by mimicking plant hormones. In soil triclopyr has a half life of 1-90 days, in water the half life is from 1-10 days, and triclopyr has a half life of 3-10 days in plants.

Imazapyr is a non-selective, systemic herbicide used to control a broad range of plants including terrestrial and aquatic grasses. It prevents synthesis of amino acids to control plant growth. Sunlight rapidly degrades imazapyr: the half life of imazapyr in water is 2 days, and in soil is from 30-155 days.

Glyphosate is a non selective systemic herbicide that can be used to control all annual and perennial plants. It can be used to control grasses, broadleaved plants, and woody plants. It controls plant growth through the inhibition of enzyme production necessary for critical amino acid formation. Glyphosate bonds very strongly, thus very little leaves the site in runoff or enters groundwater. The half life of glyphosate in soil is 1-174 days. The half life of glyphosate in water is 12-70 days.

A list of weed species currently being managed at the Palo Alto Battlefield Unit, through use of mechanical and chemical treatments, is presented in Table 3. Most non-native plant management efforts have focused on King Ranch bluestem (*Bothriochloa ischaemum*), Kleberg's bluestem

(*Dichanthium annulatum*), Guinea grass (*Urochloa maxima*), and mother of thousands (*Kalanchoe daigremontiana*).

The absence of established "Best Management Practices" will likely result in additional non-native weed spread (of existing and new weed infestations) and would continue to limit the parks ability to use the most cost effective means of weed management - prevention and early detection.

Table 3. Non-native weed species and species of concern currently managed at the Palo Alto Battlefield Unit.

Bothriochloa ischaemum	King Ranch bluestem
Dichanthium annulatum	Kleberg's bluestem
Dichanthium aristatum	Angleton bluestem
Dichanthium sericeum	Camus silky bluestem
Kalanchoe daigremontiana	Mother of thousands
Urochloa maxima	Guinea grass

Under Alternative A, management of federal and state listed noxious weeds and the above-listed non-native weed species would continue. Non-native weed management actions would remain limited to mechanical removal techniques with minimal chemical uses of **Remedy®** and **Habitat®**. Copies of the Manufacturers Specimen Labels for these two herbicides can be found in Appendix 2.

2.2.1.2 Plant Species of Management Concern / Ethnological Importance

Under Alternative A, the conditions for native prairie plant establishment will be promoted through the above identified weed management restoration actions. However, no specific actions will be taken to identify or reintroduce rare plant species that may have been present historically but are now lost from the area. The historic sacahuiste-dominated grassland prairies will remain segmented and will continue to be compromised. Overall, native plant diversity and distribution will not represent what was present during the 1846 battle.

2.2.1.3 Vegetation Monitoring

Currently, vegetation monitoring is limited to predominantly observational assessments with no true quantitative means of assessing and obtaining feedback information on the effects of visitor use and management actions on park vegetation resources. Under Alternative A, no additional vegetation monitoring actions would be taken beyond the current process of observational assessments.

2.2.1.4 Vegetation Interpretation

Interpretation of vegetation resources is currently minimal and is limited to minor discussions of the role of topography and vegetation in the outcome of the 1846 battle. Some minor interpretation is also being presented in association with existing prairie restoration efforts.

Under alternative A, no additional efforts will be made to interpret historic and existing vegetation resources at the Palo Alto Battlefield Unit.

2.2.2 Alternative B – Proactive Vegetation Management

Develop a Complete Weed Management Program including expanded herbicide use, Implement Cultural Landscape Restoration Actions including cyclic burning of historic grassland prairies Develop Vegetation Monitoring and Interpretation Programs.

This alternative would provide the park with the widest range of tools for achieving stated vegetation management goals and objects and would result in the greatest level of site restoration in meeting the mandate of the parks enabling legislation. Alternative B serves as the NPS preferred alternative.

Development Zone In this zone the park will continue to mow and manicure the vegetation immediately around the buildings, roadways and trails. Exotic plant species will be removed / reduced both mechanically and chemically in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program.

Resource Protection Zone In this zone, exotic plant species will be removed and reduced both mechanically and chemically in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program. All other vegetative processes will be allowed to proceed undisturbed.

Core Battlefield Preservation Zone In this zone, PAAL will utilize several strategies for restoring the cultural landscape. These will include a combination of mechanical, cultural, chemical and possibly biological controls. This would involve cutting woody vegetation at ground level, herbicide application on tree trunks, mechanical or manual removal of prickly pear, cyclical controlled burning to kill woody species and promote grass germination, re-introduction of sacauhiste grasses, and herbicide application on exotic grasses. Save for the re-introduction of sacauhiste grasses, any ground disturbing activities will have to be avoided due to the shallow nature of the archeological record of the battlefield. Plant management efforts may be intensive at first, however, over time, will be reduced to cyclical burning along with herbicide combating of exotic grasses. Exotic plant species will be removed / reduced both mechanically and chemically, in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program. All other vegetative processes will be allowed to proceed undisturbed.

2.2.2.1 Non-Native Plant/Weed Management Program

The National Park Service (NPS) Management Policies (2001) define exotic (non-native) species as those occurring outside their native ranges in a given place as a result of actions by humans. This definition allows the National Park Service to distinguish between changes to park resources caused by natural processes, such as natural range expansions and contractions, and those changes caused by humans. This distinction is important because the Park Service, unless stated otherwise in specific park legislation, is required to keep the parks as unaltered by human activities as possible. A full listing of known non-native plants at the Palo Alto Battlefield Unit is

presented in Table 4. Plant species identified in bold reflect the non-native plant species considered as priorities for management at the Palo Alto Battlefield Unit.

Table 4. Known non-native and weed species occurring at the Palo Alto Battlefield Unit. Species listed in bold are priorities for treatment under Alternative B. Asterisk indicates federally-listed or state-listed (Texas) noxious weeds.

Anagallis arvensis	Scarlet pimpernel
Bothriochloa ischaemum	**King Ranch bluestem**
Chloris canterai	Paraguayan windmill grass
Cynodon dactylon	Bermuda grass
Dichanthium annulatum	**Kleberg's bluestem**
Dichanthium aristatum	**Angleton bluestem**
Dichanthium sericeum	**Camus silky bluestem**
Kalanchoe daigremontiana	**Mother of thousands**
Kalanchoe delagoensis	Chandelier plant
Leucaena pulverulenta	Great lead tree
Melilotus albus	Yellow sweet clover
Pennisetum ciliare	Buffel grass
Phyla nodiflora	Turkey tangle fogfruit
Sisymbrium irio	London rocket
Sorghum halepense	Johnson grass
**Tamarix aphylla*	Athel tamarisk
Urochloa maxima	**Guinea grass**
**Urochloa panicoides*	Panic liverseed grass
Verbena brasiliensis	Brazilian vervain

Under Alternative B, non-native weed management efforts would be expanded to include an Integrated Pest Management (IPM) approach. IPM is a decision making process that relies on a combination of tools in order to effectively manage pest species. Delineating and employing a full spectrum of tools – cultural, physical, chemical, and biological – and implementing prevention and early detection management strategies is essential for effective and successful weed management. Table 5 provides a general overview of proposed weed management IPM treatment options for the Palo Alto Battlefield Unit.

Table 5. IPM weed control methods for The Palo Alto Battlefield Unit.

Treatment Option	Control Method
Administrative Controls	NPS and Park – specific management policies and procedures
Cultural Controls	Prevention/implementation of "Best Management Practices" and restoration actions
Physical (Mechanical) Controls	Mowing Prescribed Burns Hand-pulling/Cutting
Chemical Controls	Herbicide Applications
Biological Controls	Use of Insects/Natural Predators

A. Administrative and Cultural Control Methods

In accordance with NPS Management Policies (2001) "… high priority will be given to the management of exotic (non-native) species that have a substantial impact on park resources and that can reasonably be expected to be successfully controlled". While the overall goal of weed management at the Palo Alto Battlefield Unit is to eradicate or control all non-native vegetation, priority species have been identified for management and monitoring. These species have been previously identified by bold type in Table 4.

Cultural Control: Cultural techniques for managing vegetation consist of actions that managers can take to indirectly impact plant populations. Cultural techniques include prescribed fire, livestock grazing, implementation of Best Management Practices, and restoration / revegetation. Timing of these controls can be extremely important in determining the effectiveness.

The park would implement "Best Management Practices" (Table 6) that would aid in the prevention and early detection of new weed introductions and that will assist in minimizing spread of existing weed populations under the proactive vegetation management alternative. Additionally, native trees and cactus that that have invaded the historic prairies would be reduced to restore a more open viewshed, as was present during the 1846 battle.

Table 6. Preventative "Best Management Practices" proposed for use at the Palo Alto Battlefield Unit.

Weed-Free Materials	All re-vegetation/restoration projects at the park will use weed-free topsoil, seed, and mulch materials.
Approved Native Seed Mixtures Only	All seed mixtures used for re-vegetation/restoration activities will be based on native genotypes from as local of source as is possible. All seed mixtures must be appropriately certified (tagged) and will be inspected (to ensure appropriate mixture and absence of weed seed) prior to planting by park resources management staff.
Sterile Mulch	All straw mulches and/or organic forms of erosion control used at the park will be certified weed-free.
Follow-up Weed Monitoring & Control	Annual follow-up monitoring for weed presences of all re-vegetated/restored areas will be conducted for a minimum of three years following completions of re-vegetation activities.
Immediate Eradication of New Species	Any new noxious weed species found on site will be controlled or eradicated immediately to prevent further spread.
Prohibition of Undesirable Species	No non-native plant species with potential for spread will be introduced into park landscaping as per NPS Management Policies (2001).

B. Physical/Mechanical Non-native Plant Control

Mowing – Mowing is generally conducted for aesthetic purposes in typically highly visible locations such as along roadways and lawns associated with the visitor –use facilities, or more minimally, in association with park trails and associated structures. In addition to aesthetic purposes, mowing in these areas also reduces fuel heights, thereby reducing the potential for wildfire impacts to structures. Shorter vegetation within these areas also increases visitor safety by increasing visibility of uneven ground surface features and poisonous snakes. Under Alternative B, mowing will typically occur as needed in association with park trails and visitor-use facilities, but should always be conscious of the potential for mowing to spread non-native species.

Alternative B would also allow for mowing in off-trail areas, and in units of the park being managed for natural conditions, to assist with control of certain herbaceous weed species, especially infestations of annual grasses and sweet clovers. To avoid additional weed spread mowing would be prohibited in areas infested with weed species during times of seed production. Mowing equipment would also be cleaned before going on to another vegetation management unit to minimize the spread of weed propagules between units. Proper timing of mowing events (e.g. during flowering, but before seed set) will not eliminate weed plants, but can be an effective tool for preventing annual seed production and prevent additional weed seed build-up in the soil seed bank. Mowing may

also serve as an effective tool in developing firebreaks for prescribed fire events. Mowing heights within restoration and/or natural areas would be maintained at a recommended 6-8 inches. Shorter mowing heights can damage native grasses that are often intermixed with the targeted weed species

Chainsaw Removals – Chainsaw use, in association with chemical treatment of cut stumps to prevent re-sprouting, is the most effective means of treating most non-native or invasive tree species. As in the "no-action" alternative, these chainsaw activities would continue for non-native, invasive, and hazard tree removals. Primarily, chainsaw use would be expanded to assist in reducing unnaturally high densities of native tree species, like mequite, which have invaded the traditional grassland prairies.

Prescribed Fire – The use of prescribed fire on native grassland habitats is critical to ensuring long-term stability and health of these areas. In the absence of historic natural fire regimes, prescribed burning is an extremely effective management tool that can help to control weeds, reduce plant litter, recycle nutrients, and improve the overall health and vigor (e.g. resiliency) of native plant communities.

The use of prescribed fire is essential to restoration and maintenance of the natural and cultural landscape within the Palo Alto Battlefield Unit of PAAL. To this end the park has completed a Fire Management Plan. The Vegetation Management Plan is intended to supplement information within the Fire Management plan, especially issues related to fire effects on vegetation, and will not provide a detailed overview of the parks' overall Fire Management Program. The Fire Management Plan should be consulted for a more in-depth review of the NPS mandates and policy related to fire at the Palo Alto Battlefield Unit.

For each planned prescribed burn, a burn prescription plan will be developed based on the specific management objectives for the unit(s) being burned. A properly timed prescribed burn can stress many undesirable weed species (e.g. bluestems) while promoting the growth of the desired native plants. However, it should also be noted that fire can also serve to promote certain weed species if not combined with other weed management tools. Fire combined with herbicide treatments is especially effective in controlling many annual weed species. Most weed species produce seed that can remain viable within the soil for many years. The release of nutrients after a fire stimulates the germination of seeds within the soil seed bank, which can then be effectively treated with a single application of herbicide (versus multiple applications without fire due to different seed germination rates). Burning at appropriate intervals can also assist in limiting excessive fuel buildup and reducing the potential for uncontrollable wildfire events.

Hand-Pulling/Cutting – Several smaller populations of herbaceous weed species within the Palo Alto Battlefield Unit can be controlled through hand-pulling activities, though large infestations are likely to require additional spot-treatments with herbicides. Large communities of prickly pear cactus that have invaded the prairies due to twentieth century cultural activities may be removed with the use of shovels and pitch forks without substantially disturbing the ground surface.

C. Chemical Non-Native Plant Control

The National Park Service has very specific policies on the use of herbicides within National Park units. Use of herbicides is restricted within the NPS and can only be applied under the guidance of a licensed (certified) applicator (park staff or contractor). Parks are required to submit herbicide use requests to regional Integrated Pest Management Coordinators annually delineating all projects anticipated within a park that will require chemical treatment(s). These proposals are reviewed for appropriateness and if approved require park personnel to keep very specific pesticide use logs. Although chemical applications will be minimized in weed management efforts under Alternative B, when appropriately applied, herbicides are an important and often essential tool within the integrated weed management toolbox.

Herbicide use would still remain relatively light under Alternative B, but would be expanded to include additional chemicals (e.g. **Garlon 3A®, and Plateau® -** that are more species-specific, allowing for more efficient (one-time application versus several repeated applications) and effective weed control. A summary of the herbicides proposed for use under Alternative B in addition to **Garlon 4®, Remedy®** and **Habitat®** (described earlier) are provided below.

Garlon 3A® is a selective systemic herbicides used to control woody and herbaceous broadleaf plants along right-of-ways, in forests, and in grasslands and parklands. This herbicide has little or no impact on grasses. Triclopyr is the active ingredient in this herbicide and it controls target weeds by mimicking the plant hormone auxin, causing uncontrolled plant growth.

In soils, triclopyr degrades to the parent compound, triclopyr acid. Degradation occurs primarily through microbial metabolism, but photolysis and hydrolysis can be important as well. The average half-life of triclopyr acid in soils is 30 days. Offsite movement through surface or sub-surface runoff is a possibility with triclopyr acid, as it is relatively persistent and has only moderate rates of adsorption to soil particles. In water, the salt formulation is soluble, and with adequate sunlight, may degrade in several hours. .

Since the ester formulation is not water-soluble, can bind with the organic fraction of the water column and be transported to the sediments, can take significantly longer to degrade in water, and is toxic to fish and aquatic invertebrates, the use of **Garlon 3A®** at the Palo Alto Battlefield Unit will be restricted to terrestrial habitats only. The ester can also be highly volatile under warmer air temperatures (above 80^{o} F) and is best applied at cool temperatures on days with no wind.

Plateau® is a selective herbicide for both the pre-and post-emergent control of some annual and perennial grasses and some broadleaf weeds. Imazapic is the active ingredient in this herbicide and kills plants by inhibiting the production of branched chain amino acids, which are necessary for protein synthesis and cell growth. It has been useful for weed control in natural areas, particularly in conjunction with the establishment of native warm-season prairie-grasses and certain legumes.

Imazapic is relatively non-toxic to terrestrial and aquatic mammals, birds, and amphibians. Imazapic has an average half-life of 120 days in soil, is rapidly degraded by

sunlight in aqueous solution, but is not registered for use in aquatic systems**. Plateau®** is registered for wildland, pasture, and rangeland use.

All herbicide use at the Palo Alto Battlefield Unit under Alternative B would be limited to direct ground/spot applications and/or cut-stump treatments to targeted species and will typically be used in combination with other weed management actions (e.g. prescribed burning, hand-cutting of trees). Table X provides a list of the priority weed species found at the park and the herbicide(s) that is/are proposed for use to assist in effective weed management actions under. Appendix 2 contains the Manufacturers Specimen Labels (MSL's) for all herbicides proposed for use.

D. Biological Control

Biological techniques for managing vegetation consist of the deliberate introduction or manipulation of a plant species natural enemy, such as insects or pathogens, in order to remove or reduce populations of that plant species from an area. Timing of these controls can be extremely important in determining the effectiveness.

Table 7. Priority non-native species and proposed chemical/herbicide(s) treatment(s)

Weed Species	Herbicide Trade Name(s)	Active Ingredient(s)
Angleton Bluestem (*Dichanthium aristatum*)	Habitat®, Plateau®	imazapyr imazapic
Athel tamarisk (*Tamarix aphylla*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Bermuda grass (*Cynodon dactylon*)	Habitat®, Plateau®	imazapyr imazapic
Brazilian vervain (*Verbena brasiliensis*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Buffel grass (*Pennisetum ciliar*e)	Habitat®, Plateau®	Imazapyr imazapic
Camus silky bluestem (*Dichanthium sericeum*)	Habitat®, Plateau®	Imazapyr imazapic
Chandelier plant (*Kalanchoe delagoensis*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Great lead tree (*Leucaena pulverulenta*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Guinea grass (*Urochloa maxima*)	Habitat®, Plateau®	imazapyr imazapic
Johnson grass (*Sorghum halepense*)	Habitat®, Plateau®	imazapyr imazapic
King Ranch bluestem (*Bothriochloa ischaemum*)	Habitat®, Plateau®	imazapyr imazapic
Kleberg's bluestem (*Dichanthium annulatum*)	Habitat®, Plateau®	imazapyr imazapic
London rocket (*Sisymbrium irio*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Mother of thousands (*Kalanchoe daigremontiana*)	Remedy®, Garlon 3A®, Garlon 4	
Panic liverseed grass (*Urochloa panicoides*)	Habitat®, Plateau®	imazapyr imazapic
Paraguayan windmill grass (*Chloris canterai*)	Habitat®, Plateau®	imazapyr imazapic
Scarlet pimpernel (*Anagallis arvensis*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Turkey tangle fogfruit (*Phyla nodiflora*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr
Yellow sweet clover (*Melilotus albus*)	Remedy®, Garlon 3A®, Garlon 4	triclopyr

2.2.2.2 Altered Landscape Restoration

Under Alternative B, cultural landscape restorations would be expanded to restore the plant communities present during the 1846 battle. The native plant assemblages chosen for restoration will be based upon historical records, current research, identified reference sites, and/or existing site condition. Most altered landscape areas at the Palo Alto Battlefield Unit have undergone at least preliminary evaluation or assessment by interdisciplinary teams. Under alternative B, restoration activities will include the core battlefield zone and the resource protection zone.

2.2.2.3 Vegetation Monitoring

Under Alternative B, both qualitative (e.g. photo-stations/repeat photography) and quantitative vegetation monitoring (e.g. nested frequency plots) would be established to provide the park continual feedback on all vegetation and restoration management activities. Specific multi-purpose and targeted vegetation monitoring protocols will be identified and implemented to: (1) define the effectiveness of weed management treatments, (2) provide early detection of newly invading weed species, (3) determine fire effects on native and non-native vegetation, (4) detect unsolicited visitor impacts (e.g. development of social trails, soil compaction), and (5) determine prairie and riparian habitat restoration success, and (6) the proper harvesting/population maintenance of ethnologically important plant species.

2.2.2.4 Vegetation Interpretation

Park interpretive programs will be expanded to discuss not only the general role and influence of the natural topography and vegetation in the 1846 battle, but to also explain the importance of Texas coastal prairie ecosystems in maintaining biological diversity, and the importance of altered landscape restoration and weed management actions in maintaining the natural and cultural landscape at the Palo Alto Battlefield Unit.

2.2.3 Alternative C – Improved Vegetation Management

Expand Weed Management Activities without additional herbicide usage; restoration is limited to mechanical and chemical controls. Limit Vegetation Monitoring to early detection of weeds and impacts associated with visitor use areas:

Under Alternative C, vegetation management activities will be expanded beyond the activities identified within the no-action alternative (Alternative A). The visual and ecological quality of the site will be improved above the no-action condition, but the park will not achieve maximum recovery of vegetation diversity and will remain compromised in the legislative goal of restoring and maintaining the site to as close as possible to the 1846 scene.

Development Zone In this zone Palo Alto will continue to mow and manicure the vegetation immediately around the buildings, roadways and trails. Exotic plant species will be removed / reduced both mechanically and chemically in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program.

Resource Protection Zone In this zone, exotic plant species will be removed / reduced both mechanically and chemically in coordination with the Gulf Coast Exotic Plant Management

Team and following with DO 77-7 Integrated Pest Management Program. All other vegetative processes will be allowed to proceed undisturbed.

Core Battlefield Preservation Zone In this zone, PAAL will utilize several strategies for restoring the cultural landscape. This will include a combination of mechanical and chemical controls. This will involve cutting woody vegetation at ground level, herbicide application on tree trunks, and the re-introduction of sacauhiste grasses. Exotic plant species will be removed / reduced both mechanically and chemically in coordination with the Gulf Coast Exotic Plant Management Team and following with DO 77-7 Integrated Pest Management Program. All other vegetative processes will be allowed to proceed undisturbed.

2.2.3.1 Non-Native Plant/Weed Management Program

Weed management efforts will be increased in the control of both priority listed noxious weeds, exotic grasses and selected non-native tree species as identified above in Table X. Weed management methods will be limited to mechanical (mowing, chainsawing, hand pulling)and chemical control methods, with herbicide use remaining limited to Remedy®, Habitat®, and Garlon 4.

2.2.3.2 Altered Landscape

Altered landscape restoration will occur in the core battlefield zone. Restoration would be limited to cutting brush and chemically treating stumps and targeting non-native grasses with herbicides. No burning would occur under this alternative.

2.2.3.3 Plant Species of Management Concern

Minor efforts will be made to restore and maintain culturally important native plant species, such as *Spartina spartinae*, the grass most prevalent during the 1846 battle.

2.2.3.4 Vegetation Monitoring

Vegetation monitoring would be implemented, but would remain limited to more basic qualitative “change over time” analyses (e.g. establishment of photo-stations and repeat photography). No quantitative monitoring would be established to address (1) the effectiveness of weed management treatments, (2) early detection of newly invading weed species, (3) unsolicited visitor impacts (e.g. development of social trails, soil compaction), (5) prairie and riparian habitat restoration success, and (6) the proper harvesting/population maintenance of ethnologically important plant species.

2.2.3.5 Vegetation Interpretation

Interpretation of vegetation resources would only be minimally expanded to establish plant identification signage along trails and at visitor-use facilities to assist park visitors with native plant identifications.

2.3 Mitigation Measures Common to All Alternatives

Since all of the proposed alternatives include the use of chemical herbicides and clearing of brush, mitigation measures are necessary to ensure the health of staff, contractors, and visitors, as well as providing for the safety of cultural and natural resources in the park.

2.3.1 Mitigation Measures

2.3.1.1 Visitor and Public Health and Safety
Visitor and public health and safety will be ensured by limiting visitor access to treatments sites until all work has been completed. Park staff will keep all park visitors informed of daily work schedules and treatment locations. Additionally, visitors will be provided with information that identifies the resource impacts of unnatural levels of mesquite and the importance of restoring the cultural and natural landscape that existed during the time of the 1846 battle.

2.3.1.2 Cultural Landscape / Archeological Resources
To minimize any potential impacts to known park cultural resources, all work performed will be strictly supervised by the park's cultural resource staff. If new or unexpected cultural resources are identified within the treatment area, all work will be halted immediately until appropriate investigation and/or documentation can be made. Tree felling, removals, and herbicide applications will be made by trained personnel only.

2.3.1.3 Water Resources
To minimize any potential for herbicide "wash-off" into surface and/or ground water, no herbicide application will be made within 24 hours of an expected rain event. All precautions will be taken to ensure that herbicide applications are direct to the targeted plants and with the minimization of any potential for herbicide overspray. Only properly trained and licensed individuals will carry out the application of herbicide treatments.

2.3.1.4 Air Resources
To minimize potential for air resource impacts as a result of undesired herbicide overspray and/or volatilization, herbicides will only be applied under conditions of little to no wind and under the appropriate air temperature regimes. Herbicide application will strictly adhere to application conditions as specified on the Manufacturer's Specimen Label (MSL) for the identified herbicides. The MSL's for all herbicides proposed for use are presented in Appendix 2.

2.3.1.5 Soils
The use of a cut stump treatment method (Alternative B) with direct application of herbicide minimizes any potential for herbicide contamination of soils. Herbicide applications will only be applied by trained personnel and will not be used within 24 hours of an expected rain event, again to minimize any potential for herbicide contamination of soil. In situations where the soil surface may become disturbed (e.g. during restoration actions) appropriate control measures will be implemented to minimize any potential for soil erosion and/or sediment runoff into associated surface waters

2.3.1.6 Vegetation

To minimize impacts to non-targeted (native) vegetation, all herbicide applications will be applied by appropriately trained personnel and under appropriate environmental conditions as specified on the MSL. All herbicide application equipment (hand and backpack sprayers) will be checked daily to ensure proper functioning condition prior to use. The limits of weed management and restoration activities will be clearly defined to minimize any adverse effects to native vegetation.

2.3.1.7 Wildlife

Treatment sites will be walked through prior to treatment initiation to assist in minimizing wildlife presence during treatment activities. All herbicide use will be limited to the minimal application needed to obtain weed management objectives and applied only under the appropriate environmental conditions. All efforts will be made to minimize implementation of treatment actions during sensitive wildlife breeding/nesting seasons. Noise levels associated with mechanical/machinery use will be minimized to only the timeframe(s) necessary to accomplish identified vegetation management actions.

2.4 Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that ”the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA Section 101...” to:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life’s amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The environmentally preferred alternative for vegetation management at the Palo Alto Battlefield Unit is Alternative B. See Appendix 1 for the completed Environmental Screening Form for this alternative. This alternative meets all of the above criteria for the environmentally preferred alternative, with the least amount of environmental effects on the natural and human environment at the Palo Alto Battlefield Unit and its environs. Although the types of herbicide

used by the park would be expanded under this alternative, the targeted use of more species-specific herbicides will increase effectiveness of chemical weed management actions and reduce the numbers of herbicide applications needed to achieve non-native plant control. Restoration actions defined under alternative B will provide the park with the widest range of vegetation management tools and provide the greatest ability for the park to meet the legislated mandate of restoring the natural and cultural landscape associated with the 1846 battle.

The no-action alternative, Alternative A, does not meet most of the above criteria for the environmentally preferred alternative. Although this alternative limits herbicide use to Garlon 4®, Roundup®, Remedy® and Habitat®, the need for multiple applications to achieve effective weed control will increase. The no-action alternative would allow for continued non-native plant infestation and/or expansion, causing continued degradation of the natural resources and the cultural landscape at the park.

Alternative C, improved vegetation management, meets most of the above criteria for a possible environmentally preferred alternative. However, when compared to Alternative B, the effects of this alternative tend to be slightly less environmentally sound than Alternative B. For example, this alternative restricts herbicide use to Remedy® and Habitat® which may require multiple applications in order to achieve the same level of control as one application of a more species-specific herbicide. Additionally, without the best management practices and integrated pest management framework the restoration efforts will be much less effective than in alternative B. Similar to the no-action alternative, Alternative C would leave the park compromised in fully meeting its enabling legislation mandate of restoring the natural conditions associated with the visual scene of the 1846 battle. Therefore, Alternative C has not been selected as the environmentally preferred alternative.

2.5 Other Action Alternatives/Actions Considered But Dismissed From Consideration

2.5.1 Allow Full-Time Grazing of Livestock on the Site

While it is recognized that short-term (7-10 day), managed grazing can serve as a beneficial management tool for weed and native prairie restoration (Menke, 1992), full-time grazing within the Palo Alto Battlefield Unit NHS would likely result in further degradation to park vegetation resources, especially within the riparian corridor. Additionally, full-time grazing would require the construction of permanent fencing to contain livestock and to ensure public safety. This would create further visual intrusions onto the cultural landscape of the park and significantly jeopardize the restoration of desired native plant biological diversity and community types. The existing park staff is small and would not adequately allow for the additional oversight responsibilities associated with managing, monitoring, and mitigating full-time grazing issues. Therefore, full-time grazing/livestock use has been dismissed as a potential action alternative.

SECTION 3: ENVIRONMENTAL IMPACT ANALYSIS

Potential impacts to park resources from the three alternatives may be described in terms of their impact classification (positive or beneficial versus adverse or negative), the temporal scale or impact duration (short term or less than one year versus long term or greater than one year), impact intensity (negligible, minor, moderate, severe), and spatial impact (site-specific, localized, or regional). National Park Service Management Policies (2001) require analysis of potential effects to determine whether proposed action will impact park resources.

The National Park System's (NPS) fundamental purpose includes a mandate to conserve park resources and values (NPS Organic Act, 1916). Management of park resources must always attempt to avoid or minimize adverse impacts to park resources. Legislation provides the NPS with the discretion to impact park resources through management when implementation of such management is necessary to fulfill the park's mission and management actions do not impair the park resource. Impacts most likely to be categorized as impairments have major or severe adverse effect to resources or park values whose conservation is: 1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; 2) key to the natural or cultural integrity of the park; and 3) identified as a goal in the park's general management plan or other relevant NPS planning documents.

3.1 Cultural Landscape

3.1.1 Affected Environment

The cultural landscape refers to the geographic area associated with culturally significant historic events. The entire park ownership is considered part of the cultural landscape with special emphasis placed on the core battlefield area. Palo Alto Battlefield Unit landscape encompasses the approximate 3,400 acre historic Mexican War battle site 10 miles north of downtown Brownsville, Texas, in Cameron County. The site is bounded on the west and south by Texas Farm to Market Roads (FM) 1847 and 511 and to the north by Cameron County Drainage District No. 1, Main Ditch No. 2.

Early prehistoric use of the region consisted of hunter-gather cultures that relied on the region's flora and fauna for subsistence. The late prehistoric cultural tradition in the area, known as the Brownsville Complex, developed a sophisticated marine shell-working industry. In addition, there is evidence that the people of the Brownville Complex traded with the cultures of Mesoamerica (Garza, 2005).

The historic site is significant because it is the location of the first major battle of the war between Mexico and the United States. Historic descriptions of the May 8, 1846 battle identified features such as topography, vegetation and water features as significant, natural points of reference for army maneuvers, staging areas, and battle formations. The battlefield first became a National Historic Landmark in 1960, and was later placed on the National Register of Historic Places in 1975. 1978 legislation created a National Historic Site to be managed by the NPS. The

NHS boundary consisted of only a 50 acre tract of land at the intersection of FM 511 and 1847 since the core battlefield was not well defined. However the legislation would charge to NPS to conduct research to identify additional lands to be acquired to appropriately preserve and interpret the battle site of Palo Alto. This would lead to the 1992 legislation that would create the current NHS \ Palo Alto Battlefield Unit boundary.

Restoration of the cultural landscape is necessary for the park to fulfill its primary mission of protecting and maintaining the area's historic character.

3.1.2 Impact Analysis

The impact to the cultural landscape was qualitatively assessed based on the mandates of PAAL's establishing legislation, Palo Alto Battlefield National Historic Site Act of 1991 Public Law 102-304, and the effects of the treatments alternatives.

3.1.2.1 Alternative A

While *Alternative A* utilizes the least intensive vegetation management strategies, this "no action" alternative will have the most deleterious impact on the cultural landscape. This alternative does not adequately manage the historic core battlefield and its implementation will result in vegetation development that moves the site further and further from the desired historic condition.

3.1.2.2 Alternative B

The vegetation management activities prescribed in *Alternative B* will be the most effective at restoring the cultural landscape within the park. This will assist the park in meeting its legislative mandates and recreating the historic conditions of the 1846 battle. Implementing *Alternative B* will have no negative impacts to the cultural landscape and will greatly enhance the park's ability to connect present and future visitors to the significant features of this cultural landscape.

3.1.2.3 Alternative C

The vegetation management activities prescribed in *Alternative C* will maintain current vegetation conditions but will not restore the park's cultural landscape. While slightly more desirable than the "no action" alternative, *Alternative C* will negatively impact the cultural landscape of the park.

3.2 Air Quality

3.2.1 Affected Environment

Air quality is a descriptive measure of the purity of air. Air quality is determined from measuring pollutants in the air which affect the health and safety of the population. The Clean Air Act of 1970 (CAA) provides the legislative framework to protect and enhance the quality of the Nation's air resources.

The Clean Air Act, which was last amended in 1990, requires the EPA to set National Ambient Air Quality Standards (NAAQS; 40 CFR Part 50) for pollutants considered harmful to public

health and the environment. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The CAA required US Environmental Protection Agency (USEPA) to establish ambient ceilings for certain criteria pollutants. The fundamental method by which USEPA tracks compliance with the NAAQS is the designation of a particular region as an “attainment” or “nonattainment” region.

PAAL is located in Cameron County within the USEPA’s Brownsville-Laredo Intrastate Air Quality Control Region (AQCR). This region is one of a nationwide system of AQCRs established by the USEPA for air quality planning purposes (40 CFR part 81) and is designated as AQCR No 213. The Brownsville-Laredo Intrastate AQCR includes the counties of Cameron, Hidalgo, Jim Hogg, Starr, Webb, Willacy, and Zapata. The entire AQCR 213 is designated by the USEPA as being in attainment for all criteria pollutants, meeting all NAAQS standards. Palo Alto Battlefield is in an area that is in attainment of all National Ambient Air Quality Standards (NAAQS).

3.2.2 Impact Analysis

Air quality impacts were qualitatively assessed upon review of National Park Service best management practices to reduce air emissions, State of Texas Prescribed Burning Board Laws and Regulations, specifically 21 TexReg 8509, and the extent of proposed prescribed fire activities under the proposed alternatives.

3.2.2.1 Alternative A

None of the proposed activities under *Alternative A* has the potential to impact air quality include; therefore, there would not be significant impact to the resource under this alternative.

3.2.2.2 Alternative B

Prescribed burning is the only activity proposed in *Alternative B* with the potential to impact air quality. Smoke consists of dispersed airborne solids and liquid particles, called particulates, which could remain suspended in the atmosphere for a few days to several months. Particulates can reduce visibility and contribute to respiratory problems. Very small particulates can travel great distances and add to regional haze problems. Regional haze can sometimes result from multiple burn days and/or multiple owners burning within an airshed over too short a period of time to allow for dispersion. Prior to any prescribed fire, the park would be in compliance with rules and laws established by the Texas Prescribed Burning Board. For prescribed fires, there are three principle strategies to manage smoke dispersion and reduce air quality effects. They include:

> **1. Avoidance** - This strategy relies on monitoring meteorological conditions when scheduling prescribed fires to prevent smoke from drifting into sensitive receptors, or suspending burning until favorable weather (wind) conditions;

2. Dilution – This strategy ensures proper smoke dispersion in smoke-sensitive areas by controlling the rate of smoke emissions or scheduling prescribed fires when weather systems are unstable, not under conditions when a stable high-pressure area is forming with an associated subsidence inversion. An inversion would trap smoke near the ground; and

3. Emission Reduction – This strategy utilizes techniques to minimize the smoke output per unit area treated. Smoke emission is affected by the number of acres burned at one time, pre-burn fuel loadings, fuel consumption, and the emission factor. Reducing the number of acres that are burned at one time would reduce the amount of emissions generated by that burn. Reducing the fuel beforehand, e.g. removing firewood, reduces the amount of fuel available. Conducting prescribed fires when fuel moistures are high can reduce fuel consumption. Emission factors can be reduced by pile burning or by using certain firing techniques such as mass ignition.

If there was a potential for violating air quality standards the park would implement a contingency plan, including the option for immediate suppression. The major fuel types (grasses, shrubs) to be burned on the park do not generate large quantities of smoke. Prescribed fires would not violate daily national or state emission standards and would cause very minor and temporary air quality impacts. The park would only conduct prescribed fires under environmental conditions that maximized smoke dispersion. Burning in PAAL would not alter the NAAQS attainment status of the air quality control region.

3.2.2.3 Alternative C

None of the proposed activities under *Alternative C* has the potential to impact air quality include; therefore, there would not be significant impact to the resource under this alternative.

3.3 Water Quality

3.3.1 Affected Environment

Water quality is a description of the characteristics of water, referencing a set of standards. Compliance of water quality following management activities is based on a comparison between actual characteristics and these pre-established standards. Both the Clean Water Act (1972) and 2010 Texas Surface Water Quality Standards, Texas Administrative Code (TAC) Title 30, Chapter 307, define the standards against which impacts to water quality can be measured.

PAAL is located in the formerly active Rio Grande delta. Elevation change across the park is minimal and topographic features are limited to prairies, resacas (former river channels) and lomas, or small hills. Some of the resacas have been excavated in an effort to form year round water holding tanks for livestock, grazed in the past on land now owned by the park. During the past decade, most years see all surface water dry up in the park. Surface water leaving the site is confined to storm runoff following ground saturation, occurring in extreme precipitation events.

The Rio Grande is the 5th longest river in North America and the 20th longest in the world. The area of the watershed that feeds the Rio Grande is some 336,000 mi^2 (870,000 km^2). Because a

large part of the river's basin is arid or semiarid, only about half of that area, approximately 176,000 mi^2 (455,000 km^2), contributes significantly to the flow of the river. The Rio Grande is the natural border between the United States and Mexico and has historically provided, and still provides, a source of water for the people, industry, and agriculture for both countries. (Manz et al., 2005)

Based on the most current data available, Draft 2010 Texas Water Quality Inventory (Texas Commission on Environmental Quality, 2010), the Rio Grande Basin Tidal Zone, extending from the river mouth upstream 74.7 kilometers, water samples exceeded acceptable standards in samples for bacteria and elemental nutrients. For this inventory 9.1% of samples exceeded the acceptable threshold for fecal coliform bacteria. 5.6% of samples exceeded the acceptable threshold for ammonia, 36.8% of samples exceeded acceptable chlorophyll-a levels , 5.6% of samples exceeded acceptable nitrate levels , 5.9% of samples exceeded acceptable phosphorous levels. The bacteria and nutrients in excess of water quality standards are typical of water run-off from areas with a heavily developed agricultural sector.

Groundwater at Palo Alto is approximately 20 feet below the surface. The quality of the groundwater is very poor and the groundwater is not considered to be a suitable source of drinking water or water for irrigation. The groundwater is classified as moderately to very saline (more than 3,000 mg/L)and concentrations of dissolved solids including sodium, chloride and sulfate range from 1,000 to 5,000 mg/L. High levels of nitrate are also present suggesting contamination from agricultural sources (Farmer, 1992).

3.3.2 Impact Analysis

Water resource impacts were qualitatively assessed based on the hydrologic characteristics of the site, proposed treatments and mitigation measures.

3.3.2.1 Alternative A

Herbicide application is the only proposed management action in *Alternative A* that has potential to impact the water resource. However, proper application of herbicides according to manufacturer's instructions will mitigate the potential impact to water resources. The impact to water resources if any will be negligible.

3.3.2.2 Alternative B

Herbicide application is the only proposed management action in *Alternative B* that has potential to impact the water resource. This preferred alternative includes additional herbicides to increase treatment effectiveness; and, expands the total treatment area. However, herbicide application will be manual, eliminating the potential for unplanned surface water contact. Proper application of all herbicides will be in accordance with manufacturer's instructions. This will mitigate the potential impact to water resources. The impact to water resources, if any, will be negligible.

3.3.2.3 Alternative C

Herbicide application is the only proposed management action in *Alternative C* that has potential to impact the water resource. This alternative expands the treatment to a larger area than covered by the "no-action" alternative. Manual application and adherence to manufacturer's instructions

for herbicide application will mitigate the potential impact to water resources. The impact to water resources if any will be negligible.

3.4 Wildlife

The lower Rio Grande Valley is a biologically diverse region with numerous habitat types. There is a variety of wildlife in the region and the predominance of neotropical species of vertebrate fauna makes this area unique (USACE, 1995). More than 700 vertebrates have been identified in the bioregion and over 500 of these are regular inhabitants. Richard and Richardson (1993) completed a faunal survey of the park. This survey documents the presence of ten fish species, 21 amphibians and reptiles, 11 mammals, and 84 bird species. However, there are four species of in the region that are listed as species of concern or threatened and endangered at either or both the state and federal level. These four species: the **Texas tortoise** (*Gopherus berlandieri*), n**orthern Aplomado falcon** (*Falco femoralis*), **ocelot** (*Leopardus pardalis*), and the **jaguarundi** (*Herpailurus yagouarundi cacomitli*), will be discussed individually to provide a complete analysis of impacts to the wildlife resources of the park. Consultation with the Fish and Wildlife service indicates that the Palo Alto unit does not possess critical habitat for these species and the differing methods or goals for the Core Battlefield and Resource Protection Zones strive to enhance the varying habitat types for the local T&E animal species.

3.4.1 Affected Environment

The **Texas tortoise** is listed as a threatened species by the Texas Parks and Wildlife Code, Chapter 68. While populations of the tortoise are considered stable (Bury and Smith, 1986), habitat loss from human activity is the primary threat to the tortoise (Varela and Hogan, 1998). Its range extends from South-Central Texas in the United States southward into the Mexican states of Coahuila, Nuevo Leon, and Tamaulipas (Texas Parks and Wildlife Department, 2009). The tortoise's range contains a variety of habitat types. In coastal areas, including the Palo Alto Battlefield Historic Park, the tortoise occurs principally on lomas. These low hills and ridges provide thermal cover and food resources for the tortoise. Typically the lomas are surrounded by salt marsh or sacahuistal flats, as is the case at PAAL. The dense cordgrass of the sacahuistal flats are primarily uninhabitable for the tortoise and tortoises are rarely found in these areas (Bury and Smith, 1986). These sacahuistal flats preclude movement between lomas and individual lomas may represent discreet populations of tortoises in the Gulf Coast region (Judd and Rose, 1983).

The **northern Aplomado falcon** is listed as endangered in the state of Texas and was placed on the Federal Endangered Species List in 1986. The falcon has been sighted in the park. These sightings were transitory; there are no northern Aplomado falcons nesting in the park. The natural range for the falcon stretches from the southern tip of South America to the South Texas and Trans-Pecos regions, their northern limit. Northern Aplomado falcons do not construct nests of their own; rather they utilize stick nests of other birds. Habitat requirements for the falcon are open grasslands or savannah landscapes with scattered trees or brush. They subsist on a diet comprised predominantly of insects and birds. Habitat loss from grazing induced brush encroachment on native grasslands is frequently cited as the cause for the falcons decline.

Breeding and release of falcons raised in captivity has been undertaken since 1997; this program has established at least 37 nesting pairs (Texas Parks and Wildlife Department, 2009).

Study of released falcons at the Laguna Atoscosas National Wildlife Refuge (LANWR) indicated that falcons were utilizing habitat with lower densities of perch trees than previously observed. Gulf cordgrass was the most prevalent plant in all roosting sites (Perez et al., 1996).

The **ocelot** is listed as endangered in the state of Texas and was placed on the Federal Endangered Species list in 1972. There are no confirmed sightings of this species in the park. Habitat loss and fragmentation have contributed significantly to the population decline of this cat. The native range of the cat includes South Texas Brush Country and the Lower Rio Grande Valley, and extends south through Central America and South America. The cat requires areas of dense brush for denning and hunts rabbits, birds, and small rodents. Ocelots demonstrated a strong selective preference (use greater than availability) for areas with canopy cover of 95% or greater. Ocelots avoided (use was less than availability) areas with canopy cover density lower than 75% (Harveson et al., 2004). The animal hunts primarily nocturnally. There is a confirmed small population of ocelots in and around LANWR (Texas Parks and Wildlife Department, 2009).

The **jaguarundi** is listed as endangered in the state of Texas and was placed on the federal Endangered Species list in 1976. There are no confirmed sightings of this species in the park. The species occurs throughout Mexico and Central America. The lower Rio Grande Valley in Texas is the extreme northern extent of its historical range. Documented accounts of jaguarundi occurrence are restricted to Cameron, Webb and Willacy counties (Tewes and Everett, 1982). More recent work documenting sightings of the jaguarundi were restricted to one confirmed sighting in extreme southern Cameron County (Grigione et al., 2009).The jaguarondi is active early morning and evening, hunting, birds, rabbits, and other small rodents. Jaguarundi rely on dense brush for cover; their decline is believed to be a result of the loss of this habitat type (Texas Parks and Wildlife Department, 2009).

3.4.2 Impact Analysis

Impacts to the wildlife resource were qualitatively assessed using presence/absence determinations, literature reviews, and mitigation measures.

3.4.2.1 Alternative A

Reduction in invasive species through mechanical and chemical techniques does not have the potential to significantly affect wildlife resources in the park. The targeted non-native species are not traditional food sources of any indigenous wildlife populations. All herbicide treatments will be effectively mitigated through strict adherence to all relevant chemical application protocols.

Potential n**orthern Aplomado falcon** habitat would be negatively impacted by woody brush encroachment in the core battlefield and other open areas. The falcon's preference for open grasslands and savannah landscapes are not coincident with the vegetation structure developing from implementation of the "no action" alternative.

Any potential habitat of the **Texas tortoise** would not be a candidate for management activities under the “no action” alternative. There would be no impact to the tortoise under this alternative.

There has never been a confirmed sighting of the **jaguarundi** at the park. The proliferation of brush vegetation communities resulting from implementing the “no action” alternative would increase the area of potential jaguarundi habitat. Occurrence of this species is extremely rare in the Lower Rio Grande Valley of the United States and any impact to the population from the “no action” alternative will be negligible. This equates to a determination of “no effect” under the Endangered Species Act.

There has never been a confirmed sighting of the **ocelot** at the park. The proliferation of brush vegetation communities resulting from implementing the “no action” alternative would increase the area of potential ocelot habitat. Occurrence of this species is extremely rare in the Lower Rio Grande Valley of the United States and any impact to the population from the “no action” alternative will be negligible. This equates to a determination of “no effect” under the Endangered Species Act.

3.4.2.2 Alternative B

The proposed actions in the “preferred alternative” include manual and chemical reduction of brush density, and prescribed burning to restore the sacahuistal plain in the core battlefield zone while promoting dense brush throughout the resource management zone. This will serve the parks wildlife resources by providing a diverse array of suitable habitats for a wide variety of species. Any proposed reduction in mesquite brush would not be detrimental to potential use by the brush dwelling species of concern (turtle, jaguarundi and ocelot). The density target for these areas is consistent with historical brush densities, which has been used as habitat by these species prior to their precipitous population decline.

Alternative B would effectively improve n**orthern Aplomado falcon** habitat in the park. Perez et al. (1996) found gulf cordgrass communities with a low density of perch trees the most favorable vegetation for roosting sites. This is the target structure for the restoration of the core battlefield zone. The “preferred alternative” will have beneficial impact for the falcon and constitute a “may effect, not likely to adversely affect” under the parameters of the Endangered Species Act.

Prescribed burning has the potential to impact the **Texas tortoise**. The tortoise may not be able to escape fire on the coastal plain of the core battlefield. However, while present in the park the majority of tortoise activity is expected to be confined to the lomas, with very little occurrence of tortoises in the cordgrass prairie (Judd and Rose, 1983). Also, Bury and Smith (1986), identified lomas with open scrub more likely to be optimum habitat than dense brush since tortoise mobility is increased in the more open brush community and basking opportunities are enhanced. Impacts to the turtle may be mitigated and beneficial if burning is not done during the hottest and driest periods of the year. Manual brush reduction would have the same positive impact on the tortoise. Reduced brush density enhances tortoise mobility and provides more opportunities for basking.

The park's vegetation management strategy, proposed as *Alternative B*, may impact potential **ocelot** habitat. While brush cover in the core battlefield zone will be reduced, the target condition for the resource protection zone is an increase in area with brush cover. This will result in a net increase of potential habitat for this species in the park, a beneficial impact. The "preferred alternative" will have beneficial impact for the ocelot and constitute a "may effect, not likely to adversely affect" under the parameters of the Endangered Species Act.

The park's vegetation management strategy, proposed as *Alternative B*, may impact potential **jaguarundi** habitat. While brush cover in the core battlefield zone will be reduced, the target condition for the resource protection zone is an increase in area with brush cover. This will result in a net increase of potential habitat for this species in the park, a beneficial impact. The "preferred alternative" will have beneficial impact for the jaguarundi and constitute a "may effect, not likely to adversely affect" under the parameters of the Endangered Species Act.

3.4.2.3 Alternative C

The proposed actions in *Alternative C* include manual and chemical reduction of brush density to stop continued brush encroachment of the sacahuistal plain in the core battlefield zone while promoting dense brush throughout the resource management zone. Any proposed reduction in mesquite brush would not be detrimental to potential use by the brush dwelling species of concern (turtle, jaguarundi and ocelot). The density target for these areas is consistent with historical brush densities, which has been used as habitat by these species prior to their precipitous population decline.

Alternative C would not change the current quality of habitat available to the **northern Aplomado falcon** in the park. The limited effectiveness of this treatment will preclude total restoration of the battlefield. It will arrest further mesquite encroachment into the park; but, it is not expected to reduce mesquite density and increase cordgrass cover enough to resemble the Falcons preferred habitat.

Any potential habitat of the **Texas tortoise** would not be a candidate for management activities under Alternative C. There would be no impact to the tortoise under this alternative.

The park's vegetation management strategy, proposed as *Alternative C*, may impact potential **ocelot** habitat. While brush cover in the core battlefield zone will not increase, the brush cover the resource protection zone will increase. This will result in a net increase of potential habitat for this species in the park, a beneficial impact. Alternative C will have beneficial impact for the ocelot and constitute a "may effect, not likely to adversely affect" under the parameters of the Endangered Species Act.

The park's vegetation management strategy, proposed as *Alternative C*, may impact potential **jaguarundi** habitat. While brush cover in the core battlefield zone will not increase, the brush cover the resource protection zone will increase. This will result in a net increase of potential habitat for this species in the park, a beneficial impact. Alternative C will have beneficial impact for the jaguarundi and constitute a "may effect, not likely to adversely affect" under the parameters of the Endangered Species Act.

3.5 Native Vegetation

3.5.1 Affected Environment

PAAL is located in the Tamaulipan biotic province, a region of the Matamoran vegetation district. This vegetation is adapted to saline soils, low, variable precipitation and warm climate; and, the vegetation has characteristics of desert, tropical and coastal vegetative communities. Many of these species are endemic to south Texas and northeast Mexico (Farmer, 1992).

Based on the last complete survey of the flora at PAAL, surveyed and compiled between 2006 and 2009 (Palo Alto Battlefield Historic Park, 2009) there are 258 native plants in the park. Common vegetation assemblages and communities are defined as *Spartina spartinae* or gulf cordgrass prairie (sacahuistal plain), tamaulipan and mesquite forests (brush) and resacas, former river channels with ephemeral water and the resultant plant community (Ramsey III et al., 2001). The dominant vegetation zones are tamaulipan brush and the cordgrass prairie.

The tamaulipan brush community occurs on the higher elevation areas with less saline soils. Farmer (1992) found this type accounted for 23% of the total park area. Species common to this vegetation type are mesquite (*Prosipis glandulosa*), spiny hackberry (*Celtis pallida*), Texas ebony (*Pithecellobium flexicaule*), pricly pear (*Opuntia lindheimeri*), Spanish dagger (*Yucca treculeana*), and lotebush (*Zizyphus obtusifolia*)(Farmer, 1992; Richard and Richardson, 1993).

Cordgrass prairie accounted for the remaining 77% of the park area (Farmer, 1992). Continuing brush encroachment has decreased this area and threatens the persistence of this vegetative community in the park. This plant community occupies the lowest soils, which are more saline the upland soils occupied by the brush community. The cordgrass prairie contains gulf cordgrass or sacahuiste (*Spartina spartinae*), sea ox eye or borrichia (*Borrichia frutescens*). Mesquite tumbleweed (*Salsoa kali*) and huisache (*Acacia farnesiana*) are also common in Palo Alto's salt prairies (Farmer, 1992; Richard and Richardson, 1993).

The Texas Parks and Wildlife Department (2009) lists 12 plants as rare threatened or endangered at the state or federal level in Cameron County Texas (Table 3.1). Of these 12 plants, only one is found in the park, Bailey's ballmoss (*Tillandsia baileyi*). This plant is considered rare; it is not listed as threatened or endangered at either the State or Federal level. Bailey's ballmoss grows in clumps as an epiphyte. The leaves are gray and can grow up to 12 inches in length. It flowers in the spring and reproduces via seed. The plant is found in Cameron, Hidalgo and Willacy counties. Commonly found on Texas ebony trees, the ballmoss is threatened by fox squirrels, an introduced species, that destructively feed on the plants (Richardson and King, 2010).

Table 8. Rare, threatened, and endangered plant species of Cameron County, Texas.

Plant		Status		
Common Name	**Scientific Name**	**Federal**	**State**	
Bailey's ballmoss*	*Tillandsia baileyi**			epiphytic on various trees and tall shrubs, perhaps most common in mottes of live oak on vegtated dunes and flats in coastal portions of the South Texas Sand Sheet, but also on evergreen sub-tropical woodlands along resacas in the Lower Rio Grande Valley; flowering (February-)April-May, but conspicuous throughout the year
Green Island echeandia	*Echeandia texensis*			on somewhat saline clays of lomas along the Gulf Coast near the mouth of Rio Grande, a habitat shared with *E. chandleri*; both species grow in areas dominated by herbaceous species with scattered brush and stunted trees, or in grassy openings in subtropical thorn shrublands; flowers April, June, and November, and likely in other months as well
Lila de los llanos	*Echeandia chandleri*			most commonly encountered among shrubs or in grassy openings in subtropical thorn shrublands on somewhat saline clays of lomas along Gulf Coast near mouth of Rio Grande; also observed in a few upland coastal prairie remnants on clay soils over the Beaumont Formation at inland sites well to the north and along railroad right-of-ways and cemeteries; flowering (May-) September-December, fruiting October-December
Mexican mud-plantain	*Heteranthera mexicana*			wet clayey soils of resacas and ephemeral wetlands in South Texas and along margins of playas in the Panhandle; flowering June-December, only after sufficient rainfall
Plains gumweed	*Grindelia oolepis*			coastal prairies on heavy clay (blackland) soils, often in depressional areas, sometimes persisting in areas where management (mowing) may maintain or mimic natural prairie disturbance regimes; 'crawfish lands'; on nearly level Victoria clay, Edroy clay, claypan, possibly Greta within Orelia fine sandy loam over the Beaumont Formation, and Harlingen clay; roadsides, railroad rights-of-ways, vacant lots in urban areas, cemeteries; flowering April-December
Runyon's cory cactus	*Coryphantha macromeris* var *runyonii*			gravelly to sandy or clayey, calcareous, sometimes gypsiferous or saline soils, often over the Catahoula and Frio formations, on gentle hills and slopes to the flats between, at elevations ranging from 10 to 150 m (30 to 500 ft); ?late spring or early summer, November, fruit has been collected in August

Runyon's water-willow	*Justicia runyonii*			margins of and openings within subtropical woodlands or thorn shrublands on calcareous, alluvial, silty or clayey soils derived from Holocene silt and sand floodplain deposits of the Rio Grande Delta; can be common in narow openings such as those provided by trails through dense ebony woodlands and is sometimes restricted to microdepressions; flowering (July-) September-November
Shinners' rocket	*Thelypodiopsis shinnersii*			mostly along margins of Tamaulipan thornscrub on clay soils of the Rio Grande Delta, including lomas near the mouth of the river; Tamaulipas, Mexico specimens are from mountains, with no further detail; flowering mostly March-April, with one collection in December
South Texas ambrosia	*Ambrosia cheiranthifolia*	LE	E	grasslands and mesquite-dominated shrublands on various soils ranging from heavy clays to lighter textured sandy loams, mostly over the Beaumont Formation on the Coastal Plain; in modified unplowed sites such as railroad and highway right-of-ways, cemeteries, mowed fields, erosional areas along small creeks; flowering July-November
Star cactus	*Astrophytum asterias*	LE	E	gravelly clays or loams, possibly of the Catarina Series (deep, droughty, saline clays), over the Catahoula and Frio formations, on gentle slopes and flats in sparsely vegetated openings between shrub thickets within mesquite grasslands or mesquite-blackbrush thorn shrublands; plants sink into or below ground during dry periods; flowering from mid March-May, may also flower in warmer months after sufficient rainfall, flowers most reliably in early April; fruiting mid April-June
Texas ayenia	*Ayenia limitaris*	LE	E	Subtropical thorn woodland or tall shrubland on loamy soils of the Rio Grande Delta; known site soils include well-drained, calcareous, sandy clay loam (Hidalgo Series) and neutral to moderately alkaline, fine sandy loam (Willacy Series); also under or among taller shrubs in thorn woodland/thorn shrubland; flowering throughout the year with sufficient rainfall
Vasey's adelia	*Adelia vaseyi*			mostly subtropical evergreen/deciduous woodlands on loamy soils of Rio Grande Delta, but occasionally in shrublands on more xeric sandy to gravelly upland sites; flowering January-June

"***Blank***"- rare; "***E***"-endangered; "***LE***"-locally endangered; "***T***"-threatened. "*****"-occurs at PAAL.

3.5.2 Impact Analysis

Impacts to the native vegetation resource were qualitatively assessed using presence/absence determinations, literature reviews, and mitigation measures.

3.5.2.1 Alternative A

Reduction in invasive species through mechanical and chemical techniques proposed in *Alternative A* does have the potential to impact native vegetation resources in the park. The targeted species under the "no action" alternative are all non-native species. Herbicide treatments are localized and plants specific; no broadcast spraying is proposed. All herbicide treatments will be effectively mitigated through strict adherence to all relevant chemical application protocols.

However, the "no action" alternative will not stop continued brush encroachment and will result in the eventual loss of the sacahuistal plain, a critical habitat for the northern Aplomado falcon, and the vegetation with the most profound cultural significance in the park. The loss of this important vegetation type would constitute a negative impact to the vegetation resource.

The Bailey's ballmoss plant is commonly found in Texas ebony trees. Ebony trees are not impacted under the "no action" alternative.

3.5.2.2 Alternative B

The proposed actions in the "preferred alternative" include manual and chemical reduction of brush density, and prescribed burning to restore the sacahuistal plain in the core battlefield zone while promoting dense brush throughout the resource management zone. Herbicide treatments are localized and plants specific; no broadcast spraying is proposed. All herbicide treatments will be effectively mitigated through strict adherence to all relevant chemical application protocols.

The outcome of the "preferred alternative" is restoration of native plant communities and the cultural landscape. This restoration will improve overall ecosystem function in the park. The target vegetative communities resulting from the implementation of *Alternative B* are identified as necessary to fulfill the park's mandate to restore the cultural landscape. This goal is identified in both the park's establishing legislation and general management plan. This alternative will have long-term beneficial impacts to the native vegetation at PAAL.

The Bailey's ballmoss plant is most commonly found in Texas ebony trees. Ebony trees are not impacted under the "preferred" alternative.

3.5.2.3 Alternative C

The proposed actions in *Alternative C* include manual and chemical reduction of brush density to stop continued brush encroachment of the sacahuistal plain in the core battlefield zone while promoting dense brush throughout the resource management zone. Herbicide treatments are localized and plants specific; no broadcast spraying is proposed. All herbicide treatments will be effectively mitigated through strict adherence to all relevant chemical application protocols.

This alternative would be more effective at controlling non-native and invasive species than *Alternative A*. However it would be ineffective at restoring the native historical plant

communities as mandated by the park's establishing legislation. The overall outcome of this alternative would be a negative impact to the vegetation resource with minor intensity.

The Bailey's ballmoss plant is commonly found in Texas ebony trees. Ebony trees are not impacted under *Alternative C.*

3.6 Riparian Habitat and Floodplains

3.6.1 Affected Environment

PAAL is located in the formerly active Rio Grande delta. Executive Order 11988 Floodplain Management requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The NPS under 2001 Management Policies and Director's Order 77-2 Floodplain Management will strive to preserve floodplain values and minimize hazardous floodplain conditions.

Some level of habitat restoration and weed management activities are proposed under all alternatives for floodplain and riparian habitats at the Palo Alto Battlefield Unit. Historically, the lands that now comprise the Palo Alto Battlefield Unit were part of the active Rio Grande delta. However, major hydrologic changes have occurred since 1846. Historic flooding regimes and historic floodplain limits remain significantly altered as a result of off-park activities within the Rio Grande watershed.

3.6.2 Impact Analysis

Riparian and floodplain resource impacts were qualitatively assessed based on the hydrologic characteristics of the site, proposed treatments and mitigation measures.

3.6.2.1 Alternative A
Herbicide application is the only proposed management action in *Alternative A* that has potential to impact the riparian resource. However, proper application of herbicides according to manufacturer's instructions will effectively mitigate any potential impact to riparian resources. There will be no impact to the floodplain under Alternative A.

3.6.2.2 Alternative B
Herbicide application is the only proposed management action in *Alternative B* that has potential to impact the ripraian resource. This preferred alternative includes additional herbicides to increase treatment effectiveness; and, expands the total treatment area. However, herbicide application will be manual, eliminating the potential for unplanned surface water contact in Riparian area. Proper application of all herbicides will be in accordance with manufacturer's instructions. This will mitigate the potential impact to riparian resources. There will be no impact to the floodplain under Alternative B.

3.6.2.3 Alternative C
Herbicide application is the only proposed management action in *Alternative C* that has potential to impact the riparian resource. This alternative expands the treatment to a larger area than

covered by the “no-action” alternative. Manual application and adherence to manufacturer’s instructions for herbicide application will mitigate the potential impact to water resources. There will be no impact to the floodplain under Alternative C.

3.7 Wetlands

3.7.1 Affected Environment

Wetlands designation can include any area of land with permanent or seasonal soil saturation where this saturation is the dominant factor determining the nature of soil development and plant communities present. Historically, the grassland prairies of Palo Alto were part of the active Rio Grande delta. Major hydrologic changes have occurred since the historic 1846 battle. However, the plant communities to be restored were wetland communities, and the soils still present at the site are saturated seasonally.

3.7.2 Impact Analysis

Impacts to the wetland resource were qualitatively assessed based on the hydrologic characteristics of the site, proposed treatments and mitigation measures.

3.7.2.1 Alternative A
Alternative A involves the continuation of current vegetation management practices. This “no action” alternative will result in continued loss of the native cord grass plant communities. These sacahuistal prairies are wetland plant communities. Degradation to this wetland habitat of the park is considered a negative impact.

3.7.2.2 Alternative B
The outcome of the “preferred alternative” is restoration of native plant communities and the cultural landscape. The native plant communities to be restored are wetland plant communities. This restoration will improve the function of wetlands in the park. Wetlands are considered to be an import component of the biotic community. Restoration of the cultural landscape will indirectly restore the wetlands occupying the Palo Alto Battlefield. This restoration is considered a positive impact.

3.7.2.3 Alternative C
This alternative would be more effective at controlling non-native and invasive species than *Alternative A*. However it would be ineffective at restoring the native historical plant communities as mandated by the park’s establishing legislation. The native wetlands, defined by cordgrass prairie, will not further degrade nor will they be restored under this alternative. This is considered a negative impact.

3.8 Natural Sound

3.8.1 Affected Environment

PAAL is located very close to the urban centers of Brownsville, Texas and Matamoros, Mexico. Commercial truck and residential traffic can be heard from local highways that traverse the southern and western boundaries of the park. Railroad noises can be heard from trains passing near the park's southern boundary. Air traffic noise is present from the flights into local airports, distant over-flights and agricultural applications. Weather conditions, wind speed and direction, and season all affect the noise levels within the park. Noise level decreases in the park interior and towards the northern and eastern park boundaries, where the park is bounded by agricultural land. The core battlefield zone, at the park's interior, and the northern and eastern portions of the resource protection zone are areas where natural sounds are more dominant than the urban sounds present in the western and southern portions of the park.

3.8.2 Impact Analysis

Natural sound impacts were qualitatively assessed based on the aural characteristics of the site, proposed treatments and mitigation measures.

3.8.2.1 Alternative A

The minimal treatment of vegetation in the "no action" alternative targets non-native species in heavy visitor use areas. The result of implementing this alternative will be increased brush encroachment on the core battlefield and densification of brush in the resource protection zone. Continued brush encroachment of the core battlefield would result in the loss of the natural sounds associated with the cordgrass vegetation type this would be a negative impact. Densification of brush in the resource protection zone would further muffle the sounds from the surrounding urban environment; this would be a beneficial impact to the park. The combined impact to the park's natural sound environment would be negative but with minor severity.

3.8.2.2 Alternative B

The vegetation treatments in the "preferred alternative" target the parks major vegetation types and will restore the core battlefield to 1846 conditions, and rehabilitate the resource protection zone from agricultural use to a natural brush vegetation community. The result of implementing this alternative will be a restored cordgrass prairie in the core battlefield zone and an increase of the total area occupied by brush in the resource protection zone. Brush density would increase in some areas of the resource protection zone. Cultural sounds associated with the cordgrass vegetation type would be restored to the core battlefield zone; this would be a beneficial impact. Increasing the total area of brush and densification of brush in the resource protection zone would further muffle the sounds from the surrounding urban environment; this would be a beneficial impact to the park. The combined impact to the park's natural sound environment would be beneficial with minor severity.

3.8.2.3 Alternative C

The vegetation treatments in the *Alternative C* will reduce or cease brush encroachment in the core battlefield zone and target non-native species in heavy visitor use areas. The result of implementing this alternative will be an increase of the total area of natural brush vegetation in the resource protection zone and the core battlefield zone will remain in a state similar to its current condition. Cultural sounds associated with the cordgrass vegetation type would not be restored to the core battlefield zone nor would they diminish from their current state; this would not impact the natural sound resource. Increasing the total area of brush and densification of

brush in the resource protection zone would further muffle the sounds from the surrounding urban environment; this would be a beneficial impact to the park. The combined impact to the park's natural sound environment would be beneficial with minor severity.

3.9 Visitor Health and Safety

3.9.1 Affected Environment

Prior to the ignition of any prescribed fire in the park, all the burn parameters of the existing and approved fire management plan must be met to ensure a safe and effective prescribed fire. In addition, staff would inform the public and adjacent landowners of the time and extent of the proposed prescribed fire. In the event of potentially hazardous wildfires within the park, the Park Superintendent and Chief of Operations would coordinate public notification efforts within and outside the park. The extent of public notice would depend on the specific fire situation. In every case, assuring visitor and park staff safety would take priority over other activities.

3.9.2 Impact Analysis

Visitor health and safety impacts were qualitatively assessed based on the risks associated with implementing the proposed treatments and mitigation measures.

3.9.2.1 Alternative A

The general impacts to human health and safety in the "no action" alternative are all associated with the application of herbicides currently in use at PAAL.

To mitigate impacts to visitor health and safety from herbicide exposure, signs will be posted to inform users of area closure to prevent exposure to chemicals immediately after application. Area closures will be in effect for time periods in concordance with manufacture instructions.

To mitigate impacts to worker health and safety from herbicide exposure, manufacturer determined personal protective equipment will be used and all safety recommendations will be followed.

3.9.2.2 Alternative B

The general impacts to human health and safety in the "preferred alternative" are associated with the application of herbicides and prescribed burning.

To mitigate impacts to visitor health and safety from herbicide exposure, signs will be posted to inform users of area closure to prevent exposure to chemicals immediately after application. Area closures will be in effect for time periods in concordance with manufacture instructions.

To mitigate impacts to worker health and safety from herbicide exposure, manufacturer determined personal protective equipment will be used and all safety recommendations will be followed.

For prescribed burning, impacts to the public could include smoke inhalation, and in severe cases, injuries from fires. To mitigate impacts to visitor health and safety during prescribed burning, signs will be posted to inform users of area closure to prevent smoke inhalation and eliminate the possibility of exposure to actively burning fires. Area closures will be in effect for the entire time any risk to public health and safety from prescribed fire is present.

Factors most likely to adversely impact firefighter health and safety include accidental spills, injuries from the use of fire-fighting equipment, smoke inhalation, and, in severe cases, injuries from fires. To mitigate impacts to firefighter health and safety during prescribed burning, all mandatory protective measures and procedures detailed in National Park Service fire management protocols will be strictly followed. Strict adherence to guidelines concerning firefighter accreditation, and equipment and procedure safety guidelines will minimize accidents.

3.9.2.3 Alternative C

The general impacts to human health and safety in Alternative C are all associated with the application of herbicides currently in use at PAAL.

To mitigate impacts to visitor health and safety from herbicide exposure, signs will be posted to inform users of area closure to prevent exposure to chemicals immediately after application. Area closures will be in effect for time periods in concordance with manufacture instructions.

To mitigate impacts to worker health and safety from herbicide exposure, manufacturer determined personal protective equipment will be used and all safety recommendations will be followed.

3.10 Visitor Use and Experience

3.10.1 Affected Environment

Visitors to the park have access to the visitor's center, which provides historical videos and a collection of battlefield artifacts. Books and interpretive literature are also available in the visitor center. A one mile round trip trail provides visitor access into the core battlefield zone and access to the battlefield lookout. Interpretive signs line this trail. Disabled access is provided to these areas via a road to the overlook and core battlefield zone. Living history demonstrations and other park events occur at various times throughout the year. The park is open to visitor use year round from 8:00 am to 5:00 pm daily, save for a few holidays.

3.10.2 Impact Analysis

Impacts to visitor use and experience were qualitatively assessed based on visitor resources, proposed treatments and mitigation measures.

3.10.2.1 Alternative A

The proposed treatments in the "no action" alternative would not impact any of the resources available to visitors at the visitors' center. Removal of non-native vegetation and herbicide application may temporarily close portions of the park's battlefield trail. This would result in a negative impact with minor intensity. This impact would be temporary and short term duration.

Whenever possible, management activities requiring closure to any park facility will be timed in conjunction with historically low visitor use periods.

3.10.2.2 Alternative B

The proposed treatments in the "preferred alternative" would not impact any of the resources available to visitors at the visitors' center. Removal of non-native vegetation and herbicide application may temporarily close portions of the park's battlefield trail. Prescribed burning activities may close the park to ensure visitor safety. This would result in a negative impact with minor intensity. This impact would be temporary and short term duration. Whenever possible, management activities requiring closure to any park facility will be timed in conjunction with historically low visitor use periods. In the long-term, these negative impacts would be outweighed by the positive impacts of a more historically representative cultural landscape. Additionally, impacts on visitor use would be mitigated by including new interpretive information that explains the importance of the management action to cultural and natural resources at the park.

3.10.2.3 Alternative C

The proposed treatments in *Alternative C* would not impact any of the resources available to visitors at the visitors' center. Removal of non-native vegetation and herbicide application may temporarily close portions of the park's battlefield trail. This would result in a negative impact with minor intensity. This impact would be temporary and short term duration. Whenever possible, management activities requiring closure to any park facility will be timed in conjunction with historically low visitor use periods.

3.11 Cumulative Impacts

This section of the Environmental Assessment addresses the potential cumulative impacts associated with the implementation of the "preferred alternative" restoring the cultural landscape of the park. The analysis considers the past, present, and foreseeable future vegetation management actions that could intensify or compensate effects on the park resources.

The Council of Environmental Quality defines cumulative impacts as the incremental impact of multiple past present and future actions with individually minor or negligible impacts but with the potential to have a significant impact collectively. Cumulative impacts are the total effect of land use and environmental interaction.

Cumulative impacts from the preferred alternative would have beneficial long term effects to the park resource. Agricultural activities have been the dominant disturbance agent in the past that has compromised the cultural landscape in the park. Grazing, excavating resacas for use as cattle tanks and crop production have altered the historic vegetation on the site. The park's establishing legislation calls for the restoration of the vegetation to preserve the historic character of the site (102nd Congress, 1991-1992). Vegetation management activities at present have been ineffective at accomplishing this goal. Implementation of the preferred alternative in the future will help the park achieve its federally mandated mission of restoring the cultural landscape through restoring historical vegetation conditions.

The preferred alternative will improve habitat for the park's confirmed threatened and endangered species, the northern Aplomado falcon. Habitat availability for potential use by locally occurring threatened and endangered species, the ocelot and jaguarundi, will increase. Management activities will not adversely affect the Texas tortoise. Impacts to air and water quality will be short term and low intensity and are effectively mitigated through appropriate herbicide protocols and prescribed burning protocols. The end result of the preferred alternative will greatly improve visitor experience and restore natural vegetative communities endemic to the region. These are beneficial impacts and deemed not to be adverse significant impacts.

SECTION 4: CONSULTATION AND COORDINATION

Palo Alto Battlefield NHP initiated the internal scoping process by assembling a diverse Interdisciplinary Team of professionals to guide the development of this Vegetation Management Plan, and to identify and assess the impacts on the human environment by the implementation of the proposed alternatives presented in this plan. The team consisted of the following members:

Team Member	Duty Station	Title\Area of Expertise
Mary Kralovec	Palo Alto Battlefield NHP	Superintendent
Douglas Murphy	Palo Alto Battlefield NHP	Chief of Operations\Historian
Rolando L. Garza	Palo Alto Battlefield NHP	Chief of Resource Management\Archeologist
Pamela Benjamin	Intermountain Regional Office (D)	Vegetation Ecologist
Jill Cowley	Intermountain Regional Office (SF)	Cultural Landscape Architect
Richard Gatewood	Big Bend National Park	Fire Ecologist
John Morlock	Big Bend National Park	Regional Fire Management Officer
Patrick Pearson	Lower Rio Grande NWR (FWS)	Regional Fire Management Officer

Three of the original members of the team have taken other positions and were replaced on the team by the individuals who filled the positions they vacated. The following are the additional members of the team:

Mark Spier	Palo Alto Battlefield NHP	Superintendent
James Kitchen	Big Bend National Park	Regional Fire Management Officer
Thad Herzberger	Lower Rio Grande NWR (FWS)	Regional Fire Management Officer

On July 9, 2008 the Interdisciplinary Team conducted a formal meeting to review and refine the three draft alternatives of the Vegetation Management Plan, and to assess their impacts on the human environment in order to determine what level of NEPA compliance would be necessary. The team utilized the NPS Environmental Screening Form (ESF) as the primary tool for carrying out this task (Appendix A). In consultation with the NPS Intermountain Region's Environmental Quality Program it was determined that an Environmental Assessment would be the appropriate format of NEPA compliance for this document. In addition, the team recommended a list of impacts topics to be analyzed and set roles and responsibilities for the various members of the team.

The list of impact topics that the team recommended consisted of: Air Quality; Cultural Landscapes; Soundscapes; Water Quality or Quantity; Floodplains or Wetlands; Rare or Unusual Vegetation; Species of Special Concern; Visitor Experience; and Threatened and Endangered Species.

The team put forth that PAAL staff would be responsible for the production of the document with the Interdisciplinary Team providing technical guidance and assistance with reviewing and editing drafts. Rolando Garza was named Project Leader responsible for overall project management and coordination. Richard Gatewood would be responsible for establishing and monitoring vegetation plots with the assistance of PAAL, if the preferred alternative is selected. John Morlock would be responsible to revise PAAL's Fire Management Plan to include Prescribe Fire, if the preferred alternative is selected. Patrick Pearson would be responsible for developing and carrying out a Prescribe Burn Plan, if the preferred alternative is selected.

During the entire process of developing and refining the alternatives presented in this plan, park staff consulted with numerous regional experts from various disciplines. These regional experts represented various non NPS agencies or organizations which included, but were not limited to, U.S. Fish and Wildlife Service; Texas Parks and Wildlife Department; U.S. Department of Agriculture Research Extension Center; The Nature Conservancy; University of Texas at Brownsville; Colorado State University Department of Forest, Rangeland, and Watershed Stewardship; and University of Georgia Savannah River Ecology Laboratory. In addition, numerous NPS subject matter experts were consulted throughout the development of this plan.

In the summer of 2009, PAAL entered into a Cooperative Ecosystems Study Unit (CESU) Task Agreement with the University of Montana's Applied Forest Management Program to assist with the completion of this document. Dr. Christopher Keyes, Program Director, and Thomas Perry, Research Forester, were the two principals involved in this agreement. Keyes and Perry visited the site in January of 2010 and met many of the local experts during their visit. Keyes, Perry and Garza continued to consult with various subject matter experts throughout the development of this draft Vegetation Management Plan and Environmental Assessment.

SECTION 5: REFERENCES

102nd Congress. 1991-1992. Bill Text, HR-1642 RFS. http://thomas.loc.gov/cgi-bin/query/D?c102:1:./temp/~c102joDcLn.

Bury, R.B., and E.L. Smith. 1986. Aspects of the ecology and management of the tortoise *Gopherus berlandieri* at Laguna Atascosas, Texas. *The Southwestern Naturalist* 31 (3): 387-394.

Farmer, M. 1992. A Natural Resource Survey of Palo Alto National Battlefield. National Audubon Society, Brownsville, Texas. 24 pp.

First Annual Centennial Strategy for Palo Alto Battlefield National Historic Site. 2007. National Park Service Centennial Initiative. http://www.nps.gov/paal/parkmgmt/upload/PAAL_Centennial_Strategy.pdf.

Garza, R.L. 2005. The prehistoric peoples of the Rio Grande delta and their connections with the cultures of Mesoamerica. Studies in Rio Grande Valley History, Volume Six. University of Texas at Brownsville and Texas Southmost College. Brownsville, Texas.

Grigione, M.M., K. Menke, C. Lopez-Gonzalez, R. List, A. Banda, J. Carrera, R. Carrera, A.J. Giordano, J. Morrison, M. Sternberg, R. Thomas, and B. Van Pelt. 2009. Identifying potential conservation areas for felids in the USA and Mexico: Integrating reliable knowledge across an international border. *Oryx* 43(1): 78-86.

Harveson, P.M., M.E. Tewes, G.L. Anderson, and L.L. Laack. 2004. Habitat use by ocelots in South Texas: Implications for restoration. *Wildlife Society Bulletin* 32(3):948-954.

Judd, F.W., and F.L. Rose. 1983. Population structure, density and movements of the Texas tortoise *Gopherus berlandieri*. *The Southwestern Naturalist* 28(4):387-398.

Manz L.R., D. Sarkar, and W.W. Hammond, Jr. 2005. Water resources and water quality in the Rio Grande Valley of Texas: Current status and future projections. *Environmental Geosciences* 12(3):193-206.

Menke, J.W. 1992. Grazing and fire management for native perennial grass restoration in California grasslands. *Fremontia* 20(2):22-25.

National Park Service Organic Act. 1916. 16 USC 1. Full text at http://www.nps.gov/legacy/organic act.htm.

National Park Service (NPS). 2001. Management Policies 2001. Publication D1416. US Department of the Interior. 137 pp.

National Park Service (NPS). 2004. Palo Alto Battlefield National Historic Site, Texas; Honey Mesquite Management Environmental Assessment. U.S. Department of the Interior.

Palo Alto Battlefield Historic Park. 2009. Vegetation Survey Data. Unpublished, Brownsville, Texas.

Perez, C.J., P.J. Zwank, and D.W. Smith. 1996. Survival, movements, and habitat use of Aplomado falcons released in southern Texas. *The Journal of Raptor Research*. 30(4):175-182.

Ramsey III, E., G. Nelson, and Y.Y. Yan. 2001. Palo Alto Battlefield National Historic Site Landscape Classification and Historic Analysis. Report to the USDI National Park Service.

Richard, N.L., and A.T. Richardson. 1993. Biological inventory, natural history and human impact of Palo Alto Battlefield. Report to the USDI National Park Service. 37 pp.

Richardson, A., and K. King. 2010. Plants of Deep South Texas: A Field Guide to the Woody and Flowering Species. Texas A&M University Press, College Station, Texas.

Tewes, M.E., and D.D. Everett. 1982. Status and distribution of the endangered ocelot and jaguarundi in Texas. Cats of the World: Biology, Conservation, and Management. Proceedings of the Second International Symposium by Caesar Kleberg Wildlife Research Institute. Texas A & M University.

Texas Commission on Environmental Quality. 2010. Draft 2010 Water Body Assessments by Basin. http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/10twqi/10basinlist.html.

Texas Parks and Wildlife Department. 2009. Jaguarundi (*Herpailurus yaguarondi*) http://www.tpwd.state.tx.us/huntwild/wild/species/jag/.

Texas Parks and Wildlife Department. 2009. Northern Aplomado Falcon (*Falco femoralis septentrionalis*) http://www.tpwd.state.tx.us/huntwild/wild/species/aplomfal/.

Texas Parks and Wildlife Department. 2009. Ocelot (*Leopardus pardalis*) http://www.tpwd.state.tx.us/huntwild/wild/species/ocelot/.

Texas Parks and Wildlife Department. 2009. Rare, threatened, and endangered species by county. Database. http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species/

Texas Parks and Wildlife Department. 2009. Texas Tortoise (*Gopherus berlandieri*). http://www.tpwd.state.tx.us/huntwild/wild/species/txtort/.

Varela, V.M., and K.M. Hogan. 1998. Texas Tortoise Home Range Size and Vegetation Characteristics on the Yturria Brush Tract, Lower Rio Grande Valley National Wildlife Refuge. U.S. Fish and Wildlife Service Agency Report.

APPENDIX A
ENVIRONMENTAL SCREENING FORM

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

This form should be attached to all NEPA documents sent to the regional director's office for signature. Sections A and B should be filled out by the project initiator (may be coupled with other park project initiation forms). Sections C, D, E, and G are to be completed by the interdisciplinary team members. While you may modify this form to fit your needs, you must ensure that the form includes information detailed below and must have your modifications reviewed and approved by the regional environmental coordinator. To access this form and other compliance project information, go to http://nepc.nps.gov.

A. PROJECT INFORMATION

Park Name _____ Project/PMIS Number _____

Project Type (*Check*): ☐ Cyclic ☐ Cultural Cyclic ☐ Repair/Rehab ☐ ONPS
☐ NRPP ☐ CRPP ☐ FLHP
☐ Line Item ☐ Fee Demo ☐ Concession Reimbursable
☐ Other (specify) _____

Project Location _____

Project Originator/Coordinator _____

Project Title _____

Contract # _____ Contractor Name _____

Administrative Record Location _____

Administrative Record Contact _____

B. PROJECT DESCRIPTION/LOCATION

(To begin the statutory compliance file, attach to this form, maps, site visit notes, agency consultation, data, reports, categorical exclusion form (if relevant), or other relevant materials.)

_____

_____

_____

_____

Preliminary drawings attached? ☐ Yes ☐ No Background info attached? ☐ Yes ☐ No

Date form initiated _____ Anticipated compliance completion date _____

Projected advertisement/Day labor start _____ Projected construction start _____

Is project a hot topic (controversial or sensitive issues that should be brought to attention of Regional Director)?
☐ Yes ☐ No

C. RESOURCE EFFECTS TO CONSIDER

(Please see section F, Instructions for Determining Appropriate NEPA Pathway, prior to completing this section. Also use the process described in DO-12, 2.9 and 2.10; 3.5(G) to (G)(5) and 5.4(F) to help determine the context, duration, and intensity of effects on resources.)

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
1	Geological resources – soils, bedrock, streambeds, etc.					
2	From geohazards					
3	Air quality					
4	Soundscapes					
5	Water quality or quantity					
6	Streamflow characteristics					

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
7	Marine or estuarine resources					
8	Floodplains or wetlands					
9	Land use, including occupancy, income, values, ownership, type of use					
10	Rare or unusual vegetation – old growth timber, riparian, alpine					
11	Species of special concern (plant or animal; state or federal listed or proposed for listing) of their habitat					
12	Unique ecosystems, biosphere reserves, World Heritage Sites					
13	Unique or important wildlife or wildlife habitat					
14	Unique, essential or important fish or fish habitat					
15	Introduce or promote non-native species (plant or animal)					
16	Recreation resources, including supply, demand, visitation, activities, etc.					
17	Visitor experience, aesthetic resources					
18	Archeological resources					
19	Prehistoric/historic structures					
20	Cultural landscapes					
21	Ethnographic resources					
22	Museum collections (objects, specimens, and archival and manuscript collections)					
23	Socioeconomics, including employment, occupation, income changes, tax base, infrastructure					
24	Minority and low income populations, ethnography, size, migration patterns, etc.					
25	Energy resources					
26	Other agency or tribal use plans or policies					
27	Resource, including energy, conservation potential, sustainability					
28	Urban quality, gateway communities, etc.					
29	Long-term management of resources or land/resource productivity					
30	Other important environmental resources (e.g., geothermal, paleontological resources)?					

Comments _____

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

D. MANDATORY CRITERIA

Mandatory Criteria: If implemented, would the proposal:	Yes	No	Comment or Data Needed to Determine
A. Have significant impacts on public health or safety?			
B. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas?			
C. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources (NEPA section 102(2)(E))?			
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?			
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?			
F. Have a direct relationship to other actions with individually insignificant, but cumulatively significant, environmental effects?			
G. Have significant impacts on properties listed or eligible for listing on the National Register of Historic Places, as determined by either the bureau or office?			
H. Have significant impacts on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?			
I. Violate a federal law, or a state, local, or tribal law or requirement imposed for the protection of the environment?			
J. Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?			
K. Limit access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?			
L. Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?			

For the purposes of interpreting these procedures within the NPS, any action that has the potential to violate the NPS Organic Act by impairing park resources or values would constitute an action that triggers the DOI exception for actions that threaten to violate a federal law for protection of the environment.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

E. OTHER INFORMATION *(Please answer the following questions/provide requested information.)*

Are personnel preparing this form familiar with the site? ☐ Yes ☐ No

Did personnel visit site? ☐ Yes ☐ No *(If yes, attach meeting notes re: when site visit took place, who attended, etc.)*

Is the project in an approved plan such as a General Management Plan or an Implementation Plan with an accompanying NEPA document? ☐ Yes ☐ No If so, plan name _____

Is the project still consistent with the approved plan? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

Is the environmental document accurate and up-to-date? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

FONSI ☐ ROD ☐ *(Check one)* Date approved _____

Are there any interested or affected agencies or parties? ☐ Yes ☐ No

Did you make a diligent effort to contact them? ☐ Yes ☐ No ☐ NA

Has consultation with all affected agencies or tribes been completed? ☐ Yes ☐ No ☐ NA *(If yes, attach additional pages re: consultations, including the name, dates, and a summary of comments from other agencies or tribal contacts.)*

Are there any connected, cumulative, or similar actions as part of the proposed action (e.g., other development projects in area or identified in GMP, adequate/available utilities to accomplish project)? ☐ Yes ☐ No *(If yes, attach additional pages detailing the other actions.)*

F. INSTRUCTIONS FOR DETERMINING APPROPRIATE NEPA PATHWAY

First, always check DO-12, section 3.2, "Process to Follow," in determining whether the action is categorically excluded from additional NEPA analyses. Other sections within DO-12, including sections 2.9 and 2.10; 3.5; 4.5(G) and (G)(5); and 5.4(F), should also be consulted in determining the appropriate NEPA pathway. Complete the following tasks: conduct a site visit or ensure that staff is familiar with the site's specifics; consult with affected agencies, and/or tribes, and interested public; and complete this environmental screening form.

If your action is described in DO-12, section 3.3, "CEs for Which No Formal Documentation is Necessary," follow the instructions indicated in that section.

If your action is not described in DO-12, section 3.3, and IS described in section 3.4, AND you checked YES or identified "data needed to determine" impacts in any block in section D (Mandatory Criteria), this is an indication that there is potential for significant impacts to the human environment, therefore you must prepare an EA or EIS or supply missing information to determine context, duration, and intensity of impacts.

If your action is described in section 3.4 and NO is checked for all boxes in section D (Mandatory Criteria), AND there are either no effects or **all** of the potential effects identified in Section C (Resource Effects to Consider) are no more than minor intensity, usually there is no potential for significant impacts and an EA or EIS is not required. If, however, during internal scoping and further investigation, resource effects still remain unknown, or are at the minor to moderate level of intensity, and the potential for significant impacts may be likely, an EA or EIS is required.

In all cases, data collected to determine the appropriate NEPA pathway must be included in the administrative record.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

G. INTERDISCIPLINARY TEAM SIGNATORIES *(All interdisciplinary team members must sign.) By signing this form, you affirm the following: you have either completed a site visit or are familiar with the specifics of the site; you have consulted with affected agencies and tribes; and you, to the best of your knowledge, have answered the questions posed in the checklist correctly.*

Interdisciplinary Team Leader Name	Discipline/Field of Expertise	Date

Technical Specialists Names	Discipline/Field of Expertise	Date

H. SUPERVISORY SIGNATORY

Based on the environmental impact information contained in the statutory compliance files and in this environmental screening form, environmental documentation for the subject project is complete. If the project involves hot topics or sensitive issues, I have briefed the deputy or regional director.

Recommended:

Compliance Specialist	Telephone Number	Date

Approved:

Superintendent	Telephone Number	Date

APPENDIX B
HERBICIDE SPECIMEN LABELS

ATTENTION:

This specimen label is provided for general information only.

- This pesticide product may not yet be available or approved for sale or use in your area.
- It is your responsibility to follow all Federal, state and local laws and regulations regarding the use of pesticides.
- Before using any pesticide, be sure the intended use is approved in your state or locality.
- Your state or locality may require additional precautions and instructions for use of this product that are not included here.
- Monsanto does not guarantee the completeness or accuracy of this specimen label. The information found in this label may differ from the information found on the product label. You must have the EPA approved labeling with you at the time of use and must read and follow all label directions.
- You should not base any use of a similar product on the precautions, instructions for use or other information you find here.
- Always follow the precautions and instructions for use on the label of the pesticide you are using.

2113613-48

Roundup PRO®

Herbicide

The complete broad-spectrum postemergence professional herbicide for industrial, turf and ornamental weed control.

Complete Directions for Use

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION IS LIKELY TO RESULT.

EPA Reg. No. 524-475 2010-1

GROUP	9	HERBICIDE

Read the entire label before using this product.

Use only according to label instructions.

Not all products listed on this label are registered for use in California. Check the registration status of each product in California before using.

Read the "LIMIT OF WARRANTY AND LIABILITY" statement at the end of the label before buying or using. If terms are not acceptable, return at once unopened.

THIS IS AN END-USE PRODUCT. MONSANTO DOES NOT INTEND AND HAS NOT REGISTERED IT FOR REFORMULATION. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

1.0 INGREDIENTS

ACTIVE INGREDIENT:	
*Glyphosate, N-(phosphonomethyl)glycine, in the form of its isopropylamine salt	41.0%
OTHER INGREDIENTS (including surfactant):	59.0%
	100.0%

*Contains 480 grams per liter or 4 pounds per U.S. gallon of the active ingredient glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.

This product is protected by U.S. Patent Nos. 5,683,958; 5,703,015; 6,063,733; 6,121,199; 6,121,200. No license granted under any non-U.S. patent(s).

2.0 IMPORTANT PHONE NUMBERS

FOR **PRODUCT INFORMATION** OR ASSISTANCE IN USING THIS PRODUCT, CALL TOLL-FREE, **1-800-332-3111.**

IN CASE OF AN **EMERGENCY** INVOLVING THIS PRODUCT, OR FOR **MEDICAL ASSISTANCE**, CALL COLLECT, DAY OR NIGHT, **(314)-694-4000.**

3.0 PRECAUTIONARY STATEMENTS

3.1 Hazards to Humans and Domestic Animals

Keep out of reach of children.

CAUTION!

CAUSES EYE IRRITATION.

Avoid contact with eyes or clothing.

FIRST AID: Call a poison control center or doctor for treatment advice.	
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. • Remove contact lenses if present after the first 5 minutes then continue rinsing eye.
• Have the product container or label with you when calling a poison control center or doctor, or going for treatment.	
• You may also contact **(314) 694-4000**, collect day or night, for emergency medical treatment information.	
• This product is identified as **Roundup PRO® herbicide, EPA Registration No. 524-475**.	

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear: long-sleeved shirt and long pants, shoes plus socks. Follow manufacturer's instructions for cleaning/maintaining Personal Protective Equipment (PPE). If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

When handlers use closed systems, enclosed cabs or aircraft in a manner that meets the requirements listed in Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

IMPORTANT: When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for "applicators and other handlers" and have such PPE immediately available for use in an emergency, such as spill or equipment breakdown.

User Safety Recommendations

Users should:

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

3.2 Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

3.3 Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture.

This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. This product can only be used in accordance with the Directions for Use on this label or in separately published Monsanto Supplemental Labeling. Supplemental labeling may be found on the www.cdms.net or www.greenbook.net websites or obtained by contacting your Authorized Monsanto Retailer or Monsanto Company representative.

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 regulations.

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 4 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 greater than 14 mils in thickness composed of materials such as butyl rubber, natural rubber, neoprene rubber, or nitrile rubber, 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 (40 CFR Part 170) for agricultural pesticides. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep people and pets off treated areas until spray solution has dried.

4.0 STORAGE AND DISPOSAL

Proper pesticide storage and disposal are essential to protect against exposure to people and the environment due to leaks and spills, excess product or waste, and vandalism. Do not allow this product to contaminate water, foodstuffs, feed or seed by storage or disposal.

PESTICIDE STORAGE: Store pesticides away from food, pet food, feed, seed, fertilizers, and veterinary supplies. Keep container closed to prevent spills and contamination.

PESTICIDE DISPOSAL: To avoid wastes, use all material in this container, including rinsate, by application in accordance with label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program. Such programs are often run by state or local governments or by industry. All disposal must be in accordance with applicable Federal, State and local procedures.

[FOR RIGID PLASTIC 2.5 GAL CONTAINERS OR OTHERS </= 5 GAL]

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse this container to hold materials other than pesticides or dilute pesticides (rinsate). After emptying and cleaning, it may be allowable to temporarily hold rinsate or other pesticide-related materials in this container. Contact your state regulatory agency to determine allowable practices in your state.

CONTAINER HANDLING: Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse 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.

Pressure rinse as follows: Empty the remaining contents into application equipment or a 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.

Once cleaned, some plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or Monsanto at 1-800-768-6387. If recycling is not available, puncture and dispose of in a sanitary landfill.

[FOR RIGID PLASTIC 30 GAL CONTAINERS OR OTHERS > 5 GAL]

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse this container to hold materials other than pesticides or dilute pesticides (rinsate). After emptying and cleaning, it may be allowable to temporarily hold rinsate or other pesticide-related materials in this container. Contact your state regulatory agency to determine allowable practices in your state.

CONTAINER HANDLING: Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse 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 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 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 a 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.

Once cleaned, some plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or Monsanto at 1-800-768-6387. If recycling is not available, puncture and dispose of in a sanitary landfill.

5.0 PRODUCT INFORMATION

Product Description: This product is a postemergence, systemic herbicide with no soil residual activity. It gives broad-spectrum control of many annual weeds, perennial weeds, woody brush and trees. It is formulated as a water-soluble liquid containing surfactant and no additional surfactant is needed.

Time to Symptoms: This product moves through the plant from the point of foliage contact to and into the root system. Visible effects are a gradual wilting and yellowing of the plant, which advances to complete browning of aboveground growth and deterioration of underground plant parts. Effects are visible on most annual weeds within 2 to 4 days, but on most perennial weeds, effects may not be visible for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay development of visual symptoms.

Mode of Action in Plants: The active ingredient in this product inhibits an enzyme found only in plants and microorganisms that is essential to the formation of specific amino acids.

Cultural Considerations: Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed or cut, and have not been allowed to regrow to the specified stage for treatment.

Rainfastness: Heavy rainfall soon after application may wash this product off of the foliage and a repeat application may be required for adequate control.

No Soil Activity: Weeds must be emerged at the time of application to be controlled by this product. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or rootstocks of perennials will not be affected by this herbicide and will continue to grow.

Tank Mixing: This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

When this label identifies a tank mixture with a single generic active ingredient such as diuron, 2,4-D or dicamba, the user is responsible for ensuring that the mixture product's label allows the specific application.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly listed in this label. Mixing this product with herbicides or other materials not on this label may result in reduced performance.

Annual Maximum Use Rate: The maximum application or use rates stated throughout this label are given in units of volume (fluid ounces or quarts) of this product per acre. However, the maximum allowed application rates apply to this product combined with the use of any and all other herbicides containing the active ingredient glyphosate, whether applied separately or as tank mixtures, on a basis of total pounds of glyphosate (acid equivalents) per acre. If more than one glyphosate-containing product is applied to the same site within the same year, you must ensure that the total use of glyphosate (pounds acid equivalents) does not exceed the maximum allowed. The combined total of all treatments must not exceed 10.6 quarts of this product per acre per year. See the "INGREDIENTS" section of this label for necessary product information.

ATTENTION

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT.

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product increases when winds are gusty, as wind velocity increases, when wind direction is constantly changing or when there are other meteorological conditions that favor spray drift. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) that are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or have other unintended consequences.

5.1 Weed Resistance Management

GROUP	9	HERBICIDE

Glyphosate, the active ingredient in this product, is a Group 9 herbicide based on the mode of action classification system of the Weed Science Society of America. Any weed population may contain plants naturally resistant to Group 9 herbicides. Weed species resistant to Group 9 herbicides may be effectively managed utilizing another herbicide from a different Group or using other cultural or mechanical practices.

To minimize the occurrence of glyphosate-resistant biotypes observe the following weed management instructions:

- Scout your application site before and after herbicide applications.
- Control weeds early when they are relatively small.
- Incorporate other herbicides and cultural or mechanical practices as part of your weed control system where appropriate.
- Utilize the labeled rate for the most difficult weed in the site. Avoid tank mixtures with other herbicides that reduce this product's efficacy (through antagonism) or tank mixtures which encourage rates of this product below the label rates.
- Control weed escapes and prevent weeds from setting seeds.
- Clean equipment before moving from site to site to minimize spread of weed seed.
- Use new commercial seed as free of weed seed as possible.
- Report any incidence of repeated non-performance of this product on a particular weed to your Monsanto representative, local retailer, or county extension agent.

5.2 Management Instructions for Glyphosate-Resistant Weed Biotypes

NOTE: Appropriate testing is critical in order to confirm weed resistance to glyphosate. Contact your Monsanto representative to determine if resistance has been confirmed to any particular weed biotype in your area. Control instructions for biotypes confirmed as resistant to glyphosate are made available on separately published supplemental labeling or Fact Sheets for this product and may be obtained from your local retailer or Monsanto representative.

Follow good weed management practices to avoid the spread of confirmed resistant biotypes.

- If a naturally occurring resistant biotype is present at your site, this product may be tank-mixed or applied sequentially with an appropriately labeled herbicide with a different mode of action to achieve control.
- Cultural and mechanical control practices may also be used as appropriate.
- Scout treated sites after herbicide applications and control escapes of resistant biotypes before they set seed.
- Thoroughly clean equipment before leaving sites known to contain resistant biotypes.

6.0 MIXING

Clean sprayer parts immediately after using this product by thoroughly flushing with water.

NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, OR USE OF VISIBLY MUDDY WATER OR WATER FROM PONDS AND DITCHES THAT IS NOT CLEAR.

6.1 Mixing with Water

This product mixes readily with water. Mix spray solutions of this product as follows: Begin filling the mixing tank or spray tank with the required amount of clean water. Add the specified amount of this product near the end of the filling process and mix well. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by state or local regulations. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

6.2 Tank Mixing Procedure

When tank mixing, read and carefully observe label directions, cautionary statements and all information on the labels of all products used. Add the tank-mix product to the tank as directed by the label. Maintain agitation and add the specified amount of this product.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation may be required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near the bottom of the tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50-mesh.

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance. Ensure that the specific tank mixture product is registered for application at the desired site.

Refer to the "**Tank Mixing**" section for additional precautions.

6.3 Mixing for Hand-Held Sprayers

Prepare the desired volume of spray solution by mixing the amount of this product as indicated in the following table with water:

Spray Solution

	Amount of **Roundup PRO Herbicide**					
Desired Volume	1/2%	1%	1-1/2%	2%	5%	10%
1 Gal	2/3 oz	1-1/3 oz	2 oz	2-2/3 oz	6-1/2 oz	13 oz
25 Gal	1 pt	1 qt	1-1/2 qt	2 qt	5 qt	10 qt
100 Gal	2 qt	1 gal	1-1/2 gal	2 gal	5 gal	10 gal

2 tablespoons = 1 fluid ounce

For use in backpack, knapsack or pump-up sprayers, mix the appropriate amount of this product with water in a larger container and then fill the sprayer with the mixed solution.

6.4 Colorants or Dyes

Colorants or marking dyes may be added to spray solutions of this product; however they may reduce product performance at lower rates or dilution. Use colorants or dyes according to the manufacturer's instructions.

7.0 APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES.

7.1 Aerial Equipment

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS SPECIFIED IN THIS LABEL or in separately published Monsanto Supplemental Labeling.

Use the specified rates of this herbicide in 3 to 25 gallons of water per acre. When used according to label directions, this product will give control or partial control of herbaceous weeds, woody brush and trees listed in the "WEEDS CONTROLLED" section of this label.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations that dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure. Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO THE FEDERAL SUPPLEMENTAL LABEL FOR AERIAL APPLICATIONS IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS.

Avoid direct application to any body of water.

Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Aircraft Maintenance: PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion. To prevent corrosion of exposed parts, thoroughly wash aircraft after each day of spraying to remove residues of this product accumulated during spraying or from spills. Landing gear is most susceptible.

SPRAY DRIFT MANAGEMENT

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended.

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

AERIAL SPRAY DRIFT MANAGEMENT

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops.

1. The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the airstream and never be pointed downwards more than 45 degrees. Observe state regulations if they are more stringent.

Importance of droplet size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest 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 the "**Wind**", "**Temperature and Humidity**", and "**Temperature Inversion**" sections of this label).

Controlling droplet size

- **Volume:** Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with the higher rated flows produce larger droplets.
- **Pressure:** Use the lower spray pressures for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. 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 provides uniform coverage.
- **Nozzle orientation:** Orienting nozzles so that the spray is released backwards, parallel to the airstream, will produce larger droplets than other orientations. 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 larger droplets than other nozzle types.
- **Boom Length:** For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application Height:** Do not make applications at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces the exposure of the 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 aircraft upwind. Increase swath distance with increasing drift potential (higher wind speed, smaller droplets, etc.).

Wind

Drift potential is lowest between wind speeds of 2 to 10 miles per hour. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. Avoid application when wind speeds are below 2 miles per hour due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator needs to be familiar with local wind patterns and how they affect drift.

Temperature and Humidity

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

Temperature Inversions

Do not make applications during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud 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, movement of smoke produced by a ground source or an aircraft smoke generator can also identify temperature inversions. 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.

Sensitive Areas

Apply this product only when the potential for drift to sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

7.2 Ground Broadcast Equipment

Use the labeled rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified. As density of weeds increases, increase spray volume within the labeled range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat-fan nozzles. Check for even distribution of spray droplets.

7.3 Backpack or Hand-Held Equipment

Apply to foliage of vegetation to be controlled on a spray-to-wet basis; do not spray to the point of runoff. Spray coverage should be uniform and complete. Use coarse sprays only.

7.4 Selective Equipment

This product may be diluted with water and applied through recirculating spray systems, shielded applicators, hooded sprayers, wiper applicators or sponge bars, to listed weeds growing in any non-crop site specified on this label.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation, while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION. Contact of this product with desirable vegetation may result in unwanted plant damage or destruction.

Adjust application equipment used above desired vegetation so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation. Droplets, mist, foam or splatter of the herbicide solution settling on desirable vegetation is likely to result in discoloration, stunting or destruction.

Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

Shielded and Hooded Applicators

A shielded or hooded applicator directs the herbicide solution onto weeds, while shielding desirable vegetation from the herbicide. Use nozzles that provide uniform coverage within the treated area. Keep shields on these sprayers adjusted to protect desirable vegetation. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

Wiper Applicators and Sponge Bars

A wiper or sponge applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution. Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 miles per hour. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if two (2) applications are made in opposite directions.

Avoid leakage or dripping onto desirable vegetation. Adjust height of applicator to ensure adequate contact with weeds. Keep wiping surfaces clean. Be aware that, on sloping ground, the herbicide solution may migrate, causing dripping on the lower end and drying of the wicks on the upper end of a wiper applicator.

Do not use wiper applicators when weeds are wet.

Mix only the amount of solution to be used during a 1-day period, as reduced activity may result from use of leftover solutions. Clean wiper parts immediately after using this product by thoroughly flushing with water.

For Rope or Sponge Wick Applicators: Use solutions ranging from 33 to 75 percent of this product in water.

For Panel Applicators and Pressure-Feed Systems: Use solutions ranging from 33 to 100 percent of this product in water.

When applied as directed, this product CONTROLS the following weeds:

Corn, volunteer	Sicklepod
Panicum, Texas	Spanishneedles
Rye, common	Starbur, bristly
Shattercane	

When applied as directed, this product SUPPRESSES the following weeds:

Beggarweed, Florida	Ragweed, common
Bermudagrass	Ragweed, giant
Dogbane, hemp	Smutgrass
Dogfennel	Sunflower
Guineagrass	Thistle, Canada
Johnsongrass	Thistle, musk
Milkweed	Vaseygrass
Nightshade, silverleaf	Velvetleaf
Pigweed, redroot	

7.5 Injection Systems

This product may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix this product with the undiluted concentrate of other products when using injection systems unless specifically instructed.

7.6 CDA Equipment

The rate of this product applied per acre by controlled droplet application (CDA) equipment must not be less than the amount specified in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply in 2 to 15 gallons of water per acre.

CDA equipment produces a spray pattern that is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation, as damage or destruction is likely to result.

8.0 SITE AND USE INSTRUCTIONS

Unless otherwise specified, applications may be made to control any weeds listed in the "WEEDS CONTROLLED" section of this label. Refer also to the "**Selective Equipment**" section.

8.1 Cut Stumps

Cut stump treatments may be made on any site listed on this label. This product will control many types of woody brush and tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly-cut surface **immediately after** cutting. Delays in application may result in reduced performance. For best results, make applications during periods of active growth and full leaf expansion.

Alder	Saltcedar
Eucalyptus	Sweetgum
Madrone	Tan oak
Oak	Willow
Reed, giant	

DO NOT MAKE CUT STUMP APPLICATIONS WHEN THE ROOTS OF DESIRABLE WOODY BRUSH OR TREES MAY BE GRAFTED TO THE ROOTS OF THE CUT STUMP. Some sprouts, stems, or trees may share the same root system. Adjacent trees having a similar age, height and spacing may signal shared roots. Whether grafted or shared, injury is likely to occur to non-treated stems/trees when one or more trees sharing common roots are treated.

8.2 Forestry Site Preparation

Use this product for the control or partial control of woody brush, trees and herbaceous weeds in forestry or in preparing or establishing wildlife openings within these sites and maintaining logging roads.

This product can also be used for site preparation prior to planting any tree species, including Christmas trees, eucalyptus, hybrid tree cultivars and silvicultural nursery sites.

Refer to the "WEEDS CONTROLLED" and "**Woody Brush and Trees**" sections of this label for specific application rates and instructions.

Use higher rates of this product within the specified range for control or partial control of woody brush, trees and hard-to-control perennial herbaceous weeds. For best results, apply to actively growing woody brush and trees after full leaf expansion and before fall color and leaf drop. Increase rates within the specified range for control of perennial herbaceous weeds any time after emergence and before seedheads, flowers or berries appear.

Use the lower rates of this product within the specified range for control of annual herbaceous weeds and actively growing perennial herbaceous weeds after seedheads, flowers or berries appear. Apply to the foliage of actively growing annual herbaceous weeds any time after emergence.

This product has no herbicidal or residual activity in the soil. Where repeat applications are necessary, do not exceed 10.6 quarts of this product per acre per year.

Unless otherwise directed, do not apply this product as an over-the-top broadcast spray for forestry conifer or hardwood release.

TANK MIXTURES

Tank mixtures of this product may be used to increase the spectrum of vegetation controlled. This product may be tank-mixed with the following products provided that the specific product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

NOTE: For forestry site preparation, make sure the tank-mix product is approved for use prior to planting the desired species. Observe planting interval restrictions.

Any labeled rate of this product may be used in a tank mix with the following products for forestry site preparation.

Arsenal Applicators Concentrate	Garlon 3A
Chopper	Garlon 4
Escort	Oust
Escort XP	Oust XP

8.3 Non-crop Areas and Industrial Sites

Use in areas such as airports, apartment complexes, Christmas tree farms, commercial sites, Conservation Reserve Program (CRP) areas, ditch banks, dry ditches, dry canals, fencerows, golf courses, greenhouses, industrial sites, landscape areas, lumber yards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parks, parking areas, pastures, petroleum tank farms and pumping installations, plant nurseries, public areas, railroads, rangeland, recreational areas, residential areas, rights-of-way, roadsides, schools, sod or turf seed farms, sports complexes, storage areas, substations, turfgrass areas, utility sites, warehouse areas, and wildlife management areas.

Weed Control, Trim-and-Edge, Bare Ground

This product may be used in non-crop areas. It may be applied with any application equipment described in this label. This product may be used to trim-and-edge around objects in non-crop sites, for spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

Repeated applications of this product may be used, as weeds emerge, to maintain bare ground.

TANK MIXTURES: This product may be tank-mixed with the following products provided that the specific product is registered for use on the target site. Refer to these product labels for approved sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a single generic active ingredient listed below.

Arsenal	Landmark II MP
atrazine	Oust
Barricade 65WG	Oust XP
Certainty®	Outrider®
Crossbow L	pendimethalin
dicamba*	Plateau
diuron	Poast
Endurance	Ronstar 50WP
Escort	simazine
Escort XP	Surflan AS
Gallery 75DF	Surflan WDG
Garlon 3A	Telar DF
Garlon 4	Transline
Goal 2XL	Velpar DF
Krovar I DF	Velpar L
Landmark II	2,4-D

*This product plus dicamba tank mixtures may not be applied by air in California.

When applied as a tank mixture for bare ground, this product provides control of the emerged annual weeds and control or partial control of emerged perennial weeds, woody brush and trees.

For control or partial control of the following perennial weeds, apply 1 to 2 quarts of this product plus 2 to 4 ounces of Oust or Oust XP per acre.

Bahiagrass	Dock, curly	Poorjoe
Bermudagrass	Dogfennel	Quackgrass
Broomsedge	Fescue, tall	Vaseygrass
Dallisgrass	Johnsongrass	Vervain, blue

Chemical Mowing - Perennials

This product will suppress perennial grasses listed in this section to serve as a substitute for mowing. Use 8 fluid ounces of this product per acre when treating tall fescue, fine fescue, orchardgrass, quackgrass or reed canarygrass covers. Use 6 fluid ounces of this product per acre when treating Kentucky bluegrass. Apply treatments in 10 to 40 gallons of spray solution per acre.

Use only in areas where some temporary injury or discoloration of perennial grasses can be tolerated.

Chemical Mowing - Annuals

For growth suppression of some annual grasses, such as annual ryegrass, wild barley and wild oats growing in coarse turf on roadsides or other industrial areas, apply 4 to 5 fluid ounces of this product in 10 to 40 gallons of spray solution per acre. Make applications when annual grasses are actively growing and before the seedheads are in the boot stage of development. Treatments may cause injury to the desired grasses.

***Bromus* Species and Medusahead in Pastures and Rangelands**

***Bromus* species.** This product may be used to treat downy brome *(Bromus tectorum)*, Japanese brome *(Bromus japonicus)*, soft chess *(Bromus mollis)* and cheatgrass *(Bromus secalinus)* found in industrial, rangeland and pasture sites. Apply 8 to 16 fluid ounces of this product per acre on a broadcast basis.

For best results, coincide treatment with early seedhead emergence of the most mature plants. Delaying the application until this growth stage will maximize the emergence of other weedy grass flushes. Apply to the same site each year until seed banks are depleted and the desirable perennial grasses can become reestablished on the site.

Medusahead. To treat medusahead, apply 16 fluid ounces of this product per acre as soon as plants are actively growing, and prior to the 4-leaf stage. Applications may be made in the fall or spring.

Applications to brome and medusahead may be made using ground or aerial equipment. Aerial applications for these uses may be made using fixed wing or helicopter equipment. For aerial applications, apply in 2 to 10 gallons of water per acre. For applications using ground equipment, apply in 10 to 20 gallons of water per acre. When applied as directed in this label, there are no grazing restrictions.

Dormant Turfgrass

This product may be used to control or suppress many winter annual weeds and tall fescue for effective release of dormant bermudagrass and bahiagrass turf. Treat only when turf is dormant and prior to spring greenup.

Apply 8 to 64 fluid ounces of this product per acre. Apply the labeled rates in 10 to 40 gallons of water per acre. Use only in areas where bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated.

Treatments in excess of 16 fluid ounces per acre may result in injury or delayed greenup in highly maintained areas, such as golf courses and lawns. DO NOT apply tank mixtures of this product plus Oust or Oust XP in highly maintained turfgrass areas. For further uses, refer to the "**Roadsides**" section of this label, which gives rates for dormant bermudagrass and bahiagrass treatments.

Actively Growing Bermudagrass

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing bermudagrass. DO NOT apply more than 16 fluid ounces of this product per acre in highly maintained turfgrass areas. DO NOT apply tank mixtures of this product plus Oust or Oust XP in highly maintained turfgrass areas. For further uses, refer to the "**Roadsides**" section of this label, which gives rates for actively growing bermudagrass treatments. Use only in areas where some temporary injury or discoloration can be tolerated.

Turfgrass Renovation, Seed, or Sod Production

This product controls most existing vegetation prior to renovating turfgrass areas or establishing turfgrass grown for seed or sod. For maximum control of existing vegetation, delay planting or sodding to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses such as bermudagrass, summer or fall applications provide the best control. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray.

Desirable turfgrasses may be planted following the above procedures.

Hand-held equipment may be used for spot treatment of unwanted vegetation growing in existing turfgrass. Broadcast or hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested.

PRECAUTIONS; RESTRICTIONS: Do not disturb soil or underground plant parts before treatment. Delay tillage or renovation techniques such as vertical mowing, coring or slicing for 7 days after application to allow translocation into underground plant parts.

If application rates total 3 quarts per acre or less, no waiting period between treatment and feeding or livestock grazing is required. If the rate is greater than 3 quarts per acre, remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

8.4 Habitat Management

Habitat Restoration and Management

This product may be used to control exotic and other undesirable vegetation in habitat management and natural areas, including rangeland and wildlife refuges. Applications can be made to allow recovery of native plant species, prior to planting desirable native species, and for similar broad-spectrum vegetation control requirements. Spot treatments can be made to selectively remove unwanted plants for habitat management and enhancement.

Wildlife Food Plots

This product may be used as a site preparation treatment prior to planting wildlife food plots. Any wildlife food species may be planted after applying this product, or native species may be allowed to repopulate the area. If tillage is needed to prepare a seedbed, wait 7 days after application before tillage to allow translocation into underground plant parts.

8.5 Injection and Frill (Woody Brush and Trees)

This product may be used to control woody brush and trees by injection or frill applications. Apply this product using suitable equipment that must penetrate into the living tissue. Apply the equivalent of 1/25 fluid ounce (1 mL) of this product per each 2 to 3 inches of trunk diameter at breast height (DBH). This is best achieved by applying a 50 to 100 percent concentration of this product either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying diluted material to a continuous frill or more closely spaced cuttings. Avoid application techniques that allow runoff to occur from frilled or cut areas in species that exude sap freely. In species such as this, make the frill or cuts at an oblique angle to produce a cupping effect and use a 100 percent concentration of this product. For best results, apply during periods of active growth and after full leaf expansion. This product will control many species, some of which are listed below:

Control	Partial Control
Dogwood	Black gum
Oak	Hickory
Poplar	Maple, red
Sweetgum	
Sycamore	

8.6 Hollow Stem Injection

This product may be applied through hand-held injection devices that deliver the specified amounts of this product into targeted hollow-stem plants growing in any non-crop site specified on this label. For control of the following hollow-stem plants, follow the use instructions below:

Castorbean *(Ricinus communis)*

Inject 5 mL per plant of this product into the lower portion of the main stem.

Hemlock, Poison *(Conium maculatum)*

Inject one leaf cane per plant 10 to 12 inches above root crown with 6 mL of a 5% v/v solution of this product.

Hogweed, Giant *(Heracleum mantegazzianum)*

Inject one leaf cane per plant 12 inches above root crown with 6 mL of a 5% v/v solution of this product.

Horsetail, Field *(Equisetum arvense)*

Inject one segment above the root crown with 0.6 mL per stem of this product. Use a small syringe that calibrates to this rate.

Knotweed, Bohemian *(Polygonum bohemicum)*

Inject 6 mL per stem of this product between second and third internode.

Knotweed, Giant *(Polygonum sachalinense)*

Inject 6 mL per stem of this product between second and third internode.

Knotweed, Japanese *(Polygonum cuspidatum)*

Inject 6 mL per stem of this product between second and third internode.

Reed, Giant *(Arundo donax)*

Inject 8 mL per stem of this product between second and third internode.

Thistle, Canada *(Cirsium arvense)*

Cut 8 to 9 of the tallest plants at bud stage in a clump with clippers. Use a cavity needle that is pushed into the stem center and then slowly removed as 0.6 mL per stem of this product is injected into the stem.

NOTE: Based on the maximum annual use rate of glyphosate for these non-crop sites, the combined total for all treatments must not exceed 10.6 quarts of this product per acre. At 6 mL per stem, 10.6 quarts should treat approximately 1700 stems.

8.7 Ornamentals, Plant Nurseries, and Christmas Trees

Post-Directed, Trim-and-Edge

This product may be used as a post-directed spray around established woody ornamental species such as arborvitae, azalea, boxwood, crabapple, eucalyptus, euonymus, fir, douglas fir, jojoba, hollies, lilac, magnolia, maple, oak, poplar, privet, pine, spruce and yew. This product may also be used to trim-and-edge around trees, buildings, sidewalks and roads, potted plants and other objects in a nursery setting.

Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material. THIS PRODUCT IS NOT FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN ORNAMENTALS AND CHRISTMAS TREES. Care must be exercised to avoid contact of spray, drift or mist with foliage or green bark of established ornamental species.

Site Preparation

This product may be used prior to planting any ornamental, nursery or Christmas tree species.

Wiper Applications

This product may be used through wick or other suitable wiper applicators to control or partially control undesirable vegetation around established eucalyptus or poplar trees. See the "**Selective Equipment**" section of this label for further information about the proper use of wiper applicators.

Greenhouse/Shadehouse

This product may be used to control weeds growing in and around greenhouses and shadehouses. Desirable vegetation must not be present during application and air circulation fans must be turned off.

8.8 Parks, Recreational and Residential Areas

This product may be used in parks, recreational and residential areas. It may be applied with any application equipment described in this label. This product may be used to trim-and-edge around trees, fences, and paths, around buildings, sidewalks, and other objects in these areas. This product may be used for spot treatment of unwanted vegetation. This product may be used to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

All of the instructions in the "**Non-crop Areas and Industrial Sites**" section apply to park and recreational areas.

8.9 Railroads

The instructions in the "**Non-crop Areas and Industrial Sites**" section may be used on railroads.

Bare Ground, Ballast and Shoulders, Crossings, and Spot Treatment

This product may be used to maintain bare ground on railroad ballast and shoulders. Repeat applications of this product may be used, as weeds emerge, to maintain bare ground. This product may be used to control tall-growing weeds to improve line-of-sight at railroad crossings and reduce the need for mowing along rights-of-way. For crossing applications, up to 80 gallons of spray solution per acre may be used.

TANK MIXTURES: This product may be tank-mixed with the following products for ballast, shoulder, spot, bare ground and crossing treatments provided that the specific product is registered for use on such sites. Refer to these product labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring the mixture product's label allows the specific applications when tank mixing with a single generic active ingredient listed below:

Arsenal	Hyvar X	simazine
atrazine	Hyvar XL	Spike 80 DF
dicamba*	Krovar I DF	Telar DF
Escort	Oust	Transline
Escort XP	Oust XP	Velpar DF
Garlon 3A	Outrider	Velpar L
Garlon 4	Sahara DG	2,4-D

*This product plus dicamba tank mixtures may not be applied by air in California.

Brush Control

This product may be used to control woody brush and trees on railroad rights-of-way. Apply 4 to 10 quarts of this product per acre as a broadcast spray, using boom-type or boomless nozzles. Up to 80 gallons of spray solution per acre may be used. Apply a 3/4 to 2 percent solution of this product when using high-volume spray-to-wet applications. Apply a 5 to 10 percent solution of this product when using low volume directed sprays for spot treatment. This product may be mixed with the following products for enhanced control of woody brush and trees:

Arsenal	Krenite	Vanquish
Escort	Telar DF	Velpar DF
Escort XP	Tordon K	Velpar L
Garlon 3A	Tordon 22K	
Garlon 4	Transline	

Bermudagrass Release

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing bermudagrass. Apply 1 to 3 pints of this product in up to 80 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation. These rates will also provide partial control of the following perennial species:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

This product may be tank-mixed with Oust or Oust XP. If tank-mixed, use no more than 1 to 3 pints of this product with 1 to 2 ounces of Oust or Oust XP per acre. Use the lower rates of each product to control annual weeds less than 6 inches in height (or runner length) that are listed in this label and the Oust or Oust XP label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages. These rates will also provide partial control of the following perennial weeds:

Bahiagrass	Fescue, tall
Blackberry	Johnsongrass
Bluestem, silver	Poorjoe
Broomsedge	Raspberry
Dallisgrass	Trumpetcreeper
Dewberry	Vaseygrass
Dock, curly	Vervain, blue
Dogfennel	

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Repeat applications in the same season may cause severe injury.

8.10 Roadsides

The instructions in the "**Non-crop Areas and Industrial Sites**" section may apply to roadsides.

Shoulder Treatments

This product may be used on road shoulders. It may be applied with boom sprayers, shielded boom sprayers, high-volume off-center nozzles, hand-held equipment, and similar equipment.

Guardrails and Other Obstacles to Mowing

This product may be used to control weeds growing under guardrails and around signposts and immovable other objects along the roadside.

Spot Treatment

This product may be used as a spot treatment to control unwanted vegetation growing along roadsides.

TANK MIXTURES: This product may be tank-mixed with the following products for shoulder, guardrail, spot and bare ground treatments provided that the specific product is registered for use on such sites. Refer to these product labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statement and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a single generic active ingredient listed below.

atrazine	Landmark MP	Poast
Crossbow L	Landmark II MP	Ronstar 50 WSP
dicamba*	Landmark XP	Sahara DF
diuron	Oust	Surflan AS
Endurance	Oust XP	Surflan WDG
Escort	Outrider	Telar DF
Escort XP	pendimethalin	Velpar DF
Gallery 75DF	Plateau	Velpar L
Krovar I DF	Plateau DG	2,4-D

*This product plus dicamba tank mixtures may not be applied by air in California.

See the "**Non-crop Areas and Industrial Sites**" section of this label for tank mixing instructions.

Release of Bermudagrass or Bahiagrass

Dormant Applications

This product may be used to control or partially control many winter annual weeds and tall fescue for effective release of dormant bermudagrass or bahiagrass. Treat only when turf is dormant and prior to spring greenup. This product may also be tank-mixed with Oust or Oust XP for residual control. Tank mixtures of this product with Oust or Oust XP may delay greenup.

For best results on winter annuals, treat when plants are in an early growth stage (below 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is at or beyond the 4- to 6-leaf stage.

Apply 8 to 64 fluid ounces of this product in a tank mixture with 0.75 to 1.33 ounces of Outrider herbicide per acre. Read and follow all label directions for Outrider herbicide.

Apply 8 to 64 fluid ounces of this product per acre alone or in a tank mixture with 0.25 to 1 ounce per acre of Oust or Oust XP. Apply the labeled rates in 10 to 40 gallons of water per acre. Use only in areas where bermudagrass or bahiagrass are desirable ground covers and where some temporary injury or discoloration can be tolerated. To avoid delays in greenup and minimize injury, add no more than 1 ounce of Oust or Oust XP per acre on bermudagrass and no more than 1/2 ounce of Oust or Oust XP per acre on bahiagrass and avoid treatments when these grasses are in a semi-dormant condition.

Actively Growing Bermudagrass

This product may be used to control or partially control many annual and perennial weeds for effective release of actively growing bermudagrass. Apply 1 to 3 pints of this product in 10 to 40 gallons of spray solution per acre. Use the lower rate when treating annual weeds below 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation. These rates will also provide partial control of the following perennial species:

Bahiagrass	Johnsongrass
Bluestem, silver	Trumpetcreeper
Fescue, tall	Vaseygrass

This product may be tank-mixed with Oust or Oust XP. If tank-mixed, use no more than 1 to 2 pints of this product with 1 to 2 ounces of Oust or Oust XP per acre. Use the lower rates of each product to control annual weeds less than 6 inches in height (or runner length) that are listed in this label and the Oust or Oust XP label. Use the higher rates as annual weeds increase in size and approach the flower or seedhead stages. These rates will also provide partial control of the following perennial weeds:

Bahiagrass	Fescue, tall
Bluestem, silver	Johnsongrass
Broomsedge	Poorjoe
Dallisgrass	Trumpetcreeper
Dock, curly	Vaseygrass
Dogfennel	Vervain, blue

Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Repeat applications of the tank mix in the same season may cause severe injury.

Actively Growing Bahiagrass

For suppression of vegetative growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 6 fluid ounces of this product in 10 to 40 gallons of water per acre. Apply 1 to 2 weeks after full greenup or after mowing to a uniform height of 3 to 4 inches. This application must be made prior to seedhead emergence.

For suppression up to 120 days, apply 4 fluid ounces of this product per acre, followed by an application of 2 to 4 fluid ounces per acre about 45 days later. Make no more than 2 applications per year.

This product may be used for control or partial control of Johnsongrass and other weeds listed on the Outrider herbicide label in actively growing bahiagrass. Apply 6.25 ounces of this product with 0.75 to 2.0 ounces of Outrider herbicide per acre. Use only on well-established bahiagrass.

A tank mixture of this product plus Oust or Oust XP may be used. Apply 6 fluid ounces of this product plus 0.5 to 1.0 ounce of Oust or Oust XP per acre 1 to 2 weeks following an initial spring mowing. Make only one application per year.

8.11 Utility Sites

Use this product along electrical power, pipeline and telephone rights-of-way, and in other sites associated with these rights-of-way, such as substations, roadsides, railroads or similar rights-of-way that run in conjunction with utilities.

This product may be used in utility sites and substations for bare ground, trim-and-edge around objects, spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting a utility site to ornamentals, flowers, turfgrass (sod or seed), or beginning construction projects.

This product can be used in preparing or establishing wildlife openings within these sites, maintaining access roads and for side trimming along utility rights-of-way.

TANK MIXTURES: Tank mixtures of this product may be used to increase the spectrum of control for herbaceous weeds, woody brush and trees. This product may be tank-mixed with the following products. Refer to these products' labels for approved non-crop sites and application rates. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive precautionary statements for each product in the mixture.

User is responsible for ensuring that the mixture product's label allows the specific applications when tank mixing with a single generic active ingredient listed below.

Arsenal	Krenite	Surflan AS
atrazine	Krovar I DF	Surflan WDG
dicamba[1]	Oust	Telar DF
diuron	Oust XP	Transline
Endurance	Outrider	Vanquish
Escort	pendimethalin	Velpar DF
Escort XP	Plateau	Velpar L
Garlon 3A*	Sahara DG	2,4-D
Garlon 4[2]	simazine	

[1] This product plus dicamba tank mixtures may not be applied by air in California.

[2] For side trimming treatments, this product can be used alone or in tank mixture with Garlon 4.

*Ensure that Garlon 3A is thoroughly mixed with water according to label directions before adding this product. Have spray mixture agitating at the time this product is added to avoid spray compatibility problems.

Bare Ground and Trim-and-Edge

This product may be used in utility sites and substations for bare ground, trim-and-edge around objects, spot treatment of unwanted vegetation and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting a utility site to ornamentals, flowers, turfgrass (sod or seed), or beginning construction projects.

Repeated applications of this product may be used, as weeds emerge, to maintain bare ground.

This product may be tank-mixed with the following products. Refer to these products' labels for approved non-crop sites and application rates.

Arsenal	Plateau
Banvel	Princep DF
Barricade 65WG	Princep Liquid
diuron	Ronstar 50WP
Endurance	Sahara
Escort	simazine
Garlon 3A	Surflan

9.0 WEEDS CONTROLLED

Always use the higher rate of this product per acre within the specified range when weed growth is heavy or dense or weeds are growing in an undisturbed (noncultivated) area.

Reduced results may occur when treating weeds heavily covered with dust. For weeds that have been mowed, grazed or cut, allow regrowth to occur prior to treatment.

For low volume directed spray applications, use a 5 to 10 percent solution of this product for control or partial control of annual weeds, perennial weeds, or woody brush and trees. Spray coverage should be uniform with at least 50 percent of the foliage contacted. Coverage of the top one-half of the plant is important for best results. To ensure adequate spray coverage, spray both sides of large or tall woody brush and trees, when foliage is thick and dense, or where there are multiple resprouts.

Refer to the following label sections for rates to control annual and perennial weeds and woody brush and trees. For difficult to control annual or perennial weeds and woody brush and trees, where plants are growing under stressed conditions, or where infestations are dense, this product may be used at 5 to 10 quarts per acre for enhanced results.

9.1 Annual Weeds

Use 1 quart per acre if weeds are less than 6 inches in height or runner length and 1.5 quarts to 4 quarts per acre if weeds are over 6 inches in height or runner length or when weeds are growing under stressed conditions. Use the higher rate for tough-to-control species regardless of the weed size at application. Treat tough-to-control weeds early when they are relatively small. This product may be tank-mixed provided that the specific tank-mix product is registered for use on the target site. Refer to these product labels for approved sites and application rates.

For spray-to-wet applications, apply a 1/2 percent solution of this product to weeds less than 6 inches in height or runner length. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds. For annual weeds over 6 inches tall, or for smaller weeds growing under stressed conditions, use a 1 to 2 percent solution. Use the higher rate for tough-to-control species or for weeds over 24 inches tall.

WEED SPECIES

Anoda, spurred	Itchgrass*
Barley*	Johnsongrass, seedling
Barnyardgrass*	Junglerice
Bassia, fivehook	Knotweed
Bittercress*	Kochia
Black nightshade*	Lamb's-quarters*
Bluegrass, annual*	Little barley*
Bluegrass, bulbous*	London rocket*
Brome, downy*	Mayweed
Brome, Japanese*	Medusahead*
Browntop panicum*	Morningglory
Buttercup*	*(Ipomoea spp.)*
Carolina foxtail*	Mustard, blue*
Carolina geranium	Mustard, tansy*
Castorbean	Mustard, tumble*
Cheatgrass*	Mustard, wild*
Cheeseweed	Oats
(Malva parviflora)	Pigweed*
Chervil*	Plains/Tickseed coreopsis*
Chickweed*	Prickly lettuce*
Cocklebur*	Puncturevine
Copperleaf, hophornbeam	Purslane, common
Corn*	Ragweed, common*
Corn speedwell*	Ragweed, giant
Crabgrass*	Red rice
Dwarfdandelion*	Russian thistle
Eastern mannagrass*	Rye*
Eclipta*	Ryegrass*
Fall panicum*	Sandbur, field*
Falsedandelion*	Shattercane*
Falseflax, smallseed*	Shepherd's-purse*
Fiddleneck	Sicklepod
Field pennycress*	Signalgrass, broadleaf*
Filaree	Smartweed, ladysthumb*
Fleabane, annual*	Smartweed, Pennsylvania*
Fleabane, hairy	Sowthistle, annual
*(Conyza bonariensis)**	Spanishneedles
Fleabane, rough*	Speedwell, purslane*
Florida pusley	Sprangletop*
Foxtail*	Spurge, annual
Goatgrass, jointed*	Spurge, prostrate*
Goosegrass	Spurge, spotted*
Grain sorghum (milo)*	Spurry, umbrella*
Groundsel, common*	Starthistle, yellow
Hemp sesbania	Stinkgrass*
Henbit	Sunflower*
Horseweed/Marestail	Teaweed/Prickly sida
(Conyza canadensis)	Texas panicum*

WEED SPECIES	
Velvetleaf	Wild oats*
Virginia copperleaf	Witchgrass*
Virginia pepperweed*	Woolly cupgrass*
Wheat*	Yellow rocket

*When using field broadcast equipment (aerial applications or boom sprayers using flat-fan nozzles) these species will be controlled or partially controlled using 1 pint of this product per acre. Applications must be made using 3 to 10 gallons of carrier volume per acre. Use nozzles that ensure thorough coverage of foliage and treat when weeds are in an early growth stage.

9.2 Perennial Weeds

Best results are obtained when perennial weeds are treated after they reach the reproductive stage of growth (seedhead initiation in grasses and bud formation in broadleaves). For non-flowering plants, best results are obtained when the plants reach a mature stage of growth. In many situations, treatments are required prior to these growth stages. Under these conditions, use the higher application rate within the specified range. Use a 2 percent solution on tough-to-control perennials such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed spot treatments, apply a 5 to 10 percent solution of this product.

Allow 7 or more days after application before tillage.

Weed Species	Rate (QT/A)	Hand-Held % Solution
Alfalfa*	1	2
Alligatorweed*	4	1.5
Anise (fennel)	2 - 4	1 - 2
Bahiagrass	3 - 5	2
Beachgrass, European *(Ammophila arenaria)*	–	5
Bentgrass*	1.5	2
Bermudagrass	5	2
Bermudagrass, water (knotgrass)	1.5	2
Bindweed, field	4 - 5	2
Bluegrass, Kentucky	2	2
Blueweed, Texas	4 - 5	2
Brackenfern	3 - 4	1 - 1.5
Bromegrass, smooth	2	2
Bursage, woolly-leaf	–	2
Canarygrass, reed	2 - 3	2
Cattail	3 - 5	2
Clover; red, white	3 - 5	2
Cogongrass	3 - 5	2
Dallisgrass	3 - 5	2
Dandelion	3 - 5	2
Dock, curly	3 - 5	2
Dogbane, hemp	4	2
Fescue (except tall)	3 - 5	2
Fescue, tall	1 - 3	2
German ivy	2 - 4	1 - 2
Guineagrass	3	1
Horsenettle	3 - 5	2
Horseradish	4	2
Iceplant	2	1.5 - 2
Jerusalem artichoke	3 - 5	2
Johnsongrass	2 - 3	1
Kikuyugrass	2 - 3	2
Knapweed	4	2
Lantana	–	1 - 1.25
Lespedeza	3 - 5	2
Milkweed, common	3	2
Muhly, wirestem	2	2
Mullein, common	3 - 5	2
Napiergrass	3 - 5	2
Nightshade, silverleaf	2	2
Nutsedge; purple, yellow	3	1 - 2
Orchardgrass	2	2
Pampasgrass	3 - 5	1.5 - 2
Paragrass	3 - 5	2
Pepperweed, perennial	4	2
Phragmites*	3 - 5	1 - 2
Poison hemlock	2 - 4	1 - 2
Quackgrass	2 - 3	2
Redvine*	2	2
Reed, giant	4 - 5	2
Ryegrass, perennial	2 - 3	1
Smartweed, swamp	3 - 5	2
Spurge, leafy*	–	2
Sweet potato, wild*	–	2
Thistle, artichoke	2 - 3	1 - 2
Thistle, Canada	2 - 3	2
Timothy	2 - 3	2
Torpedograss*	4 - 5	2
Trumpetcreeper*	2 - 3	2
Vaseygrass	3 - 5	2
Velvetgrass	3 - 5	2
Wheatgrass, western	2 - 3	2

*Partial control

9.3 Woody Brush and Trees

Apply this product after full leaf expansion, unless otherwise directed. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when applications are made in the spring to early summer when brush species are at high moisture content and are flowering.

Ensure thorough coverage when using spray-to-wet treatments using hand-held equipment. When using hand-held equipment for low volume directed-spray spot treatments, apply a 5 to 10 percent solution of this product.

Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

Weed Species	Broadcast Rate (QT/A)	Hand-Held Spray-to-Wet % Solution
Alder	3 - 4	1 - 1.5
Ash*	2 - 5	1 - 2
Aspen, quaking	2 - 3	1 - 1.5
Bearclover (Bearmat)*	2 - 5	1 - 2
Beech*	2 - 5	1 - 2
Birch	2	1
Blackberry	3 - 4	1 - 1.5
Blackgum	2 - 5	1 - 2
Bracken	2 - 5	1 - 2
Broom; French, Scotch	2 - 5	1.5 - 2
Buckwheat, California*	2 - 4	1 - 2
Cascara*	2 - 5	1 - 2
Catsclaw*	–	1 - 1.5
Ceanothus*	2 - 5	1 - 2
Chamise*	2 - 5	1
Cherry; bitter, black, pin	2 - 3	1 - 1.5
Coyote brush	3 - 4	1.5 - 2
Deerweed	2 - 5	1
Dogwood*	2 - 5	1 - 2
Elderberry	2	1
Elm*	2 - 5	1 - 2
Eucalyptus	–	2
Gorse*	2 - 5	1 - 2
Hasardia*	2 - 4	1 - 2
Hawthorn	2 - 3	1 - 1.5
Hazel	2	1
Hickory*	2 - 5	1 - 2
Honeysuckle	3 - 4	1 - 1.5
Hornbeam, American*	2 - 5	1 - 2
Kudzu	4	2
Locust, black*	2 - 4	1 - 2
Madrone resprouts*	–	2
Manzanita*	2 - 5	1 - 2
Maple, red	2 - 4	1 - 1.5
Maple, sugar	–	1 - 1.5
Monkey flower*	2 - 4	1 - 2

Weed Species	Broadcast Rate (QT/A)	Hand-Held Spray-to-Wet % Solution
Oak; black, white*	2 - 4	1 - 2
Oak, post	3 - 4	1 - 1.5
Oak; northern, pin	2 - 4	1 - 1.5
Oak, Scrub*	2 - 4	1 - 1.5
Oak; southern red	2 - 3	1 - 1.5
Peppertree, Brazilian (Florida holly)*	2 - 5	1 - 2
Persimmon*	2 - 5	1 - 2
Pine	2 - 5	1 - 2
Poison ivy	4 - 5	2
Poison oak	4 - 5	2
Poplar, yellow*	2 - 5	1 - 2
Redbud, eastern	2 - 5	1 - 2
Rose, multiflora	2	1
Russian olive*	2 - 5	1 - 2
Sage, black	2 - 4	1
Sage, white*	2 - 4	1 - 2
Sage brush, California	2 - 4	1
Salmonberry	2	1
Saltcedar*	2 - 5	1 - 2
Sassafras*	2 - 5	1 - 2
Sourwood*	2 - 5	1 - 2
Sumac, laurel, poison, smooth, sugarbush, winged*	2 - 4	1 - 2
Sweetgum	2 - 3	1 - 1.5
Swordfern*	2 - 5	1 - 2
Tallowtree, Chinese	–	1
Tan oak resprouts*	–	2
Thimbleberry	2	1
Tobacco, tree*	2 - 4	1 - 2
Toyon*	–	2
Trumpetcreeper	2 - 3	1 - 1.5
Vine maple*	2 - 5	1 - 2
Virginia creeper	2 - 5	1 - 2
Waxmyrtle, southern*	2 - 5	1 - 2
Willow	3	1
Yerba Santa*	–	2

*Partial control

10.0 LIMIT OF WARRANTY AND LIABILITY

Monsanto Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

To the fullest extent permitted by law, buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

This Company does not warrant any product reformulated or repackaged from this product except in accordance with this Company's stewardship requirements and with express written permission from this Company.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

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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

BASF
The Chemical Company

FIRST AID

If inhaled	• 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. • Call a poison control center or doctor for further treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. • Call a poison control center for treatment advice.

HOTLINE NUMBER

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 wash-waters 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 sulfonyl-urea, imidazolinone, triazine, substituted urea, dinitroanaline, 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. Depending 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® 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™ boom, or THRU-VALVE™ 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 prairegrasses 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).

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 prairegrasses 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® 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® ROUNDUP® PRO, glyphosate, ARSENAL® herbicide, SAHARA® DG herbicide, diuron, CAMPAIGN®, FINALE®, GARLON™ 3A, MSMA, VANQUISH®, OUST®, ESCORT™®, TORDON®, 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.

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 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® herbicide** 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.

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	12	12	18	26	40
5-8	12	14	22	30	44
9-12	12	18	24	36	48
Rotational Crops	Bahiagrass CLEARFIELD® corn hybrids Peanuts Rye Wheat	Snapbeans Southern peas Soybeans Tobacco	Barley Cotton[1] Grain sorghum Oats	Field corn[2] All crops not otherwise listed or included for use on this label[2]	Canola[2] Potatoes[2] Red table beets[2] Sugar beets[2]

[1] **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.

[2] 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 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 3 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 8 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 bromegrass, "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 bromegrass and wheatgrass with **Plateau** may result in foliar height and seedhead suppression.

Smooth Bromegrass 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 bromegrass 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 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 dilimenene 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 4 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 8 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 course 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 supression 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® herbicide 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** 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® ROUNDUP® PRC, or glyphosate. Fall applications of **Plateau** at 8 to 12 oz/A plus 24 to 64 oz/A ACCORD® or ROUNDUP® PRC 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 a ACCORD® or ROUNDUP® PRC 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[1]

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

[1] See individual grass sections for application timing.

[2] High rates may result in stunting and growth suppression.

[3] **Plateau** preemergence applications to newly seeded sideoats, blue grama and Eastern gamagrass may result in thinning or loss of stand.

[4] Some bluegrass varieties are sensitive to **Plateau**. Drought can delay recovery and may result in overgrazing of treated area.

[5] Tolerance unknown

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

Grass Species[1]	Tolerant	Suppressed[2]	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, sideoats	X	X		
Indiangrass	X			
Medusaneac			X	
Needleandthread	X			
Needlegrass, green	X			
Orchardgrass		X		
Prairie cordgrass		X		
Prairie dropseed				X
Praire sandreed	X			
Praire threeawn	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		

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

[2] 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** 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

Seedling Wildflower and Legume Tolerance to Plateau (4 oz/A)[1] in Mixed Grass/Forb Stands.

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

Seedling Wildflower and Legume Tolerance to Plateau® herbicide (4 oz/A)[1] in Mixed Grass/Forb Stands. (CONT):

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

[1] For legumes, at least three true leaves should be present before a postemergence application.

Established Wildflower and Legume Tolerance to Plateau (maximum rate[1], oz/A) in Mixed Grass/Forb Stands.

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

[1] Height suppression or stand reduction may occur at maximum use rate. For legumes, some yellowing and stunting can occur at higher use rates.

[2] Postemergence application should be made early post on the flowers to reduce injury and increase flower set.

[3] Will not flower.

[4] Most native rangeland lupines are tolerant to **Plateau** at 12 oz/A postemergence.

Wildflower Establishment with Plateau 4 oz/A + PENDULUM herbicide 2 lbs a.i./A[1]

Common Name	Genus Species	PRE[2]	POST[3]
Blackeyed Susan	*Rudbeckia hirta*	Yes	Yes
Blanketflower	*Gaillardia pulchella*	No	Yes
Bundleflower, Illinois	*Desmanthus illinoensis*	>50% thinning	Yes
Clover, Crimson	*Trifolium incarnatum*	>50% thinning	Yes
Coneflower, Clasping	*Dracopsis amplexicaulis*	Yes	Yes
Coneflower, Upright Prairie	*Ratibida columnifera*	Nc	OK
Coneflower, Purple	*Echinacea purpurea*	Yes	Yes
Coreopsis, Dwarf Red Plains	*Coreopsis tinctoria* var. Gay Feather	OK stunting	OK stunting
Coreopsis, Plains	*Coreopsis tinctoria*	OK stunting	Yes
Coreopsis, Lance Leaved	*Coreopsis lanceolata*	25% thinning	Yes
Cornflower	*Centaurea cyanus*	Nc	OK 20% thinning
Cosmos, Garden	*Cosmos bipinnatus*	OK 10% thinning	OK stunting
Cosmos, Yellow	*Cosmos sulphureus*	Yes	Yes
Daisy, Ox-eye	*Chrysanthemum leucanthemum*	25% thinning	Yes
Daisy, Shasta	*Chrysanthemum maximum*	marginal-OK 20% thinning	Yes
Lupine, Perennial	*Lupinus perennis*	Yes	≤50% thinning
Partridgepea	*Cassia fasciculata*	25% thinning	Yes
Poppy, California	*Eschscholzia californica*	Yes	25% injury stunting, thinning
Yarrow, Gold	*Achillea filipendulina*	OK thinning	OK

[1] 2 lbs ai/A = 2.4 qts of PENDULUM herbicide 3.3 EC or 3.3 lbs of PENDULUM herbicide WDG

[2] Preemergence at planting

[3] 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® herbicide** 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 16 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 to12 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 8 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 (OUS™®) with the ALS/AHAS enzyme inhibiting mode of action. If naturally occurring ALS/AHAS resistant biotypes are present in an area, **Plateau** 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® herbicide, ROUNDUP® PRO, ESCORT®, KARMEX®, 2,4-D, diuron, ENDURANCE® 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® herbicide, SAHARA® DG herbicide, KROVAR®, OUS™®, TORDON®, VANQUISH® 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 or 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® herbicide at 12 oz per Acre[1]

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

Brush and Tree Species Tolerance to Plateau at 12 oz per Acre[1] (CONT):

Common Name	Genus Species	Tolerance by Application Method[2] Directed Below Foliage	To Foliage
Sagebrush, Fringed	*Artemisia frigida*	Yes	Yes
Saltcedar	*Tamarix* spp.	Yes	No
Serviceberry	*Amelanchier ainifolia*	Yes	NR
Snowberry, Western	*Symphoricarpos occidentalis*	Yes	Injury[5]
Spruce species	*Picea* spp.	Yes[4]	Yes[4]
Sugarberry	*Celtis laevigata*	Yes	Yes
Sweetgum	*Liquidambar styraciflua*	Yes	Yes[6]
Sycamore	*Plantanus occidentalis*	Yes	No
Tree-of-Heaven	*Allanthus altissima*	Yes	Yes
Walnut, American Black	*Jugians nigra*	Yes	No
Willow	*Salix* spp.	Yes	Injury[5]

[1] Not intended for nursery, orchard, ornamental plantings, new plantings or seedling trees.

[2] Yes = Tolerant

No = Not Tolerant, Severe injury or death

NR = Not Recommended due to insufficient tolerance data

[3] Not for use on ornamental or fruit bearing trees.

[4] Applications made just before or during candling may cause candle injury or death.

[5] 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.

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

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

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
GRASS WEEDS				
Brome, Downy	*Bromus tectorum*	C	—	WA
Cheat	*Bromus secalinus*	C	—	WA
Crabgrass				
Large (Hairy)	*Digitaria sanguinalis*	C	4	SA
Smooth	*Digitaria ischaemum*	C	4	SA
Foxtail,				
Giant	*Setaria faberi*	C	6	SA
Green	*Setaria viridis*	C	4	SA
Yellow	*Setaria glauca*	C	4	SA
Goatgrass, Jointed	*Aegilops cylindrica*	C	C	WA
Goosegrass	*Eleusine indica*	S	2	SA
Johnsongrass (Seedling)	*Sorghum halepense*	C	12	SA
Medusahead	*Taeniatherum caput-medusae*	C	2	WA
Panicum, Fall	*Panicum dichotomiflorum*	S	6	SA
Sandbur	*Cenchrus* sp.	S	C	A/P
Shattercane	*Sorghum bicolor*	C	12	SA
Signalgrass, Broadleaf	*Brachiaria platyphylla*	C	C	SA
Stiltgrass, Japanese	*Microstegium vimineum*	C	4	A
Vaseygrass	*Paspalum urvillei*	—	8	P
SEDGES				
Nutsedge				
Yellow	*Cyperus esculentus*	S	4S	P
Purple	*Cyperus rotundus*	S	4S	P
Sedge	*Juncus* sp.	S	4S	A/P

[1] C = control, S = suppression in northern United States only

[2] Maximum plant height in inches at time of application

[3] 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[1]	POST[2]	Annual/ Biennial/ Perennial[3]
BROADLEAVES				
Anoda, Spurred	*Anoda cristata*	C	6	SA
Baby's Breath[5]	*Gypsophila paniculata*	—	C	P
Bedstraw, Catchweed	*Galium aparine*	C	C	WA
Bedstraw, Marsh	*Galium* spp.	C	C	WA
Beggarweed, Florida	*Desmodium tortuosum*	C	6	SA
Bindweed, Field	*Convolvulus arvensis*	—	C	P
Buffalobur	*Solanum rostratum*	—	C	SA
Burclover	*Medicago* sp.	—	4	SA
Chickweed, Common	*Stellaria media*	C	6	SA
Cocklebur, Common	*Xanthium strumarium*	C	6	SA
Cornsalad, Common	*Valerianella locusta*	—	C	WA
Crownbeard, Golden	*Verbisina encelioides*	C	2	SA
Dandelion	*Taraxacum officinale*	—	C	P
Dock, Curly	*Rumex crispus*	C	6	B
Fiddleneck	*Amsinckia* sp.	—	C	SA
Flax, Spurge	*Thymelaea passerina*	C	C	A
Fleabane, Annual	*Erigeron annuus*	—	C	A
Geranium, Carolina	*Geranium carolinianum*	—	C	WA/B
Geranium, Cranesbill	*Geranium maculatum*	C	C	WA/B
Ground Cherry	*Physalis heterophylla*	—	C	P
Hemlock, Poison	*Conium maculatum*	C	6	B
Henbit	*Lamium amplexicaule*	C	3	WA/B

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

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
BROADLEAVES				
Houndstongue, Bristly	*Cynoglossum officinale*	C	C	B
Indigo, Hairy	*Indigofera hirsuta*	C	2	P
Jimsonweed	*Datura stramonium*	C	6	SA
Knapweed, Russian[6]	*Centaurea repens*	—	C*	P
Knotweed, Prostrate	*Polygonum aviculare*	C	C	SA
Kochia*	*Kochia scoparia*	C	3	SA
Lambsquarters, Common	*Chenopodium album*	C	3	SA
Morningglory				
Cypressvine	*Ipomoea quamoclit*	C	6	SA
Entireleaf	*Ipomoea hederacea*	C	6	SA
Ivyleaf	*Ipomoea hederacea*	C	6	SA
Pitted	*Ipomoea lacunosa*	C	6	SA
Smallflower	*Jacquemontia tamnifolia*	C	6	SA
Tall	*Ipomoea purpurea*	C	6	SA
Mustard, Wild	*Brassica kaber*	C	C	WA
Onion, Wild	*Allium canadense*	C	C	P
Pepperweed, Perennial	*Lepidium latifolium*	—	C	P
Pigweed[4]	*Amaranthus* sp.	C	6	SA
Plantain, Narrowleaf	*Plantago lanceolata*	C	C	B
Poinsettia, Wild	*Euphorbia heterophylla*	C	6	SA
Puncture Vine	*Tribulus terrestris*	—	C	SA
Purslane, Common	*Portulaca oleracea*	C	4	SA
Pusley, Florida	*Richardia scapra*	C	4	SA
Queen Anne's Lace	*Daucus carota*	C	C	B
Ragweed				
Common	*Ambrosia artemisiifolia*	C	3	SA
Giant	*Ammbrosia trifida*	S	6	SA
Western	*Ambrosia psilostachya*	—	C	A/P
Rocket, Yellow	*Barbarea vulgaris*	C	C	WA
Senna, Coffee	*Cassia occidentalis*	C	4	SA
Sicklepod	*Senna obtusifolia*	C	6	SA
Sida, Prickly	*Sida spinosa*	C	6	SA
Smartweed				
Ladysthumb	*Polygonum persicaria*	C	C	SA
Pennsylvania	*Polygonum pensylvanicum*	C	C	SA
Swamp	*Polygonum coccineum*	C	C	SA
Spurge				
Leafy	*Euphorbia esula*	—	FALL*	P
Spotted	*Euphorbia maculata*	C	4	SA
Toothed	*Euphorbia dentata*	C	4	SA
Starbur, Bristly	*Acanthospermum hispidum*	—	6	SA
Sunflower	*Helianthus annuus*	—	18	SA
Tansymustard	*Descurainia pinnata*	C	C	WA
Teasel, Common	*Dipsacus fullonum*	—	C	B
Thistle				
Bull	*Cirsium vulgare*	S	C	WA/B
Musk	*Carduus nutans*	S	C	B
Platt	*Cirsium canescens*	S	C	P
Russian*	*Salsola iberica*	C	3	A
Toadflax, Dalmatian	*Linaria dalmatica*	—	C*	P
Velvetleaf	*Abutilon theophrasti*	C	C	A
Vervain, Blue	*Verbena hastata*	—	S	WA
Vervain, prostrate	*Verbena bracteata*	—	C	P
Whitetop	*Cardaria* spp.	—	C	P
Willowherb	*Epilobium* spp.	—	C	P
Woodsorrel, Yellow	*Oxalis stricta*	C	C	P

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

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

[1] C = control, S = suppression

[2] Maximum plant height in inches at time of application

[3] Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial P=Perennial

[4] Some species are tolerant and resistant biotypes are possible.

[5] For annual control. The addition of 1-2 pints of 2,4-D will aid in burndown.

[6] For best control apply in the fall.

*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 0408

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.

000241-00365.20080731.**NVA 2008-04-126-0220**
Supplemental: NVA 2006-04-126-0318
Supersedes: NVA 2006-04-126-0287
Based on: NVA 2008-04-126-0219

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF
The Chemical Company

Specimen Label

Dow AgroSciences

Garlon® 4

Specialty Herbicide

®Trademark of Dow AgroSciences LLC

For the control of woody plants and annual and perennial broadleaf weeds in non-crop industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, forests and in the establishment and maintenance of wildlife openings. Use on these sites may include application to grazed areas.

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2- pyridinyloxyacetic acid, butoxyethyl ester	61.6%
Other Ingredients	38.4%
Total	100.0%

Contains petroleum distillates
Acid equivalent: triclopyr - 44.3% - 4 lb/gal

EPA Reg. No. 62719-40

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.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Causes Moderate Eye Irritation • Harmful If Swallowed • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reactions In Some Individuals

Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.

Personal Protective Equipment (PPE)

Applicators and other handlers who handle this pesticide must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks

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

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS (40 CFR 170.240(d)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

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

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If swallowed: Immediately call a poison control center or doctor. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give **any** liquid to the person. Do not give anything by mouth to an unconscious person.

Note to Physician: This product may pose an aspiration pneumonia hazard. Contains petroleum distillates.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

This pesticide is toxic to fish. 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 washwater or rinsate.

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

Physical or Chemical Hazards

Combustible. Do not use or store the product near heat or open flame.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies elsewhere on this label If terms are unacceptable, return at once unopened.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

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.

Agricultural Use Requirements

The requirements in this box apply to forestry uses.

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
- Shoes plus socks
- Protective eyewear

Non-Agricultural Use Requirements

The requirements in this box apply to all use sites on this label except for forestry uses.

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard 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.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.
Pesticide Storage: Store above 28°F or agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Storage and Disposal (Cont.)

Nonrefillable containers 5 gallons or less:
Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** 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. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a 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.

Refillable containers 5 gallons or larger:
Container Reuse: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

Nonrefillable containers 5 gallons or larger:
Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** 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 a 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.

General Information

Use Garlon® 4 specialty herbicide for the control of woody plants and annual and perennial broadleaf weeds in non-crop industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, forests and in the establishment and maintenance of wildlife openings. Use on these sites may include application to grazed areas.

Garlon 4 is an oil soluble, emulsifiable liquid product containing the herbicide triclopyr. Garlon 4 may be applied to woody or herbaceous broadleaf plants as a foliar spray or as a basal bark or cut stump application to woody plants. As a foliar spray, Garlon 4 controls only herbaceous plants that have emerged from the soil or woody plants that are in full leaf at the time of application. Small amounts of Garlon 4 can kill or injure many broadleaf plants. To prevent damage to crops and other desirable plants, follow all directions and precautions.

General Use Precautions and Restrictions

In Arizona: The state of Arizona has not approved Garlon 4 for use on plants grown for commercial production; specifically forests grown for commercial timber production, or on designated grazing areas.

When applying this product in tank mix combination, follow all applicable use directions, precautions, and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Apply no more than 1/2 gallon of Garlon 4 (2 lb ae of triclopyr) per acre per growing season on rights-of-way or any area where grazing or harvesting is allowed.

On forestry sites, Garlon 4 may be used at rates up to 6 quarts (6 lb ae of triclopyr) per acre per year.

Garlon 4 may be used at rates up to 8 quarts (8 lb ae of triclopyr) per acre per year on non-crop industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides and railroads, fence rows, non-irrigation ditch banks. Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Do not apply Garlon 4 directly to, or otherwise permit it to come into direct contact with, cotton, grapes, peanuts, soybeans, tobacco, vegetable crops, flowers, citrus, or other desirable broadleaf plants. Do not permit spray mists containing Garlon 4 to drift onto such plants.

It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites where surface water is not present except in isolated pockets due to uneven or unlevel conditions. Do not apply to open water (such as lakes, reservoirs, rivers, streams, creeks, salt water bays, or estuaries).

Do not apply on ditches currently being used to transport irrigation water. Do not apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result.

Do not apply this product using mist blowers unless a drift control additive, high viscosity inverting system, or equivalent is used to control spray drift.

Sprays applied directly to Christmas trees may result in conifer injury. When treating unwanted vegetation in Christmas tree plantations, care should be taken to direct sprays away from conifers.

Garlon 4 is formulated as a low volatile ester. However, the combination of spray contact with impervious surfaces, such as roads and rocks, and increasing ambient air temperatures, may result in an increase in the volatility potential for this herbicide, increasing a risk for off-target injury to sensitive crops such as grapes and tomatoes.

Grazing and Haying Restrictions
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals:** Do not allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- Do not harvest hay for 14 days after application.
- Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoiding Injurious Spray Drift
Make applications only when there is little or no hazard from spray drift. Small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application: Garlon 4 may be aerially applied by fixed wing aircraft or helicopter. For aerial application on rights-of-way or other areas near susceptible crops, apply through a Microfoil† or Thru-Valve boom†, or use an agriculturally labeled drift control additive. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free as mixtures containing agriculturally labeled thickening agents or applications made with the Microfoil or Thru Valve boom. Do not use a thickening agent with the Microfoil or Thru Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

†Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

Spray Drift Management

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.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the following Aerial Drift Reduction Advisory. [This information is advisory in nature and does not supersede mandatory label requirements.]

Aerial Drift Reduction Advisory

Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest 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 produced larger droplets than other orientations and is the recommended practice. Significant deflection from 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.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe 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 aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 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: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud 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 the 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.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Garlon 4 should be used in thickened (high viscosity) spray mixtures using an agriculturally labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. When using a spray thickening or inverting additive, follow all use directions and precautions on the product label. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low. In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine droplet spray. Select nozzles and pressures which provide adequate plant coverage, but minimize the production of fine spray particles.

High Volume Leaf-Stem Treatment: To minimize spray drift, keep sprays no higher than brush tops and keep spray pressures low enough to provide coarse spray droplets. An agriculturally labeled thickening agent may be used to reduce drift.

Mixing Directions

Garlon 4 may be foliarly applied by diluting with water or by preparing an oil-water emulsion. For woody plant control, an oil-water emulsion performs more dependably under a broader range of conditions than a straight water dilution and is recommended for aerial applications.

Oil-Water Mixture Sprays
Prepare a premix of oil, surfactant and Garlon 4 in a separate container using diesel fuel, fuel oil, or kerosene plus an emulsifier such as Sponto 712 or Triton X-100. Use a jar test to check spray mix compatibility before preparing oil-water emulsion sprays in the mixing tank. Do not allow any water or mixtures containing water to get into the premix or Garlon 4 since a thick "invert" (water in oil) emulsion may form that will be difficult to break. Such an emulsion may also be formed if the premix or Garlon 4 is put into the mixing tank before the addition of water. Fill the spray tank about one-half full with water, then slowly add the premix with continuous agitation and complete filling the tank with water. Continue moderate agitation.

Ground Application: Add oil to the spray mix at a rate of 5 to 10% of the total mix, up to a maximum of 1 gallon of oil per acre, using agricultural spray emulsifiers according to mixing instructions below.

Aerial Application: Use oil and water in the spray mixture in a 1:5 ratio (1 part oil to 5 parts water), up to a maximum of 1 gallon of oil per acre according to mixing instructions below.

Oil Mixture Sprays for Basal Treatment
Prepare oil-based spray mixtures using either diesel fuel, No. 1 or No. 2 fuel oil, kerosene or a commercially available basal oil. Substitute other oils or diluents only as recommended by the oil or diluent's manufacturer. When preparing an oil mixture, read and follow the use directions and precautions on the manufacturer's product label. Add Garlon 4 to the required amount of oil in the spray tank or mixing tank and mix thoroughly. If the mixture stands over 4 hours, reagitation is required.

Oil Mixtures of Garlon 4 and Tordon K: Tordon K and Garlon 4 may be used in tank mix combination for basal bark treatment of woody plants. These herbicides are incompatible and will not form a stable mixture when mixed together directly in oil. Make a stable tank mixture for basal bark application by first combining each product with a compatibility agent prior to final mixing in the desired ratio. (See product bulletin for mixing instructions.) Tordon K is not registered for use in the states of California and Florida.

Water Dilutions
For water dilutions, an agricultural surfactant at the manufacturer's recommended rate may be added to the spray mixture to provide improved wetting of foliage. To help minimize spray drift, a drift control and deposition aid cleared for application to growing crops is recommended.

Tank Mixing
Garlon 4 may be applied in tank mix combination with labeled rates of other herbicides provided (1) the tank mix product is labeled for the timing and method of application for the use site to be treated; and (2) tank mixing is not prohibited by the label of the tank mix product. When tank mixing Garlon 4 with other materials, a compatibility test (jar test) using relative proportions of the tank mix ingredients should be conducted prior to mixing ingredients in the spray tank. Use a clear glass quart jar with lid and mix the tank mix ingredients in the required order and their relative proportions. Invert the jar containing the mixture several times and observe the mixture for approximately 1/2 hour. If the mixture balls-up, forms flakes, sludges, jels, oily films or layers, or other precipitates, it is not compatible and the tank mix combination should not be used.

Mixing Order for Tank Mixes: Add one-half of the needed water to the mixing tank and start agitation. Add different materials in the order indicated below, allowing time for complete dispersion and mixing after addition of each product.

1. Water soluble herbicide (if used)
2. Premix of oil, emulsifier, Garlon 4 and other oil-soluble herbicide (if used); see below

Add the remaining water. During the final filling of the tank, add a drift control and deposition aid cleared for application to growing crops (if used), plus an agricultural surfactant (if a water dilution rather than an oil-water emulsion spray is used). Maintain continuous agitation of the spray mixture during mixing, final filling and throughout application to ensure spray uniformity.

Premixing: Prepare a premix of oil, emulsifier (if oil-water emulsion), and Garlon 4 plus other oil-soluble herbicide (if used), e.g., 2,4-D ester. **Note:** Do not allow water or mixtures containing water to get into the premix or Garlon 4 since a thick "invert" (water in oil) emulsion may form that will be difficult to break. Such an emulsion may also be formed if the premix or Garlon 4 is put into the mixing tank before the addition of water.

Tank Mixing Precautions:

- Read carefully and follow all applicable use directions, precautions, and limitations on the respective product labels.
- Do not exceed recommended application rates. If products containing the same active ingredient are tank mixed, do not exceed the maximum allowable active ingredient use rates.
- For direct injection or other spray equipment where the product formulations will be mixed in undiluted form, special care should be taken to ensure tank mix compatibility.
- Always perform a (jar) test to ensure the compatibility of products to be used in tank mixture.

Mixing with Liquid Fertilizer for Broadleaf Weed Control
Garlon 4 may be tank mixed with liquid nitrogen fertilizer and foliarly applied for weed control and fertilization of grass pastures. Use Garlon 4 in accordance with recommendations for grass pastures as given on this label. Apply at rates recommended by supplier or Extension Service Specialist. **Note:** Garlon 4 is not recommended for use with liquid fertilizer on woody plants (brush). Foliage burn caused by liquid fertilizer may reduce herbicide effectiveness on woody plants. Test for mixing compatibility using desired procedure and spray mix proportions in clear glass jar before mixing in spray tank. A compatibility aid such as Unite or Compex may be needed in some situations. **Compatibility is best with straight liquid nitrogen fertilizer solutions. Mixing with N-P-K solutions or suspensions may not be satisfactory even with the addition of compatibility aid.** Premixing Garlon 4 with 1 to 4 parts water may help in difficult situations.

Fill in the spray tank about half full with the liquid fertilizer, then add the herbicide with agitation and complete filling the tank with fertilizer. Apply immediately and continue agitation in the spray tank during application. **Do not store liquid fertilizer spray mixtures**. Application during very cold weather (near freezing) is not advisable. The likelihood of mixing or compatibility problems with liquid fertilizer increases under cold conditions.

Note: Do not use spray equipment for other applications to land planted, or to be planted, to susceptible crops or desirable plants **unless** it has been determined that all phytotoxic herbicide residue has been removed by thoroughly cleaning the equipment.

Plants Controlled by Garlon 4

Woody Plant Species

alder
arrowwood
ash
aspen
bear clover (bearmat)
beech
birch
blackberry
blackbrush
blackgum
boxelder[1]
Brazilian pepper
buckthorn
cascara
ceanothus
cherry[3]
chinquapin
choke cherry
cottonwood
crataegus (hawthorn)
dogwood
Douglas-fir
elderberry
elm (except winged elm)
gallberry
gorse
granjeno
guajillo
guava[3]
hazel
hickory
hornbeam
huisache (suppression)
kudzu[2]
locust
madrone
maple (except bigleaf, vine[3])
milkweed vine[3]
mulberry
oaks
osage orange
pepper vine[3]
persimmon, eastern
pine
poison ivy
poison oak
poplar
salmonberry
saltbush
(*Braccharis* spp.)[3]
salt cedar[1]
sassafras
scotch broom
sumac
sweetbay magnolia
sweetgum
sycamore
tanoak
thimbleberry
tree-of-heaven
(*Ailanthus*)[1]
trumpet creeper[3]
tulip poplar
twisted acacia
Virginia creeper[3]
wax myrtle (top growth)
wild rose
willow
willow primrose
winged elm

[1]For best control, use either a basal bark or cut stump treatment.
[2]For complete control, re-treatment may be necessary.
[3]Basal or dormant stem applications only.

Annual, Biennial and Perennial Broadleaf Weeds

Note: Numbers in parentheses refer to footnotes below table.

black medic
bull thistle
burdock
Canada thistle
chicory
cinquefoil
clover
creeping beggarweed
curly dock
dandelion (top growth)
dogfennel
field bindweed
goldenrod
ground ivy
lambsquarters
lespedeza
matchweed
mustard
Oxalis
plantain
purple loosestrife
ragweed
sericea lespedeza (1)
smartweed
sulfur cinquefoil (2)
sweet clover
tropical soda apple (3)
vetch
wild carrot
(Queen Anne's lace)
wild lettuce
wild violet
yarrow

1. **Sericea lespedeza:** Apply 1 to 2 pints of Garlon 4 per acre. For best results, apply after maximum foliage development in the late spring to early summer, but prior to bloom.
2. **Sulfur cinquefoil:** Apply 1 to 2 pints of Garlon 4 per acre. For best results, apply to plants in the rosette stage.
3. **Tropical soda apple:** Apply 2 pints of Garlon 4 per acre when tropical soda apple plants reach the first flower stage. For best results, apply in a total spray volume of 40 gallons per acre using ground equipment. An agricultural surfactant may be added at the manufacturer's recommended rate to provide more complete wetting and coverage of the foliage. Spot treatments may be used to control sparse plant stands. For spot treatment use a 1 to 1.5% solution of Garlon 4 in water (1 to 1 1/2 gallons of Garlon 4 in 100 gallons total spray mixture) and spray the entire plant to completely wet the foliage. **In Florida**, control of tropical soda apple may be improved by using the following management practices:

- Mow plants to a height of 3 inches every 50 to 60 days or whenever they reach flowering. Continue the mowing operation through April.
- In late May to June (50 to 60 days after the April mowing), apply Garlon 4 as a broadcast treatment.
- Use spot treatment to control any remaining plants or thin stands of plants that germinate following a broadcast treatment.

Application Methods

Use Garlon 4 at rates of 1 to 8 quarts per acre to control broadleaf weeds and woody plants. It is suggested that rates higher in this rate range be used to control woody plants. In all cases, use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. The order of addition to the spray tank is water, spray thickening agent (if used), surfactant (if used), additional herbicide (if used), and Garlon 4. If a standard agricultural surfactant is used, use at a rate of 1 to 2 quarts per acre. Use continuous adequate agitation.

Before using any recommended tank mixtures, read the directions and all precautions on both labels.

For best results apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, elm, maples (other than vine or big leaf), oaks, pines, or winged elm are prevalent, during applications made during late summer when the plants are mature, or during drought conditions, use the higher rates of Garlon 4 alone or in combination with Tordon® 101 Mixture specialty herbicide or Tordon K herbicide. Tordon 101 Mixture and Tordon K are restricted use pesticides. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

When using Garlon 4 in combination with 2,4-D low volatile ester herbicide, generally the higher rates of Garlon 4 should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

On sites where easy to control brush species dominate, rates less than those listed may be effective. Consult state or local extension personnel for such information.

Foliage Treatment With Ground Equipment

Use sufficient spray volume to completely and uniformly cover foliage. For ground application, apply 10 gallons or more of total spray volume per acre. Use higher spray volumes for ground applications to ensure adequate coverage with increased depth and density of foliage, particularly for treatment of woody plants.

High Volume Foliage Treatment

For control of woody plants, use Garlon 4 at the rate of 2 to 6 quarts per 100 gallons of spray mixture, or Garlon 4 at 2 to 4 quarts may be tank mixed with labeled rates of 2,4-D low volatile ester herbicide, Tordon 101 Mixture, or Tordon K and diluted to make 100 gallons of spray. Do not apply more than 2 gallons of Garlon 4 per acre. On rangeland and permanent pasture sites, make 1 application per year and apply no more than 2 quarts of Garlon 4 (2 lb ae of triclopyr) per acre. Apply at a volume of 100 to 400 gallons of total spray per acre depending upon size and density of woody plants. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida. When tank mixing, follow applicable use directions and precautions on each manufacturer's label.

Depending upon the size and density of the woody plants, apply sufficient spray volume to thoroughly wet all leaves, stems, and root collars. To minimize spray drift, select the minimum spray pressure that provides adequate plant coverage without forming a mist and direct sprays no higher than the top of the target plants. Use a drift control additive cleared for application to growing crops to reduce spray drift. Before using any tank mixture, read the directions and use precautions on both labels. For best results, apply when woody plants and weeds are actively growing.

Table 1: The following table is provided as a guide to the user to achieve the proper rate of Garlon 4.

Total Spray Volume (gallons/acre)	Rate of Garlon 4	
	Forestry Sites (qt/100 gallons of spray)[1]	Non-Cropland Sites (qt/100 gallons of spray)[2]
400	1.5	2
300	2	2.7
200	3	4
100	6	8
50	12	16
40	15	20
30	20	26.7
20	30	40
10	60	80

[1]Do not exceed the maximum use rate of 6 qt of Garlon 4 (6 lb ae of triclopyr) per acre per year.

[2]Do not exceed the maximum use rate of 8 qt of Garlon 4 (8 lb ae of triclopyr) per acre per year for non-grazable areas, or 2 qt (2 lb ae of triclopyr) per acre per year for grazed areas, except on portions of grazed areas that meet the following requirement. Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Table 2

Application Rates per 100 Gallons of Spray		
Garlon 4	**Plus Tank Mix Product**	**Rate (qt)**
1 - 4 qt	--	--
1 - 2 qt	Grazon® P+D specialty herbicide	4
1 - 2 pt	2,4-D low volatile ester herbicide	1 - 2
1 - 2 qt	Tordon 22K	1 - 2
2 qt	Reclaim® specialty herbicide [1,2]	2

[1] Reclaim is registered for use only in Arizona, Texas, Oklahoma and New Mexico.
[2] See directions for Mesquite Control Using High Volume Foliage Treatment below.

Mesquite Control Using High Volume Foliage Treatment: For control of mesquite infestations of low to moderate density, apply Garlon 4 and Reclaim in a tank mixture to individual plants with backpack or hand-held sprayers or a vehicle-mounted sprayer with hand-held spray wand or spray gun. For individual plant treatment, use 2 quarts of Garlon 4 in combination with 2 quarts of Reclaim per 100 gallons of total spray solution (1/2% v/v of each product). Apply in water or as an oil-water emulsion as described in Mixing Directions. If using an oil-water emulsion, add the oil at a rate of 5% of the total spray volume. Apply as a complete spray-to-wet foliar application, including all leaves. Thorough coverage is necessary for good results, but do not spray to the point of runoff. Do not apply when mesquite foliage is wet. The total amount of Garlon 4 applied should not exceed 1 1/3 pints per acre. For best results, follow information given elsewhere in this label concerning effect of environmental conditions and application timing on control. This application method works best for brush less than 8 feet tall since efficient treatment and thorough coverage of taller brush is difficult to achieve with this method. To minimize drift, select a spray nozzle and pressure that provides good coverage while forming a coarse spray. Additionally, drift may be reduced by using the minimum pressure necessary to obtain plant coverage without forming a mist and by directing sprays no higher than the top of target plants. If desired, a spray dye may be added to the spray mixture to mark the treated plants.

Low Volume Foliage Treatment

To control susceptible woody plants, mix up to 20 quarts of Garlon 4 in 10 to 100 gallons of finished spray. The spray concentration of Garlon 4 and total spray volume per acre should be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see General Use Precautions and Restrictions). For best results, a surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Tank Mixing: As a low volume foliage spray, up to 12 quarts of Garlon 4 may be applied in tank mix combination with labeled rates of Tordon K or Tordon 101 Mixture in 10 to 100 gallons of finished spray. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Broadcast Applications With Aerial or Ground Equipment

Environmental conditions and application timing influence brush and weed control results. For best results, apply when woody plants and weeds are actively growing. For woody species, apply after the rapid growth period of early spring when leaf tissue is fully expanded and terminal growth has slowed. Brush regrowth should be at least 4 ft high prior to treatment to insure adequate foliage for herbicide absorption. Adequate soil moisture before and after treatment as well as the presence of healthy foliage at the time of application are important factors contributing to optimal herbicidal activity.

Use sufficient spray volume to completely and uniformly cover foliage. For ground application, apply 10 gallons or more of total spray volume per acre. For aerial application, apply at least 2 gallons of total spray volume per acre. Use higher spray volumes for ground or aerial applications to ensure adequate coverage with increased depth and density of foliage, particularly for treatment of woody plants.

Mesquite: The herbicidal response of mesquite is strongly influenced by foliage condition, growth stage and environmental conditions. For best results, apply when new growth foliage has turned from light to dark green, when the soil temperature is above 75°F at a depth of 12 to 18 inches, and soil moisture is adequate for plant growth. Apply within 60 days after the 75ºF minimum soil temperature at the 12- to 18-inch depth has been reached. Product performance may be adversely affected if application is made before mesquite foliage has turned from light to dark green or if foliage has been injured or removed by late frost, insects, hail or plant diseases. Do not treat if mesquite exhibits new (light green) terminal growth in response to recent heavy rainfall during the growing season. Rate of soil warm-up at the 12- to 18-inch depth may vary with soil texture and drainage. Coarse-textured (sandy) soils warm up sooner than fine-textured (clay) soils and dry soils warm up more quickly than wet soils. Mesquite regrowth should be at least 4 ft high prior to treatment to insure adequate foliage for herbicide absorption.

Mesquite Only

Apply 1/2 to 1 pint of Garlon 4 per acre in combination with 2/3 to 1 1/3 pint per acre of Reclaim. See label for Reclaim for additional treatment recommendations and information on mesquite control. Apply aerially as an oil:water emulsion in 4 gallons or more total volume per acre or with ground equipment in 10 gallons or more total volume per acre. Use a maximum of 1 gallon of oil per acre for aerial or ground application.

Mesquite and Pricklypear Cactus

If pricklypear cactus is a target species in association with mesquite, apply a tank mix of 1/2 to 1 pint of Garlon 4 with 1 to 2 pints of Tordon 22K per acre. (The 2 pint per acre rate of Tordon 22K provides a higher and more uniform plant kill of pricklypear.) Tordon 22K may also be applied in combination with Reclaim to control pricklypear while providing improved control of mesquite. See labels for Tordon 22K and Reclaim for additional information and treatment recommendations. Apply aerially as an oil:water emulsion in 4 gallons or more total volume per acre or with ground equipment in 10 or gallons or more total volume per acre. If mesquite canopy is dense, use higher spray volumes. Use a maximum of 1 gallon of oil per acre for aerial or ground application.

South Texas Mixed Brush (Mesquite, Pricklypear Cactus, Blackbrush, Twisted Acacia and Granjeno)

Use 1 to 2 pints of Garlon 4 in a tank mix with 2 pints of Tordon 22K per acre if pricklypear is a problem, or with 2/3 to 1 1/3 pints of Reclaim per acre if mesquite is the prevalent species. Garlon 4 contributes to the control of non-legume species such as granjeno and oaks. However, if woody legume species are predominate, apply 2 pints of Tordon 22K per acre in combination with 2/3 to 1 1/3 pints of Reclaim per acre for improved control. See labels for Tordon 22K and Reclaim for additional information and treatment recommendations. Apply aerially in an oil:water emulsion in 4 gallons or more total volume per acre or with ground equipment in 15 gallons or more total volume per acre. Use a maximum of 1 gallon of oil per acre for aerial or ground application. The use of an oil:water emulsion is critical and good spray coverage is essential for acceptable brush control.

Sand Shinnery Oak Suppression

In Texas, New Mexico and Oklahoma, apply Garlon 4 alone at a rate of 1/2 to 2 pints per acre for suppression of shinnery oak growing on sandy soils. Grass response following suppression may be impressive where rainfall is adequate. Grazing deferment following application together with proper grazing management is recommended to allow for the reestablishment of grass stands.

Post Oak and Blackjack Oak - Regrowth Stands

Apply in the late spring (May) to early summer (June-July) when oak leaves are fully developed (expanded). Use 2 quarts of Garlon 4 alone or in tank mix combination with 0.5 to 1 pints of 2,4-D low-volatile ester herbicide per acre. Apply in an oil:water emulsion or water surfactant dilution in sufficient total volume per acre to assure thorough coverage, usually 5 gallons or more per acre by fixed-wing aircraft or helicopter or 15 to 25 gallons per acre by ground equipment. Use a maximum of 1 gallon of oil per acre for aerial or ground application. Lower rates may be used for suppression only. Control will require at least 3 consecutive treatments. **Note:** Regrowth plants have a large root mass relative to top growth when compared to undisturbed plants. In order for top growth to intercept and translocate enough herbicide to control the roots, delay broadcast treatment until top growth is at least 4 ft tall.

High Volume Foliage Treatment: For regrowth less than 4 ft tall, apply 2 quarts of Garlon 4 per 100 gallons of water and 2 quarts of ag surfactant alone or in tank mix combination with 1 gallon of Grazon P+D or 1 quart of Tordon 22K. Apply as a high volume leaf-stem treatment to individual plants using ground equipment.

Post Oak and Blackjack Oak - Mature Stands

For control of mature stands (greater than 5 ft tall), apply 2 quarts of Garlon 4 per acre in late spring (May) to early summer (June-July) when oak leaves are fully developed (expanded). Understory species such as winged elm, buckbrush, tree huckleberry and ash occurring in some areas will not be controlled (only suppressed or defoliated) by using Garlon 4 alone. Where these understory species occur, control may be improved by tank mixing 2 quarts of Garlon 4 with 1 quart of Tordon 22K or 4 quarts of Grazon P+D per acre. For best results, apply as an oil:water emulsion in a total volume of 5 gallons per acre or more by fixed-wing aircraft or helicopter.

Other Susceptible Woody Plants

Apply 2 to 4 pints of Garlon 4 alone or in combination with 2 to 3 quarts of 3.8 lb/gal 2,4-D low volatile ester or amine formulation per acre. If difficult to control species such as ash, choke cherry, elm, maple or oaks are prevalent, and during applications made when plants are mature late in the summer or during drought conditions, use the higher rates of Garlon 4, alone or with 2,4-D. Garlon 4 may also be applied in a tank mixture with Grazon P+D or Tordon 22K for increased control of certain species. See labels for Grazon P+D and Tordon 22K for additional information and treatment recommendations. Apply aerially in 4 gallons or more total volume per acre or with ground equipment in 10 gallons or more total volume per acre. For best results on blackberry, apply during or after bloom. For management of kudzu, apply 1 quart of Garlon 4 per acre. Repeat application may be necessary to achieve desired level of control.

Susceptible Broadleaf Weeds

Use 2 pints of Garlon 4 per acre in a water spray. Apply as a broadcast spray in a total volume of 10 gallons or more per acre by ground equipment or aerially in a total volume of 2 gallons or more per acre. Apply anytime the weeds are actively growing. Garlon 4 at 1/2 to 3 pints may be tank mixed with 1 to 2 quarts of 3.8 lb/gal 2,4-D amine or low volatile ester.

Woody Plant Control

Foliage Treatment: Use 4 to 8 quarts of Garlon 4 in enough water to make 5 gallons or more per acre of total spray, or 1 1/2 to 3 quarts of Garlon 4 may be combined with labeled rates of 2,4-D low volatile ester, Tordon 101 Mixture, or Tordon K in sufficient water to make 5 gallons or more per acre of total spray. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Broadleaf Weed Control

Use Garlon 4 at rates of 1 to 4 quarts in a total volume of 5 gallons or more per acre as a water spray mixture. Apply anytime weeds are actively growing. Garlon 4 at 0.25 to 3 quarts may be tank mixed with labeled rates of 2,4-D amine or low volatile ester, Tordon K, or Tordon 101 Mixture to improve the spectrum of activity. For thickened (high viscosity) spray mixtures, Garlon 4 can be mixed with diesel oil or other inverting agent. When using an inverting agent, read and follow the use directions and precautions on the product label. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Foliage Treatment (Utility and Pipeline Rights-of-Way)

Use 4 to 8 quarts of Garlon 4 alone, or 3 to 4 quarts of Garlon 4 in a tank mix combination with labeled rates of 2,4-D low volatile ester, Tordon 101 Mixture or Tordon K and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Basal Bark, Dormant Stem and Cut Surface Treatments

Individual plant treatments such as basal bark and cut surface applications may be used on any use site listed on this label at a maximum use rate of 8 lb ae of triclopyr per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2 lb ae of triclopyr per acre.

Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 1 to 5 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with knapsack sprayer or power spraying equipment using low pressure (20 to 40 psi). Spray the basal parts of brush and tree trunks to a height of 12 to 15 inches from the ground, thoroughly wetting the indicated area. Spray until runoff at the ground line is noticeable. Old or rough bark requires more spray than smooth young bark. Apply anytime, including the winter months, except when snow or water prevent spraying to the ground line. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Low Volume Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Spray the basal parts of brush and tree trunks to a height of 12 to 15 inches from the ground in a manner that thoroughly wets the lower stems, including the root collar area, but not to the point of runoff. Herbicide concentration should vary with size and susceptibility of species treated. Apply anytime, including the winter months, except when snow or water prevent spraying to the ground line or when stem surfaces are saturated with water. See Table 1 for relationship between mixing rate, spray volume and maximum application rate. **Note:** The addition of a soil active herbicide to a basal bark mixture with Garlon 4 may result in damage to surrounding non-target vegetation. Care should be taken to assess the areas in which these soil active herbicides are used in combination with Garlon 4 in basal bark applications. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Garlon 4 Plus Tordon K in Oil Tank Mix: Garlon 4 and Tordon K may be used in tank mix combination as a low volume basal bark treatment to improve control of certain woody species such as ash, elm, maple, poplar, aspen, hackberry, oak, oceanspray, birch, hickory, pine, tanoak, cherry, locust, sassafras, and multiflora rose. (See product bulletin for mixing instructions.) Tordon K is not registered for use in the states of California and Florida.

Streamline Basal Bark Treatment (Southern States)

To control or suppress susceptible woody plants for conifer release, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Streamline basal bark treatments are most effective on stems less than 4 inches in basal diameter. Apply with a backpack or knapsack sprayer using equipment that provides a directed straight stream spray. Apply the spray in a 2- to 3-inch wide band to one side of stems less than 3 inches in basal diameter. When the optimum amount of spray mixture is applied, the treated zone should widen to encircle the stem within approximately 30 minutes. Treat both sides of stems which are 3 to 4 inches in basal diameter. Direct the spray at bark that is approximately 12 to 24 inches above ground. Pines (loblolly, slash, shortleaf, and Virginia) up to 2 inches in diameter breast height (dbh) can be controlled by directing the spray at a point approximately 4 feet above ground. Vary spray mixture concentration with size and susceptibility of the species being treated. Better control is achieved when spray is applied to thin juvenile bark and above rough thickened mature bark. This technique is not recommended for scrub and live oak species, including blackjack, turkey, post, live, bluejack and laurel oaks, or bigleaf maple. Apply anytime, including winter months, except when snow or water prevents spraying at the desired height above ground level. **Note:** Best results with some hardwood species occur when applications are made from approximately 6 weeks prior to leaf expansion in the spring until approximately 2 months after leaf expansion is completed. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Low Volume Stem Bark Band Treatment (North Central and Lake States)

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Apply the spray in a 6- to 10-inch wide band that completely encircles the stem. Spray in a manner that completely wets the bark, but not to the point of runoff. The treatment band may be positioned at any height up to the first major branch. For best results, apply the band as low as possible. Spray mixture concentration should vary with size and susceptibility of species to be treated. Applications may be made anytime, including winter months. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Thinline Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in diameter, apply Garlon 4, either undiluted or mixed at 50 to 75% v/v with oil, in a thin stream to all sides of the lower stems. The stream should be directed horizontally to apply a narrow band of Garlon 4 around each stem or clump. Use a minimum of 2 to 15 milliliters of Garlon 4 or oil mixture with Garlon 4 to treat single stems and from 25 to 100 milliliters to treat clumps of stems. Use an applicator metered or calibrated to deliver the small amounts required. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Dormant Stem Treatment

Dormant stem treatments control susceptible woody plants and vines with stems less than 2 inches in diameter. Plants with stems greater than 2 inches in diameter may not be controlled and resprouting may occur. This treatment method is best suited for sites with dense, small diameter brush. Dormant stem treatments of Garlon 4 can also be used as a chemical side-trim for controlling lateral branches of larger trees that encroach onto roadside, utility, or other rights-of-way.

Mix 4 to 8 quarts of Garlon 4 in 2 to 3 gallons of crop oil concentrate or other recommended oil and add this mixture in enough water to make 100 gallons of spray solution. Use continuous adequate agitation. Apply with knapsack or power spraying equipment, using low pressure (20 to 40 psi). In western states, apply anytime after woody plants are dormant and most of the foliage has dropped. In other areas apply anytime within 10 weeks of budbreak, generally February through April. Thoroughly wet the upper parts of the stems and use the remainder to wet the lower 12 to 15 inches above the ground to the point of runoff. For root suckering species such as sumac, sassafras and locust, also spray the ground under the plant to cover small root suckers which may not be visible above the soild surface. For oil-water mixture application, mix 6 quarts of Garlon 4, 25 gallons of oil and 1.5 gallons of an approved agricultural spray emulsifier such as Sponto 712 or Triton X-100 as indicated in the mixing directions. Treat as above. Garlon 4 may be mixed with 4 quarts of Weedone 170 herbicide to improve the control of black cherry and broaden the spectrum of herbicidal activity. Do not apply to wet or saturated bark as poor control may result.

Cut Stump Treatment

To control resprouting, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressures and a solid cone or flat fan nozzle. Spray the root collar area, sides of the stump, and the outer portion of the cut surface, including the cambium, until thoroughly wet, but not to the point of runoff. Spray mixture concentration should vary with the size and susceptibility of species treated. Apply anytime, including in winter months, except when snow or water prevent spraying to the ground line. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Cut Stump Treatment in Western States

To control resprouting of salt cedar and other *Tamarix* species, bigleaf maple, tanoak, Oregon myrtle, and other susceptible species, apply undiluted Garlon 4 to wet the cambium and adjacent wood around the entire circumference of the cut stump. Treatments may be applied throughout the year; however, control may be reduced with treatment during periods of moisture stress as in late summer. Cut stumps so that they are approximately level to facilitate uniform coverage of Garlon 4. Use an applicator which can be calibrated to deliver the small amounts of material required.

Growing Point and Leaf Base (Crown) Treatment of Yucca

Prepare a 2% v/v solution of Garlon 4 in diesel or fuel oil (13 fl oz of Garlon 4 in 5 gallons of spray mixture). Thoroughly wet the center of the plant including growing point and leaf bases to the soil surface. Complete coverage of leaves is not necessary.

Forest Management Applications

For broadcast applications, apply 1 to 6 quarts of Garlon 4 per acre in a total spray volume of 5 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. Use spray volumes sufficient to provide thorough coverage of treated foliage. Nozzles or additives that produce larger droplets of spray may require higher spray volumes to provide adequate coverage.

Plant Back Interval for Conifers: Conifers planted sooner than 1 month after treatment with Garlon 4 at less than 4 quarts per acre or sooner than 2 months after treatment at 4 to 6 quarts per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture should be consulted and the longest recommended waiting period before planting observed.

Forest Site Preparation (Not for Conifer Release)

Southern States including Alabama, Arkansas, Delaware, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia: To control susceptible woody plants and broadleaf weeds, apply Garlon 4 at a rate of 4 to 6 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 2 to 4 quarts of Garlon 4 per acre in tank mix combination with labeled rates of Tordon 101 Mixture or Tordon K. Tordon 101 Mixture and Tordon K are not registered for use in the state of Florida. Where grass control is also desired, Garlon 4, alone or in tank mix combination with Tordon K or Tordon 101 Mixture, may be applied with labeled rates of other herbicides registered for grass control in forests. Use of tank mix products must be in accordance with the most restrictive of label limitations and precautions. Do not exceed labeled application rates. Garlon 4 cannot be tank mixed with any product containing a label prohibition against such mixing.

Western, Northeastern, North Central, and Lake States (States not Listed Above as Southern States): To control susceptible woody plants and broadleaf weeds, apply Garlon 4 at a rate of 3 to 6 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 1.5 to 3 quarts of Garlon 4 per acre in tank mix combination with labeled rates of Tordon 101 Mixture, Tordon K, or 2,4-D low volatile ester. Tordon 101 Mixture and Tordon K are not registered for use in the state of California. Where grass control is also desired, Garlon 4, alone or in tank mix combination with Tordon 101 Mixture or Tordon K, may be applied with labeled rates of other herbicides registered for grass control in forests. When applying tank mixes, follow applicable use directions and precautions on each product label.

Southern Coastal Flatwoods: To control susceptible broadleaf weeds and woody species such as gallberry and wax-myrtle, and for partial control of saw-palmetto, apply 2 to 4 quarts of Garlon 4 per acre. To broaden the spectrum of species controlled to include fetterbush, staggerbush, titi, and grasses, apply 2 to 3 quarts of Garlon 4 per acre in tank mix combination with labeled rates of Arsenal Applicator's Concentrate herbicide. Where control of gallberry, wax-myrtle, broadleaf weeds, and grasses is desired, apply 2 to 3 quarts of Garlon 4 per acre in tank mix combination with labeled rates of Accord Concentrate or Accord SP herbicide.

These treatments may be broadcast during site preparation of flat planted or bedded sites or, on bedded sites, applied in bands over the top of beds. For best results, apply in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August. **Note:** Do not apply after planting pines.

Directed Spray Applications for Conifer Release

To release conifers from competing hardwoods and brush such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, hickory, alder, birch, aspen, pin cherry, *Ceanothus* spp., blackberry, chinquapin, and poison oak, mix 4 to 20 quarts of Garlon 4 in enough water to make 100 gallons of spray mixture. This spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent anytime after the hardwoods and brush have reached full leaf size, but before autumn coloration. The majority of treated hardwoods and brush should be less than 6 feet in height to ensure adequate spray coverage. Care should be taken to direct spray away from contact with conifer foliage, particularly foliage of desirable pines. See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Note: Spray may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Broadcast Applications for Mid-Rotation Understory Brush Control in Southern Coastal Flatwoods Pine Stands (Ground Equipment Only)

For control of susceptible species such as gallberry and wax-myrtle and broadleaf weeds, apply 2 to 4 quarts of Garlon 4 per acre. To broaden the spectrum of woody plants controlled to include fetterbush, staggerbush, and titi, apply 2 to 3 quarts of Garlon 4 per acre in tank mix combination with labeled rates of Arsenal Applicator's Concentrate. Saw-palmetto will be partially controlled by use of Garlon 4 at 4 quarts per acre or by mixtures of Garlon 4 at 2 to 3 quarts per acre in tank mix combination with either Arsenal Applicator's Concentrate or Escort herbicide. These mixtures should be broadcast applied over target understory brush species, **but to prevent injury to pines, make applications underneath the foliage of pines.** Apply sprays in 30 gallons or more per acre of total volume. For best results, apply in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August.

Broadcast Applications for Conifer Release in the Pacific Northwest and California

Dormant Conifers Before Bud Swell (Excluding Pines): To control or suppress deciduous hardwoods such as vine maple, bigleaf maple, alder, scotch broom, or willow **before leaf-out**, or evergreen hardwoods such as madrone, chinquapin, and *Ceanothus* spp., use Garlon 4 at 1 to 2 quarts per acre. Use diesel or fuel oil as a diluent, or use water plus 1 to 2 gallons per acre of diesel oil or a suitable surfactant or oil substitute at manufacturer's recommended rates. **Mixing with oil as the only diluent requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Conifer Plantations (Excluding Pines) After Hardwoods Begin Growth and Before Conifer Bud Break ("Early Foliar" Hardwood Stage): Use Garlon 4 at 1 to 1.5 quarts alone or with 2,4-D low volatile ester herbicide in water carrier to provide no more than 3 lb ae per acre from both products. After conifer bud break, these sprays may cause more serious injury to the crop trees. Use of a surfactant may cause unacceptable injury to conifers especially after bud break.

Conifer Plantations (Excluding Pines) After Conifers Harden Off in Late Summer and While Hardwoods are Still Actively Growing: Use Garlon 4 at rates of 1 to 1.5 quarts per acre alone or with 2,4-D low volatile ester to provide no more than 3 lb ae per acre from both products. Treat as soon after conifer bud hardening as possible so that hardwoods and brush are actively growing. Use of oil, oil substitute, or surfactant may cause unacceptable injury to the conifers.

Broadcast Applications for Conifer Release in the Eastern United States

To release spruce, fir, red pine, and white pine from competing hardwoods such as red maple, sugar maple, striped maple, alder, birch (white, yellow, and grey), aspen, ash, pin cherry, and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 4 at rates of 1.5 to 3 quarts per acre alone or with 2,4-D amine or low volatile ester to provide no more than 4 lb ae per acre from both products. Apply in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Conifer Release in the Lake States Region

To release spruce, fir, and red pine from competing hardwoods such as aspen, birch, maple, cherry, willow, oak, hazel, and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 4 at rates of 1.5 to 3 quarts per acre. Apply in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Terms and Conditions of Use

If terms of the following Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitation of Remedies.

Warranty Disclaimer

Dow AgroSciences warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. Dow AgroSciences MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Dow AgroSciences or the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

To the extent permitted by law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at Dow AgroSciences' election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

To the extent permitted by law, Dow AgroSciences shall not be liable for losses or damages resulting from handling or use of this product unless Dow AgroSciences is promptly notified of such loss or damage in writing. To the extent permitted by law, in no case shall Dow AgroSciences be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of Dow AgroSciences or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or this Limitation of Remedies in any manner.

Produced for Dow AgroSciences LLC • Indianapolis, IN 46268 USA

Label Code: D02-102-026
Replaces Label: D02-102-025
LOES Number: 010-00085

EPA accepted 04/18/07

Revisions:

1. Product may be applied by fixed wing aircraft or helicopter.
2. Added mixing directions section.
3. Added blackbrush, granjeno, guajillo, guava, milkweed vine, osage orange, pepper vine, trumpet creeper, twisted acacia, Virginia creeper and willow primrose to list of woody plants controlled.
4. Added biennial broadleaf weeds to list of weeds controlled.
5. Added dormant stem and cut surface treatments.

Dow AgroSciences™

Remedy*

EC Herbicide

GROUP	4	HERBICIDE

For the control of undesirable woody plants and annual and perennial broadleaved weeds on pastures and rangelands

AGRICULTURAL

READ THE LABEL AND BOOKLET BEFORE USING
KEEP OUT OF REACH OF CHILDREN

GUARANTEE. triclopyr 480g acid equivalent/L
(present as butoxyethyl ester)

REGISTRATION NO. 26420 PEST CONTROL PRODUCTS ACT

CAUTION  **POISON**

HARMFUL IF SWALLOWED
MAY CAUSE SKIN IRRITATION
MAY BE HARMFUL IF ABSORBED THROUGH SKIN
POTENTIAL SKIN SENSITIZER

NET CONTENTS: 10 L and 110 L returnable container

Dow AgroSciences Canada Inc.
Suite 2100, 450 - 1 Street S.W.
Calgary, Alberta
T2P 5H1
1-800-667-3852

*Trademark of Dow AgroSciences LLC

PRECAUTIONS
HARMFUL IF SWALLOWED
MAY CAUSE SKIN IRRITATION
MAY BE HARMFUL IF ABSORBED THROUGH SKIN
POTENTIAL SKIN SENSITIZER
KEEP OUT OF REACH OF CHILDREN
Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid breathing vapour or spray mist. Where frequent inhalation of spray mist cannot be avoided, occupational exposure to pesticides can be reduced by use of an air-purifying respirator equipped with organic vapour cartridges. Avoid contact with treated foliage and other contaminated surfaces while wet. When spraying, follow a "walk in, spray out" pattern to avoid contact with treated brush. Take precautions to avoid spray drift. Direct spray outward and away from self. Avoid overhead spraying. Select spray nozzle types and pressures to minimize drift potential.

Practice good personal hygiene. At all times when handling herbicide concentrate or applying the dilute mixture, plan events in such a way as to minimize personal exposure. Locate wash stations with an adequate supply of fresh water on work vehicles. Wash thoroughly with soap and water after handling and before eating or smoking. Bathe or take a hot shower after work using plenty of soap.

To minimize exposure when handling and applying Remedy EC Herbicide:

- Read and follow directions in the Protective Equipment Requirements and Operator Use Precautions sections on the label.
- Applicators should receive training on how to minimize personal exposure while applying high volume stem-foliage applied herbicides, including the "walk in, spray out" technique and on how to minimize contact with treated foliage.
- Applicators should be supervised to ensure that all label directions and proper application techniques are followed.

PROTECTIVE EQUIPMENT REQUIREMENTS
Handling Concentrate
When handling concentrate, wear goggles or faceshield, chemical resistant gloves (nitrile or neoprene), clean coveralls over normal work clothes, impermeable head covering and chemical resistant boots (rubber) during all mixing/loading activities. Remove clothing contaminated with concentrate promptly and wash before reuse. Exercise care in removal of contaminated clothing to avoid secondary skin contact. Segregate contaminated articles and launder separately from other clothing using a double rinse. Leather articles such as boots, belts or watchbands should be destroyed if contaminated by concentrate.

Applying Dilute Spray Solution
Ground Application: When spraying dilute solution and during equipment maintenance and repair, wear clean coveralls over normal working clothes, impermeable head covering, chemical resistant gloves (nitrile or neoprene) and chemical resistant footwear such as rubber boots.
Aerial Application: Wear clean coveralls over normal working clothes, head covering, and chemical resistant footwear such as rubber boots during aerial application. In addition, wear chemical resistant gloves during any repair or cleanup activities.

PHYSICAL OR CHEMICAL HAZARDS
COMBUSTIBLE. Do not use or store near heat or open flame.

FIRST AID
Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.
If swallowed: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately or contact a poison control centre **IMMEDIATELY**
If in eyes: Flush **IMMEDIATELY** with clean flowing water for fifteen minutes.
If inhaled: Remove to fresh air if effects occur. Consult a physician or a poison control centre **IMMEDIATELY**.
If on skin: Wash off in flowing water or shower.

TOXICOLOGICAL INFORMATION
The decision of whether to induce vomiting or not should be made by an attending physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. **This product contains petroleum distillates.** No specific antidote. Employ supportive care. Treatment should be based on judgment of the physician in response to reactions of the patient.

AGRICULTURAL CHEMICAL
Do not ship or store with food, feeds, drugs or clothing.

ENVIRONMENTAL HAZARDS
This product is highly toxic to fish, aquatic plants and aquatic invertebrates and is not labelled for application to water surfaces. Keep out of wetlands, lakes, ponds, streams, rivers and wildlife habitats at the edge of bodies of water. Do not contaminate water by cleaning of equipment or disposal of wastes.

Sensitive terrestrial and aquatic habitat must be protected. A buffer zone should be maintained to avoid overspray and drift into these habitats (refer to Ground Application and/or Aerial Application sections for the buffer zone requirements and spray drift control recommendations). Examples of habitat which may border treated areas are shelterbelts, wetlands (e.g., potholes), sloughs, dry slough borders, non-target wooded areas and vegetated areas adjacent to water.

This product contains a petroleum distillate which is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment.

STORAGE
Do not contaminate water, food or feed by storage or disposal. Store above -2°C or agitate container before use.

DISPOSAL
Recyclable Containers:
Do not reuse this container for any purpose. This is a recyclable container, and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Make the empty, rinsed container unsuitable for further use.

If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

Returnable Containers:
Do not reuse this container for any purpose. For disposal, this empty container may be returned to the point of purchase (distributor/dealer).

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

GENERAL INFORMATION

Remedy EC Herbicide is recommended for the control of undesirable woody plants and annual and perennial broadleaved weeds on pastures and rangelands.

Among the woody plants controlled at the lower rate are:

alder	elderberry	pines♦
ash	elm♦	poplar
aspen	hawthorn	red maple♦
basswood	hickory	raspberry♦
beech	hop-hornbeam	sassafras
birch	honey locust♦	sumac
blackberry	locust	sycamore
buckthorn	maples	tamarack
cherry♦	mulberry	wild rose
chokecherry♦	oaks♦	willow
cottonwood	poison oak	witchhazel
dogwood		

♦These species may require treatment at the higher rate and may need to be retreated the following year, particularly if the original treatment was made at the lower rate.

Among the annual and perennial broadleaved weeds controlled are:

burdock	field bindweed	smooth bedstraw
chicory	lamb's-quarters	vetch
curled dock	ragweed	wild lettuce
dandelion	smartweed	

GENERAL USE PRECAUTIONS

- Do not apply this product in a manner inconsistent with the label.
- Do not apply Remedy EC Herbicide directly to, or otherwise permit it to come into direct contact with desirable crops or other desirable broadleaved plants or non-target species and do not permit spray mists containing Remedy EC Herbicide to drift onto them.

Avoid Spray Drift
Apply only when there is little or no hazard from spray drift. Small quantities of the spray, which may not be visible, may seriously injure susceptible crops and damage sensitive non-target habitat. A method must be used to detect air movement, lapse conditions or temperature inversions (stable air) such as the use of balloons or a continuous smoke column at or near the spray site or a smoke generator on the spray equipment. If the smoke develops into layers or indicates a potential for hazardous spray drift, DO NOT SPRAY.

PREHARVEST/GRAZING INTERVALS
Treated areas may be grazed by livestock or harvested for livestock feed provided that the following intervals are adhered to:

Grazing or harvesting green forage

I. Lactating dairy animals
   A. Up to 4.7 L/ha: withhold lactating dairy animals from consuming treated green forage for 14 days following treatment.
   B. 4.7 to 8.0 L/ha: withhold lactating dairy animals from consuming treated forage for 60 days following treatment.

II. Other livestock
   A. Up to 4.7 L/ha: no grazing restriction.
   B. 4.7 to 8.0 L/ha: do not graze or harvest green forage from treated area for 14 days following treatment.

III. **NOTE:** If less than 25% of a grazed area is treated, there is no grazing restriction (for other livestock only).

Haying (harvesting of dried forage)

I. Lactating dairy animals
   A. For treatments up to 8.0 L/ha do not feed lactating dairy animals hay which had been harvested within 60 days of treatment.

II. Other livestock
   A. Up to 4.7 L/ha: do not harvest for 7 days following treatment.
   B. 4.7 to 8.0 L/ha: do not harvest hay for 14 days following treatment.

Slaughter Withhold
Withdraw livestock from grazing treated grass or consumption of treated hay at least 3 days prior to slaughter.

DIRECTIONS FOR USE
General
For best results, applications of Remedy EC Herbicide should be made when woody plants and weeds are actively growing. Use higher rates when hard-to-control species such as ash, chokecherry, elm, maple (other than vine or big leaf), oaks or pine are present. If lower rates are used on hard-to-control species, resprouting may occur and retreatment may be necessary the following year.

When using a drift control agent, follow the manufacturer's directions for the correct mixing sequence.

Ground Application
Consult with the appropriate provincial authorities about use permits and the establishment of buffer zones.

Use Precautions
Remedy EC Herbicide is not registered for application to water surfaces including lakes, ponds and streams and is highly toxic to certain species of fish, aquatic plants and aquatic invertebrates. Do not overspray such areas. In order to reduce the hazard of drift to non-target plants, aquatic species or sensitive habitat, ensure that appropriate buffer zones are maintained and refer to the section Spray Drift Control.

Spray Drift Control
Take into consideration areas of human habitation, areas of human activities, bodies of water, meteorological conditions, application equipment, and sprayer settings used for application. The potential for spray drift with ground broadcast applications can be reduced by:

- Apply a coarse spray using large droplet producing nozzle tips. Do not apply with cone-type nozzle or other nozzles that produce a fine droplet spray.
- Use of Radiarc® or Nalco-Trol® or an equivalent drift control system or additive.
- Keep the spray boom as low as possible.
- Use a spray pressure no greater than is required to obtain a proper spray pattern for adequate plant coverage.
- For ground application, do not apply Remedy EC Herbicide when wind velocity and direction pose a risk of spray drift. Apply when wind speed is low. For aerial application, please refer to "Use Precautions" for appropriate buffer zones under "Restricted Use."

If a spray thickening agent is used, follow all use directions and precautions on the product label. When using a power sprayer and handgun, direct sprays no higher than the tops of the target plants.

GROUND EQUIPMENT APPLICATIONS
Single Stem Foliar
For control of woody plants up to 2.5 m in height, use Remedy EC Herbicide at rates of 4 to 8 L in enough water to make 1000 L of spray solution. Use the higher rate for late summer application when growth rates are reduced or when hard-to-control species are present. Spray brush to the point of runoff. Coverage should be thorough to wet all foliage. To minimize spray drift do not use pressures exceeding 1400 kPa at the spray nozzle. Direct the spray away from crops or desired non-target vegetation. Use of a drift control system is suggested to minimize spray drift. For woody plants exceeding 2.5 m in height cut and spray regrowth or use one of the basal application methods.

Low Volume Foliar
For control of woody plants up to 2.5 m in height use this technique with knapsack or backpack sprayers equipped with flat fan or solid cone nozzles. Power sprayers and handguns may also be used. For control of woody plants, mix 1 to 5 L of Remedy EC Herbicide in enough water to make 100 L of spray solution. Use of a rate in the upper end of the recommended range is suggested for control of basal sprouting and root suckering species and for tall, dense brush. Direct the spray solution to thoroughly wet the foliage of the target plants but not to the point of runoff. Apply after full leafout, but before autumn colouration. For woody plants exceeding 2.5 m in height cut and spray regrowth or use one of the basal application methods.

Broadcast Foliar
For woody plant control and broadleaved weed control, make applications with equipment that will assure uniform coverage of the low spray volume applied. Do not use pressure exceeding 275 kPa at the spray nozzle. Apply any time during the growing season. Use the higher rates for late summer applications when growth rates are reduced or when hard-to-control species are present.

Woody Plant Control
Mix 4 to 8 L of Remedy EC Herbicide in a minimum of 200 L of water per hectare to ensure uniform coverage.

Broadleaved Weed Control
Mix 1 to 4 L of Remedy EC Herbicide in a minimum of 200 L of water per hectare to ensure uniform coverage.

BASAL BARK APPLICATIONS

General Information and Mixing Instructions

For control of woody plants on pastures and rangelands, use Remedy EC Herbicide in oil mixtures prepared and applied as described below. Use a diluent such as mineral oil or vegetable oil. Add Remedy EC Herbicide to the required amount of oil in the mixing tank and mix thoroughly When mixing with oils commercially formulated for basal bark herbicide applications, read and follow the use directions and precautions on the product label prepared by the oil's manufacturer.

Use the higher spray mixture concentration of Remedy EC Herbicide when treating basal sprouting and root suckering species or when applying during the dormant season. Use low nozzle pressure to minimize spattering of spray solution off the target stem.

One-Sided Low Volume

To control woody plants with stems less than 15 cm in basal diameter, mix 20 to 30 L of Remedy EC Herbicide in enough oil diluent to make 100 L of spray mixture. Apply with a knapsack or backpack sprayer using a flat fan or solid cone nozzle, or wick attachment. Low pump pressures of 70 to 210 kPa are recommended. Spray the basal parts of at least one side of each stem to thoroughly wet the lower 30 cm, including the root collar area, but not to the point of runoff. Apply at any time, including the winter months, except when snow or water prevent spraying at the ground line.

Streamline

To control woody plants, mix 20 to 30 L of Remedy EC Herbicide in enough oil to make 100 L of spray mixture. Apply using a knapsack or backpack sprayer with a flat fan or solid cone nozzle, or wick attachment. Low pump pressures of 70 to 210 kPa are recommended. Apply sufficient spray to one side of stems less than 8 cm in basal diameter to form a band 5 cm in width. When the optimum amount of spray mixture is applied, the treated zone should widen to encircle the stem within approximately 30 minutes. Treat both sides of stems which are 8 to 15 cm in basal diameter. Direct the spray at a point on the stem that is approximately 30 to 50 cm above ground level. Optimal results are achieved when applications are made to young vigorously growing stems which have not developed the thicker bark characteristics of slower growing, understory trees in older stands. Apply at any time, including the winter months, except when snow or water prevents spraying at the desired height above ground level.

Cut Stump Treatment

To control resprouting of cut stumps of woody species, mix 20 to 30 L of Remedy EC Herbicide in enough oil to make 100 L of spray mixture. Apply with a backpack or knapsack sprayer using a flat fan or a solid cone nozzle.

Low pump pressures of 70 to 210 kPa are recommended. Thoroughly wet the outer portion of the cut surface adjacent to the cambium and the sides of the stumps, including the root collar area, but not to the point of runoff. Apply at any time, including the winter months, except when snow or water prevents spraying to the ground line. Care must be given to ensure treatment of all cut stems in a clump.

*** EDITOR'S NOTE: START BLACK BOX ***

RESTRICTED USE

Remedy EC Herbicide may be applied by air for control of susceptible woody plants on pastures and rangelands.

NOTICE TO USER: This control product is to be used only in accordance with the directions on this label. It is an offence under the *Pest Control Products Act* to use a control product under unsafe conditions.

NATURE OF RESTRICTION: This product is to be used only in the manner authorized; consult local pesticide regulatory authorities about use permits that may be required.

DIRECTIONS FOR USE

Aerial Application

Apply only by fixed-wing or rotary aircraft equipment which has been functionally and operationally calibrated for the atmospheric conditions of the area and the application rates and conditions of this label.

Label rates, conditions and precautions are product specific. Read and understand the entire label before opening this product. Apply only at the rate recommended for aerial application on this label. **Where no rate for aerial application appears for the specific use, this product cannot be applied by any type of aerial equipment.**

Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices

Use Precautions

Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. Apply only under conditions of good practice specific to aerial application as outlined in the *Basic Knowledge Requirements for Pesticide Education in Canada: Applicator Core* and *Aerial Module*, developed by CAPCO.

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed.

Coarse sprays are less likely to drift, therefore, avoid combinations of pressure and nozzle type that will result in fine particles (mist). Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift. Do not spray when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelter-belt) or aquatic habitat.

Operator Precautions

Do not allow the pilot to mix chemicals to be loaded onto the aircraft. Loading of premixed chemicals with a closed system is permitted.

It is desirable that the pilot have communication capabilities at each treatment site at the time of application.

The field crew and the mixer/loaders must wear chemical resistant gloves, coveralls and goggles or face shield during mixing/loading, cleanup and repair. Follow the more stringent label precautions in cases where the operator precautions exceed the generic label recommendations on the existing ground boom label.

All personnel on the job site must wash hands and face thoroughly before eating and drinking. Protective clothing, aircraft cockpit and vehicle cabs must be decontaminated regularly.

Product Specific Precautions

Read and understand the entire label before opening this product. If you have questions, call the manufacturer at 1-800-667-3852 or obtain technical advice from the distributor or your provincial agricultural representative. Application of this specific product must meet and/or conform to the precautions and application rates set out below.

ENVIRONMENTAL HAZARDS

This product is highly toxic to fish, aquatic plants and aquatic invertebrates and is not labelled for application to water surfaces. Keep out of wetlands, lakes, ponds, streams, rivers and wildlife habitats at the edge of bodies of water. A buffer zone should be maintained to avoid overspray and drift into these habitats. Do not contaminate water by cleaning of equipment or disposal of wastes.

Aerial application must only be done on the basis of provincial use permit. Buffer zones are specified to protect the sensitive areas as identified in the Environmental Hazards section of the product label.

Among the species controlled are:

alder	elderberry	pines♦
ash	elm♦	poplar
aspen	hawthorn	red maple♦
basswood	hickory	raspberry♦
beech	hop-hornbeam	sassafras
birch	honey locust♦	sumac
blackberry	locust	sycamore
buckthorn	maples	tamarack
cherry♦	mulberry	wild rose
chokecherry♦	oaks♦	willow
cottonwood	poison oak	witchhazel
dogwood		

♦These species may require treatment at the higher rate and may need to be retreated the following year, particularly if the original treatment was made at the lower rate.

DIRECTIONS FOR USE:
AERIAL APPLICATION
Remedy EC Herbicide may be applied by either fixed or rotary wing aircraft for the control of susceptible woody plants and annual and perennial broadleaved weeds on pastures and rangelands. Use 4 to 8 L of Remedy EC Herbicide in a minimum spray volume of 30 L per hectare. Delivery systems suggested for use in applying Remedy EC Herbicide by air include: booms equipped with coarse droplet producing conventional disc and core nozzles (such as D8-46 or D10-46), the Microfoil® boom or the Thru-Valve® boom. Ensure uniform and adequate coverage is achieved and that equipment has been accurately calibrated. Use higher application rates and volumes when plants are dense or under drought conditions.

USE PRECAUTIONS
Remedy EC Herbicide is not registered for application to water surfaces including lakes, ponds and streams and is highly toxic to certain species of fish, aquatic plants and aquatic invertebrates. Do not overspray such areas. In order to reduce the hazard of drift to sensitive areas as identified in the Environmental Hazards section of the label, ensure that appropriate buffer zones are maintained as outlined below.

Use only closed mixing/loading systems for aerial application.

BUFFER ZONE TABLES FOR REMEDY EC HERBICIDE

AQUATIC APPLICATION HABITATS

A buffer zone should be maintained to avoid overspray and drift into wetlands, lakes, ponds, streams, rivers, and wildlife habitats at the edge of bodies of water. Appropriate buffer zones, based on aircraft type, boom height, droplet spectrum, and rate of application, are as follows.

AQUATIC I - APPLICATION BY FIXED WING AIRCRAFT

1) DROPLET SPECTRUM: COARSE (VMD 351 µm; range 163 to 595 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Aquatic Habitats (by Boom Height) †			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	3	24	83	156
>4 to 6 L/ha	9	41	132	246
>6 to 8 L/ha	16	58	187	321

2) DROPLET SPECTRUM: VERY COARSE (VMD 461 µm; range 224 to 787 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Aquatic Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	1	15	58	113
>4 to 6 L/ha	5	25	85	165
>6 to 8 L/ha	8	35	113	215

† Boom height is the distance between the target vegetation (e.g. canopy) and the boom of the aircraft. The buffer zone is the distance between the sensitive habitat and the downwind edge of the spray boom. For example, these charts are read as follows: at an application rate of 6 L/ha, a boom height of 10 m, and a coarse droplet spectrum (VMD 351 µm), maintain a 41 m buffer zone between aquatic habitats (e.g., wetlands, lakes, ponds, streams, rivers, and wildlife habitats at the edge of bodies of water) and the downwind edge of the spray boom.

AQUATIC II - APPLICATION BY ROTARY AIRCRAFT (HELICOPTER)

1) DROPLET SPECTRUM: COARSE (VMD 351 µm; range 163 to 595 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Aquatic Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	1	10	57	118
>4 to 6 L/ha	5	15	89	202
>6 to 8 L/ha	8	19	133	270

2) DROPLET SPECTRUM: VERY COARSE (VMD 461 µm; range 224 to 787 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Aquatic Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	1	7	39	85
>4 to 6 L/ha	3	11	53	118
>6 to 8 L/ha	5	13	68	155

TERRESTRIAL APPLICATION HABITATS

A buffer zone should be maintained to avoid overspray and drift into sensitive terrestrial wildlife habitats. Consult the Provincial Pesticide Authority regarding the determination of these areas. Appropriate buffer zones, based on aircraft type, boom height, droplet spectrum, and rate of application, are as follows.

TERRESTRIAL I - APPLICATION BY FIXED WING AIRCRAFT

1) DROPLET SPECTRUM: COARSE (VMD 351 µm; range 163 to 595 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Terrestrial Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	18	43	90	144
>4 to 6 L/ha	27	55	118	194
>6 to 8 L/ha	33	66	149	247

2) DROPLET SPECTRUM: VERY COARSE (VMD 461 µm; range 224 to 787 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Terrestrial Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	15	32	72	116
>4 to 6 L/ha	20	43	91	148
>6 to 8 L/ha	24	50	110	183

TERRESTRIAL II - APPLICATION BY ROTARY AIRCRAFT (HELICOPTER)

1) DROPLET SPECTRUM: COARSE (VMD 351 µm; range 163 to 595 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Terrestrial Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	15	25	71	121
>4 to 6 L/ha	19	30	87	152
>6 to 8 L/ha	21	33	108	205

2) DROPLET SPECTRUM: VERY COARSE (VMD 461 µm; range 224 to 787 µm)

Rate of Application (L Remedy EC Herbicide/ha)	Buffer Zones (m) from Terrestrial Habitats (by Boom Height)			
	≤ 5 m	> 5-10 m	>10-20 m	>20-30 m
4 L/ha	11	21	57	97
>4 to 6 L/ha	15	24	69	120
>6 to 8 L/ha	17	27	79	141

Spray Drift Control

Apply only when there is little or no hazard of spray drift since small quantities of product may injure susceptible crops and damage sensitive non-target habitats.

1. Do not apply Remedy EC Herbicide when wind velocity and direction pose a risk of spray drift.
2. Do not apply when the wind speed is greater than 16 km/hr
3. Remedy EC Herbicide should not be applied at a boom height greater than 30 m above the target vegetation.
4. Aerial application should be made as close to the ground as possible while maintaining adequate coverage.
5. For helicopter application use pressures at the lower end of the range recommended by the nozzle manufacturer. For fixed wing application use pressures at the higher end of the range recommended by the nozzle manufacturer.

6. Use a boom length less than 75% of the wing span or rotor length.

7. Coarse spray droplets are less prone to drift, therefore avoid spray dispersal systems and settings that produce a large proportion of fine droplets in the spray pattern. Delivery systems suggested for use in applying Remedy EC Herbicide by air include: booms equipped with coarse droplet producing conventional disc and core nozzles (such as D8-46 or D10-46), straight stream coreless nozzles (such as D6 or D8), and the Microfoil or Thru-Valve boom. Conventional disc and core nozzles should be oriented straight back or at an angle of less than 30° down.

8. Do not apply by air when an air temperature inversion exists. Such condition is characterized by little or no wind and an air temperature near the ground that is lower than at higher levels. A method must be used to detect air movement, lapse conditions or temperature inversions such as the use of balloons or a continuous smoke column at or near the site.

*** EDITOR'S NOTE: END BLACK BOX ***

RESISTANCE MANAGEMENT RECOMMENDATIONS

For resistance management, Remedy EC Herbicide is a Group 4 herbicide. Any weed population may contain or develop plants naturally resistant to Remedy EC Herbicide and other Group 4 herbicides. The resistant biotypes may dominate the weed population if these herbicides are used repeatedly in the same field. Other resistance mechanisms that are not linked to site of action, but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

To delay herbicide resistance:

- Where possible, rotate the use of Remedy EC Herbicide or other Group 4 herbicides with different herbicide groups that control the same weeds in a field.
- Use tank mixtures with herbicides from a different group when such use is permitted.
- Herbicide use should be based on an IPM program that includes scouting, historical information related to herbicide use and crop rotation, and considers tillage (or other mechanical), cultural, biological and other chemical control practices.
- Monitor treated weed populations for resistance development.
- Prevent movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment and planting clean seed.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or integrated weed-management recommendations for specific crops and weed biotypes.
- For further information or to report suspected resistance, contact Dow AgroSciences Canada Inc. at 1-800-667-3852 or at www.dowagro.ca.

NOTICE TO USER: This control product is to be used only in accordance with the directions on this label. It is an offence under the *Pest Control Products Act* to use a control product under unsafe conditions.

NOTICE TO BUYER: Seller's guarantee shall be limited to the terms set out on the label and, subject thereto, the buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

120905

SPECIMEN LABEL NOTES:

- English and French label updates to conform to current labelling conventions.
- Dow AgroSciences Canada Inc. address change

Label code: CN-26420-006-E
Replaces: CN-26420-005-E

Habitat®

herbicide

Applications may only be made for the control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water, including estuarine and marine sites. Applications may be made to control undesirable wetland, riparian and terrestrial vegetation growing in or around surface water when applications may result in inadvertent applications to surface water.

Active ingredient:	
Isopropylamine salt of Imazapyr (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid)*	28.7%
Inert ingredients	71.3%
Total	100.0%

* Equivalent to 22.6% 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid or 2 pounds acid per gallon.

EPA Reg. No. 241-426 **U.S. Patent No. 4,798,619** **EPA Est. No.**

KEEP OUT OF REACH OF CHILDREN.

CAUTION/PRECAUCIÓN

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.)

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

See Next Page for Additional Precautionary Statements

Net contents: _____

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF
The Chemical Company

FIRST AID	
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If inhaled	• 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. • Call a poison control center or doctor for further treatment advice.
HOT LINE NUMBER	
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

HAZARD TO HUMANS
CAUTION!

Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE):

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category A on an EPA chemical-resistant category selection chart.

Applicators and other handlers must wear:

- Long-sleeve shirt and long pants
- Chemical-resistant gloves, Category A
- shoes plus socks

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

PHYSICAL AND CHEMICAL HAZARDS

Spray solutions of **HABITAT® herbicide** should be mixed, stored and applied only in stainless steel, fiberglass, plastic and plastic-lined steel containers.

DO NOT mix, store or apply **HABITAT** or spray solutions of **HABITAT** in unlined steel (except stainless steel) containers or spray tanks.

ENVIRONMENTAL HAZARDS

DO NOT apply to water except as specified in this label. Treatment of aquatic weeds may result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss may cause the suffocation of some aquatic organisms. Do not treat more than one half of the surface area of the water in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outward in bands to allow aquatic organisms to move into untreated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This pesticide is toxic to vascular plants and should be used strictly in accordance with the drift precautions on the label.

DIRECTIONS FOR USE

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

HABITAT should be used only in accordance with recommendations on the leaflet label attached to the container. Keep containers closed to avoid spills and contamination.

STORAGE AND DISPOSAL

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

PESTICIDE STORAGE: DO NOT store below 10° 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. 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. 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.

IMPORTANT

DO NOT use on food crops. **DO NOT** apply this product within one-half mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.) or within one-half mile of an active potable water intake in a standing body of water, such as a lake, pond or reservoir. **DO NOT** apply to water used for irrigation

except as described in **APPLICATION TO WATERS USED FOR IRRIGATION** section of this label. Keep from contact with fertilizers, insecticides, fungicides and seeds. **DO NOT** drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the treated soil may be washed or moved into contact with their roots. **DO NOT** use on lawns, walks, driveways, tennis courts, or similar areas. **DO NOT** side trim desirable vegetation with this product unless severe injury and plant death can be tolerated. Prevent drift of spray to desirable plants.

Clean application equipment after using this product by thoroughly flushing with water.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

Applications may only be made for the control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water, including estuarine and marine sites. Applications may be made to control undesirable wetland, riparian and terrestrial vegetation growing in or around surface water when applications may result in inadvertent applications to surface water.

Do not apply more than 6 pints of product (1.5 lbs. acid equivalent) per acre per year.

Aerial application is restricted to helicopter only.

Application of **HABITAT® herbicide** can only be made by federal or state agencies, such as Water Management District personnel, municipal officials and the U.S. Army Corps of Engineers, or those applicators who are licensed or certified as aquatic pest control applicators and are authorized by the state or local government.

Treatment to other than non-native invasive species is limited to only those plants that have been determined to be a nuisance by a federal or state government entity.

Applications to private waters: Applications may be made to private waters that are still, such as ponds, lakes and drainage ditches where there is minimal or no outflow to public waters.

Application to public waters: Applications may be made to public waters such as ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, streams, rivers, and other slow-moving or quiescent bodies of water for control of aquatic weeds or for control of riparian and wetland weed species.

Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

Recreational Use of Water in Treatment Area: There are no restrictions on the use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water in/from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

Precautions for Potable Water Intakes: Do not apply **HABITAT** directly to water within one-half mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.) or within one-half mile of an active potable water intake in a standing body of water such as lake, pond or reservoir. To make aquatic applications around and within one-half mile of active potable water intakes, the water intake must be turned off during application and for a minimum of 48 hours after the application. These aquatic applications may be made only in the cases where there are alternative water sources or holding ponds, which would permit the turning off of an active potable water intake for a minimum period of 48 hours after the applications. Note: Existing potable water intakes which are no longer in use, such as those replaced by connections to wells or a municipal water system, are not considered to be active potable water intakes. This restriction does not apply to intermittent, inadvertent overspray of water in terrestrial use sites.

APPLICATION TO WATERS USED FOR IRRIGATION

Water treated with **HABITAT** may not be used for irrigation purposes for 120 days after application or until **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Seasonal Irrigation Waters: HABITAT may be applied during the off-season to surface waters that are used for irrigation on a seasonable basis, provided that there is a minimum of 120 days between **HABITAT** application and the first use of treated water for irrigation purposes or until **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Irrigation Canals/Ditches: DO NOT apply **HABITAT** to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less. DO NOT apply **HABITAT** to dry irrigation canals/ditches.

Quiescent or Slow Moving Waters: In lakes and reservoirs DO NOT apply **HABITAT** within one (1) mile of an active irrigation water intake during the irrigation season. Applications less than one (1) mile from an inactive irrigation water intake may be made during the off-season, provided that the irrigation intake will remain inactive for a minimum 120 days after application or until **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Moving water: DO NOT apply within one-half mile downstream of an active irrigation water intake. When making applications upstream from an active irrigation water intake, the intake must be turned off for a period of time sufficient to allow the upstream portion of treated water to completely flow past the irrigation intake before use can resume. Shut off time will be determined by the speed of water flow and the distance and length of water treated upstream from the intake. Consult local, state and/or federal authorities before making any applications upstream from an active irrigation water intake.

GENERAL INFORMATION

Use Sites: HABITAT is an aqueous solution to be mixed with water and a surfactant and applied as a spray solution to control floating and emergent undesirable vegetation (see **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section) in or near bodies of water which may be flowing, non-flowing, or transient. **HABITAT** may be applied to aquatic sites that include lakes, rivers, streams, ponds, seeps, drainage ditches, canals, reservoirs, swamps, bogs, marshes, estuaries, bays, brackish water, transitional areas between terrestrial and aquatic sites and seasonal wet areas. See **AQUATIC USE** section of this label for precautions, restrictions, and instructions on aquatic uses.

Read and observe the following directions if aquatic sites are present in terrestrial noncrop areas and are part of the intended treatment area:

Herbicidal Activity: HABITAT will control most annual and perennial grasses and broadleaf weeds in addition to many brush and vine species with some residual control of undesirable species that germinate above the waterline. **HABITAT** is readily absorbed through emergent leaves and stems 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 or submerged storage organs, which

prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species until two or more weeks after application. Complete kill of plants may not occur for several weeks. Applications of **HABITAT® herbicide** are rainfast one hour after treatment.

HABITAT does not control plants which are completely submerged or have a majority of their foliage under water.

Application Methods: HABITAT must be applied to the emergent foliage of the target vegetation and has little to no activity on submerged aquatic vegetation. **HABITAT** concentrations resulting from direct application to water are not expected to be of sufficient concentration or duration to provide control of target vegetation. Application should be made in such a way as to maximize spray interception by the target vegetation while minimizing the amount of overspray that enters the water. For maximum activity, weeds should be growing vigorously at the time of application and the spray solution should include a surfactant (See **ADJUVANTS** section for specific recommendations). **HABITAT** may be selectively applied by using low-volume directed application techniques or may be broadcast-applied by using ground equipment, watercraft or by helicopter. In addition, **HABITAT** may also be used for cut stump, cut stem and frill and girdle treatments within aquatic sites (see **AERIAL APPLICATIONS** and **GROUND APPLICATIONS** sections for additional details).

HABITAT should be applied with surface or helicopter application equipment in a minimum of 5 gallons of water per acre. When applying by helicopter, follow directions under the **AERIAL APPLICATIONS** section of this label, otherwise refer to section on **GROUND APPLICATIONS** when using surface equipment.

Applications made to moving bodies of water should be made while traveling upstream to prevent concentration of this herbicide in water. DO NOT apply to bodies of water or portions of bodies of water where emergent and/or floating weeds do not exist.

When application is to be made to target vegetation that covers a large percentage of the surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in the suffication of some sensitive aquatic organisms. Do not treat more than one half of the surface area of the water in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outward in bands to allow aquatic organisms to move into untreated areas.

Avoid wash-off of sprayed foliage by spray boat or recreational boat backwash for one hour after application.

Apply **HABITAT** at 2 to 6 pints per acre depending on species present and weed density. DO NOT exceed the maximum label rate of 6 pints per acre (1.5 lb ai/A) per year. Use the higher labeled rates for heavy weed pressure. Consult the **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT HERBICIDE** section of this label for specific rates.

HABITAT may be applied as a draw down treatment in areas described above. Apply **HABITAT** to weeds after water has been drained and allow 14 days before reintroduction of water.

PRECAUTIONS FOR AVOIDING INJURY TO NON-TARGET PLANTS

Untreated desirable plants can be affected by root uptake of **HABITAT** from treated soil. Injury or loss of desirable plants may result if **HABITAT** is applied on or near desirable plants, on areas where their roots extend, or in locations where the treated soil may be washed or moved into contact with their roots. When making applications along shorelines where desirable plants may be present, caution should be exercised to avoid spray contact with their foliage or spray application to the soil in which they are rooted. Shoreline plants that have roots that extend into the water in an area where **HABITAT** has been applied generally will not be adversely affected by uptake of the herbicide from the water.

If treated vegetation is to be removed from the application site, DO NOT use the vegetative matter as mulch or compost on or around desirable species.

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 determines the potential for spray drift. The applicator and the entity authorizing spraying 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 (helicopter, 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 treatment area, 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 HELICOPTERS ONLY

Water Volume: 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 ¾ the length of the 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 helicopter safety, applications should 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)

Water Volume: 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.

ADJUVANTS

Postemergence applications of **HABITAT® herbicide** require the addition of a spray adjuvant. Only spray adjuvants that are approved or appropriate for aquatic use should be utilized.

Nonionic Surfactants: Use a nonionic surfactant at the rate 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 with at least 70% 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).

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated seed oil or vegetable-based seed oil concentrate may be used at the rate of 1.5 to 2 pints per acre. 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 above. Research indicates that these oils may aid in **HABITAT** deposition and uptake by plants under moisture or temperature stress.

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.

Invert emulsions: HABITAT can be applied as an invert emulsion. The spray solution results in an invert (water-in-oil) spray emulsion designed to minimize spray drift and spray run-off, resulting in more herbicide on the target foliage. The spray emulsion may be formed in a single tank (batch mixing) or injected (in-line mixing). Consult the invert chemical label for proper mixing directions.

Other: An antifoaming agent, spray pattern indicator or drift reducing agent may be applied at the product labeled rate if necessary or desired.

TANK MIXES

HABITAT may be tank-mixed with other aquatic use herbicides for the control of emergent and floating aquatic vegetation.

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

AERIAL APPLICATIONS

All precautions should be taken to minimize or eliminate spray drift. Helicopters can be used to apply **HABITAT**; however, DO NOT make applications by helicopter unless appropriate buffer zones can be maintained to prevent spray drift out of the target area, or when spray drift as a result of helicopter application can be tolerated. Aerial equipment designed to minimize spray drift, such as a helicopter equipped with a Microfoil™ boom, Thru-Valve™ 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 any other conditions which allow drift. Side trimming is not recommended with **HABITAT** unless death of treated tree can be tolerated.

Uniformly apply the recommended amount of **HABITAT** in 5 to 30 gallons of water per acre; include in the spray solution a nonionic surfactant or methylated seed oil or manufacturer's label rate of a silicone-based surfactant (See the **Adjuvants** section of this label for specific recommendations). A foam reducing agent may be added at the recommended label rate, if needed.

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.

GROUND APPLICATIONS

FOLIAR APPLICATIONS

Low Volume Foliar:

Use equipment calibrated to deliver 5 to 20 gallons of spray solution per acre. To prepare the spray solution, thoroughly mix in water 0.5 to 5% **HABITAT® herbicide** plus surfactant (see the **ADJUVANTS** section of this label for specific recommendations). A foam reducing agent may be applied at the recommended label rate, if needed. For control of difficult species (see **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes but do not apply more than 6 pints of **HABITAT** per acre. Excessive wetting of foliage is not recommended. See the **MIXING GUIDE** below for some suggested volumes of **HABITAT** and water.

For low volume, select proper nozzles to avoid over-application. Proper application is critical to ensure desirable results. Best results are achieved when the spray covers the crown and approximately 70 percent of the plant. The use of an even flat fan tip with a spray angle of 40 degrees or less will aid in proper deposition.

Recommended tip sizes include 4004E, or 1504E. For a straight stream and cone pattern, adjustable cone nozzles such as 5500 X3 or 5500 X4 may be used. Attaching a rollover valve onto a Spraying Systems Model 30 gunjet or other similar spray guns allows for the use of both a flat fan and cone tips on the same gun.

Moisten, but do not drench target vegetation causing spray solution to run off.

Low Volume Foliar with Backpacks:

For low-growing species, spray down on the crown, covering crown and penetrating approximately 70% of the plant.

For target species 4 to 8 feet tall, swipe the sides of target vegetation by directing spray to at least two sides of the plant in smooth vertical motions from the crown to the bottom. Make sure to cover the crown whenever possible.

For target species over 8 feet tall, lace sides of the target vegetation by directing spray to at least two sides of the target in smooth zigzag motions from crown to bottom.

Low Volume Foliar with Hydraulic Handgun Application Equipment:

Use same technique as described above for **Low Volume with Backpacks**.

For broadcast applications, simulate a gentle rain near the top of target vegetation, allowing spray to contact the crown and penetrate the target foliage without falling to the understory. Herbicide spray solution which contacts the understory may result in severe injury or death of plants in the understory.

SPRAY SOLUTION MIXING GUIDE FOR LOW-VOLUME FOLIAR APPLICATIONS

AMOUNT OF SPRAY SOLUTION BEING PREPARED	DESIRED CONCENTRATION (fluid volume)				
	0.5%	0.75%	1%	1.5%	5%
	(amount of **HABITAT** to use)				
1 gallon	0.6 oz.	0.9 oz.	1.3 oz.	1.9 oz.	6.5 oz.
3 gallons	1.9 oz.	2.8 oz.	3.8 oz.	5.8 oz.	1.2 pint
4 gallons	2.5 oz.	3.8 oz.	5.1 oz.	7.7 oz.	1.6 pint
5 gallons	3.2 oz.	4.8 oz.	6.5 oz.	9.6 oz.	2 pints
50 gallons	2 pints	3 pints	4 pints	6 pints	10 quarts
100 gallons	4 pints	6 pints	8 pints	6 quarts	5 gallons

2 tablespoons = 1 fluid ounce

High Volume Foliar:

For optimum performance when spraying medium to high-density vegetation, use equipment calibrated to deliver up to 100 gallons of spray solution per acre (GPA). Spray solutions exceeding 100 GPA may result in excessive spray run-off, causing increased ground cover injury, and injury to desirable species. To prepare the spray solution, thoroughly mix **HABITAT** in water and add a surfactant (see **ADJUVANT** section for specific recommendations and rates of surfactants). A foam-reducing agent may be added at the recommended label rate, if needed. For control of difficult species (see **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes, but do not apply more than 6 pints of **HABITAT** per acre. Uniformly cover the foliage of the vegetation to be controlled but do not apply to run-off. Excessive wetting of foliage is not recommended.

Side Trimming:

DO NOT side trim with **HABITAT** unless severe injury or death of the treated tree can be tolerated. **HABITAT** is readily translocated and can result in death of the entire tree.

CUT SURFACE TREATMENTS

HABITAT may be used to control undesirable woody vegetation by applying the **HABITAT** solution to the cambium area of freshly cut stump surfaces or to fresh cuts on the stem of the target woody vegetation. Applications can be made at any time of the year except during periods of heavy sap flow in the spring. Do not overapply solution causing run-off from the cut surface.

Injury may occur to desirable woody plants if the shoots extend from the same root system or their root systems are grafted to those of the treated tree.

CUT SURFACE APPLICATIONS WITH DILUTE AND CONCENTRATE SOLUTIONS:

HABITAT may be mixed as either a concentrated or dilute solution. The dilute solution may be used for applications to the cut surface of the stump or to cuts on the stem of the target woody vegetation. Concentrated solutions may be used for applications to cuts on the stem. Use of the concentrated solution permits application to fewer cuts on the stem, especially for large diameter trees. Follow the application instructions to determine proper application techniques for each type of solution.

- To prepare a dilute solution, mix 8 to 12 fluid ounces of **HABITAT® herbicide** with one gallon of water. The use of a surfactant or penetrating agent may improve uptake through partially callused cambiums.
- To prepare a concentrated solution, mix 2 quarts of **HABITAT** with no more than 1 quart of water.

Cut stump treatments:

- Dilute Solution- spray or brush the solution onto the cambium area of the freshly cut stump surface. Insure that the solution thoroughly wets the entire cambium area (the wood next to the bark of the stump).

Cut stem (injection, hack & squirt) treatments:

- Dilute Solutions- Using standard injection equipment, apply 1 milliliter of solution at each injection site around the tree with no more than one-inch intervals between cut edges. Insure that the injector completely penetrates the bark at each injection site.
- Concentrate Solutions- Using standard injection equipment, apply 1 milliliter of solution at each injection site. Make at least one injection cut for every 3 inches of Diameter at Breast Height (DBH) on the target tree. For example, a 3-inch DBH tree will receive 1 injection cut and a 6-inch DBH tree will receive 2 injection cuts. On trees requiring more than one injection site place the injection cuts at approximately equal intervals around the tree.

Frill or girdle treatments:

- Using a hatchet, machete, or chainsaw, make cuts through the bark and completely around the tree to expose the cambium. The cut should angle downward extending into the cambium enough to expose at least two growth rings. Using a spray applicator or brush, apply a 25% to 100% solution of **HABITAT** into each cut until thoroughly wet. Avoid applying so much herbicide that runoff to the ground or water occurs.

AQUATIC SPECIES CONTROLLED

HABITAT® herbicide will control the following target species as specified in the BASF RECOMMENDATION section of the table. Rate recommendations are expressed in terms of product volume for broadcast applications and as a % solution for directed applications including spot treatments. **For % solution applications, DO NOT apply more than the equivalent of 3 quarts of HABITAT per acre.**

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Floating Species		
*Duckweed	*Lemna minor*	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Duckweed, Giant	*Spirodela polyriza*	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Frogbit	*Limnobium spongia*	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Spatterdock	*Nuphar luteum*	Apply a tank-mix of 2-4 pints/acre **HABITAT** + 4 to 6 pints/acre glyphosate (0.5% **HABITAT** + 1.5% glyphosate) in 100 GPA water for best control. Ensure 100% coverage of actively growing, emergent foliage.
*Water Hyacinth	*Eichhornia crassipes*	1-2 pints/acre (0.5% solution) applied in 100 GPA water to actively growing foliage.
*Water Lettuce	*Pistia stratiotes*	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
Emerged Species		
*Alligatorweed	*Alternanthera philoxeroides*	1 to 4 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing emergent foliage. Tank-mix with glyphosate is NOT recommended, and may reduce alligatorweed control, requiring higher **HABITAT** rates.
*Arrowhead, Duck-potato	*Sagittaria spp.*	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Bacopa, lemon	*Bacopa spp.*	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Parrot feather	*Myriophyllum aquaticum*	Must be foliage above water for sufficient **HABITAT** uptake. Apply 2 - 4 pints to actively growing emergent foliage.
*Pennywort	*Hydrocotyle spp.*	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Pickerelweed	*Pontederia cordata*	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Taro, wild; Dasheen; Elephant's Ear; Coco Yam	*Colocasia esculentum*	4-6 pints/acre (1.5% solution) applied in 100 GPA with a high quality 'sticker' adjuvant. Ensure good coverage of actively growing, emergent foliage.
*Water lily	*Nymphaea odorata*	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Water primrose	*Ludwigia uruguayensis*	4-6 pints/acre (1.5% solution), ensure 100% coverage of actively growing, emergent foliage. Tank-mix with glyphosate is NOT recommended and may reduce water primrose control.

* Not approved for use in California

(continued)

AQUATIC SPECIES CONTROLLED *(continued)*

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Terrestrial/Marginal		
*Soda Apple, aquatic; Nightshade	*Solanum tampicense*	2 pts./acre applied to foliage
*Bamboo, Japanese	*Phyllostachys spp.*	3 to 4 pints/acre applied to the foliage when plant is actively growing. Before setting seed head. More foliage will result in greater herbicide uptake, resulting in greater root kill.
Brazilian Pepper; Christmasberry	*Schinus terebinthifolius*	2 - 4 pints/acre applied to foliage
Cattail	*Typha spp.*	2-4 pints (1% solution) applied to actively growing, green foliage after full leaf elongation. Lower rates will control cattail in the north; higher rates are needed in the south.
Chinese Tallow Tree	*Sapium sebiferum*	16 to 24 oz applied to foliage
Cogon Grass	*Imperata cylindrica*	Burn foliage, till area, that fall spray 2 qt./acre **HABITAT® herbicide** + MSO applied to new growth.
Cordgrass, prairie	*Spartina spp.*	4-6 pints applied to actively growing foliage
*Cutgrass	*Zizaniopsis miliacea*	4-6 pints applied to actively growing foliage
*Elephant Grass; Napier Grass-	*Pennisetum purpureum*	3 pts./acre applied to actively growing foliage
*Flowering rush	*Butumu typla*	2-3 pints applied to actively growing foliage
Giant Reed, Wild Cane	*Arundo donax*	4 to 6 pints/acre applied in spring to actively growing foliage
*Golden Bamboo	*Phyllostachys aurea*	3 to 4 pints/acre applied to the foliage when plant is actively growing. Before setting seed head. More foliage will result in greater herbicide uptake, resulting in greater root kill.
Junglerice	*Echinochloa colonum*	3-4 pints applied to actively growing foliage
Knapweeds	*Centaurea species*	Russian Knapweed - 2 to 3 pints + 1 qt./acre MSO fall applied after senescence begins
Knotweed, Japanese (see Fallopia japonica)	*Polygonum cuspidatum*	3 to 4 pts./acre applied postemergence to actively growing foliage
Melaleuca; Paperbark Tree	*Melaleuca quinquenervia*	For established stands, apply 6 pints/acre **HABITAT** + 6 pints/acre glyphosate + spray adjuvant. For best results use 4 qt./A methylated seed oil as an adjuvant. For ground foliar application, uniformly apply to ensure 100% coverage. For broadcast foliar control, apply aerially in a minimum of two passes at 10 gallons/acre applied cross treatment. For spot treatment use a 25% **HABITAT** + 25% solution of + glyphosate + 1.25% MSO in water applied as a frill or stump treatment.
*Nutgrass; Kili'p'opu	*Cyperus rotundus*	2 pints **HABITAT** + 1 qt./acre MSO applied early postemergence
*Nutsedge	*Cyperus spp.*	2 to 3 pints postemergence to foliage or pre-emergence incorporated, non-incorporated preemergence applications will not control.

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(continued)

AQUATIC SPECIES CONTROLLED *(continued)*

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Terrestrial/Marginal (Cont.)		
Phragmites; Common Reed	*Phragmites australis*	4 to 6 pints/acre applied to actively growing, green foliage after full leaf elongation, ensure 100% coverage. If stand has a substantial amount of old stem tissue, mow or burn, allow to regrow to approximately 5' tall before treatment. Lower rates will control phragmites in the north; higher rates are needed in the south.
*Poison Hemlock	*Conium maculatum*	2 pints **HABITAT® herbicide** + 1 qt./acre MSO applied preemergence to early postemergence to rosette, prior to flowering
Purple Loosestrife	*Lythrum salicaria*	1 pint/acre applied to actively growing foliage
Reed canarygrass	*Phalaris arundinacea*	3 to 4 pints/acre applied to actively growing foliage
Rose, swamp	*Rosa palustris*	2 to 3 pts./acre applied to actively growing foliage
Russian-Olive	*Elaeagnus angustifolia*	2 to 4 pints/acre or a 1% solution, applied to foliage
Saltcedar; Tamarisk	*Tamarix species*	Aerial apply 2 qts. **HABITAT** + 0.25%v/v NIS applied to actively growing foliage during flowering. For spot spraying use 1% solution of **HABITAT** + 0.25%v/v NIS and spray to wet foliage. After application wait at least two years before disturbing treated saltcedar. Earlier disturbance can reduce overall control.
Smartweed	*Polygonum* spp.	2 pints/acre applied early postemergence
Sumac	*Rhus spp.*	2 to 3 pts./acre applied to foliage
Swamp Morning Glory; Water Spinach; Kangkong	*Ipomoea aquatica*	1 to 2 pints/acre **HABITAT** + 1 qt./acre MSO applied early postemergence
Torpedo Grass	*Panicum repens*	4 pints/acre (1 - 1.5% solution), ensure good coverage to actively growing foliage.
*White Top; Hoary Cress	*Cardaria draba*	1 to 2 pints/acre applied in spring, to foliage, during flowering.
Willow	*Salix* spp.	2 to 3 pts./acre **HABITAT** applied to actively growing foliage, ensure good coverage.

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ADDITIONAL WEEDS CONTROLLED BY HABITAT HERBICIDE

In terrestrial sites, **HABITAT** will provide preemergence or postemergence control with residual control of the following target vegetation species at the rates listed. Residual control refers to control of newly germinating seedlings in both annuals and perennials. In general, annual weeds may be controlled by preemergence or postemergence applications of **HABITAT**. **For established biennials and perennials postemergence applications of HABITAT are recommended.**

The rates shown below pertain to broadcast applications and indicate the relative sensitivity of these weeds. The relative sensitivity should be referenced when preparing low volume spray solutions (see "Low Volume" section of "Ground Applications"); low volume applications may provide control of the target species with less **HABITAT** per acre than is shown for the broadcast treatments. **HABITAT** should be used only in accordance with the recommendations on this label and the leaflet label.

The relative sensitivity of the species listed below can also be used to determine the relative risk of causing non-target plant injury if any of the below listed species are considered to be desirable within the area to be treated.

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. If naturally occurring resistant biotypes are present in an area, **HABITAT** should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

GRASSES

COMMON NAME	SPECIES	GROWTH HABIT[2]
Apply 2-3 pints per acre[1]		
Annual bluegrass	*(Poa annua)*	A
Broadleaf signalgrass	*(Brachiaria platyphylla)*	A
Canada bluegrass	*(Poa compressa)*	P
Downy brome	*(Bromus tectorum)*	A
Fescue	*(Festuca* spp.*)*	A/P
Foxtail	*(Setaria* spp.*)*	A
Italian ryegrass	*(Lolium multiflorum)*	A
Johnsongrass	*(Sorghum halepense)*	P
Kentucky bluegrass	*(Poa pratensis)*	P
Lovegrass	*(Eragrostis* spp.*)*	A/P
*Napier grass	*(Pennisetum purpureum)*	P
Orchardgrass	*(Dactylis glomerata)*	P
Paragrass	*(Brachiaria mutica)*	P
Quackgrass	*(Agropyron repens)*	P
Sandbur	*(Cenchrus* spp.*)*	A
Sand dropseed	*(Sporobulus cryptandrus)*	P
Smooth brome	*(Bromus inermis)*	P
Vaseygrass	*(Paspalum urvillei)*	P
Wild oats	*(Avena fatua)*	A
Witchgrass	*(Panicum capillare)*	A
Apply 3-4 pints per acre[1]		
Barnyardgrass	*(Echinochloa crus-gali)*	A
Beardgrass	*(Andropogon* spp.*)*	P
Bluegrass, Annual	*(Poa annua)*	A
*Bulrush	*(Scirpus validus)*	P
Cheat	*(Bromus secalinus)*	A
Crabgrass	*(Digitaria* spp.*)*	A
Crowfootgrass	*(Dactyloctenium aegyptium)*	A
Fall panicum	*(Panicum dichotomiflorum)*	A
Goosegrass	*(Eleusine indica)*	A
Itchgrass	*(Rottboellia exaltata)*	A
Lovegrass	*(Eragrostis* spp.*)*	A
*Maidencane	*(Panicum hemitomon)*	A
Panicum, Browntop	*(Panicum fasciculatum)*	A
Panicum, Texas	*(Panicum texanum)*	A
Prairie threeawn	*(Aristida oligantha)*	P
Sandbur, Field	*(Cenchrus incertus)*	A
Signalgrass	*(Brachiaria platyphylla)*	A
Wild barley	*(Hordeum* spp.*)*	A
Wooly Cupgrass	*(Eriochloa villosa)*	A
Apply 4-6 pints per acre[1]		
Bahiagrass	*(Paspalum notatum)*	P
Bermudagrass[3]	*(Cynodon dactylon)*	P
Big bluestem	*(Andropogon gerardii)*	P
Dallisgrass	*(Paspalum dilatatum)*	P
Feathertop	*(Pennisetum villosum)*	P
Guineagrass	*(Panicum maximum)*	P
Saltgrass[3]	*(Distichlis stricta)*	P
Sand dropseed	*(Sporobolus cryptandrus)*	P

GRASSES (CONT)

COMMON NAME	SPECIES	GROWTH HABIT[2]
Sprangletop	*(Leptochloa* spp.*)*	A
Timothy	*(Phleum pratense)*	P
Wirestem muhly	*(Muhlenbergia frondosa)*	P

BROADLEAF WEEDS

COMMON NAME	SPECIES	GROWTH HABIT[2]
Apply 2-3 pints per acre[1]		
Burdock	*(Arctium* spp.*)*	B
Carpetweed	*(Mollugo verticillata)*	A
Carolina geranium	*(Geranium carolinianum)*	A
Clover	*(Trifolium* spp.*)*	A/P
Common chickweed	*(Stellaria media)*	A
Common ragweed	*(Ambrosia artemisiifolia)*	A
Dandelion	*(Taraxacum officinale)*	P
Dog fennel	*(Eupatorium capillifolium)*	A
Filaree	*(Erodium* spp.*)*	A
Fleabane	*(Erigeron* spp.*)*	A
Hoary vervain	*(Verbena stricta)*	P
Indian mustard	*(Brassica juncea)*	A
Kochia	*(Kochia scoparia)*	A
Lambsquarters	*(Chenopodium album)*	A
*Lespedeza	*(Lespedeza* spp.*)*	P
Miners lettuce	*(Montia perfoliata)*	A
Mullein	*(Verbascum* spp.*)*	B
Nettleleaf goosefoot	*(Chenopodium murale)*	A
Oxeye daisy	*(Chrysanthemum leucanthemum)*	P
Pepperweed	*(Lepidium* spp.*)*	A
Pigweed	*(Amaranthus* spp.*)*	A
Puncturevine	*(Tribulus terrestris)*	A
Russian thistle	*(Salsola kali)*	A
Smartweed	*(Polygonum* spp.*)*	A/P
Sorrell	*(Rumex* spp.*)*	P
Sunflower	*(Helianthus* spp.*)*	A
Sweet clover	*(Melilotus* spp.*)*	A/B
Tansymustard	*(Descurainia pinnata)*	A
Western ragweed	*(Ambrosia psilostachya)*	P
Wild carrot	*(Daucus carota)*	B
Wild lettuce	*(Lactuca* spp.*)*	A/B
Wild parsnip	*(Pastinaca sativa)*	B
Wild turnip	*(Brassica campestris)*	B
Woollyleaf bursage	*(Franseria tomentosa)*	P
Yellow woodsorrel	*(Oxalis stricta)*	P
Apply 3-4 pints per acre[1]		
Broom snakeweed[4]	*(Gutierrezia sarothrae)*	P
Bull thistle	*(Cirsium vulgare)*	B
Burclover	*(Medicago* spp.*)*	A
Chickweed, Mouseear	*(Cerastium vulgatum)*	A
Clover, Hop	*(Trifolium procumbens)*	A
Cocklebur	*(Xanthium strumarium)*	A

BROADLEAF WEEDS (CONT)

COMMON NAME	SPECIES	GROWTH HABIT[2]
Cudweed	*(Gnaphalium spp.)*	A
Desert Camelthorn	*(Alhagi pseudalhagi)*	P
Dock	*(Rumex spp.)*	P
Fiddleneck	*(Amsinckia intermedia)*	A
Goldenrod	*(Solidago spp.)*	P
Henbit	*(Lamium aplexicaule)*	A
Knotweed, prostrate	*(Polygonum aviculare)*	A/P
Pokeweed	*(Phytolacca americana)*	P
Purslane	*(Portulaca spp.)*	A
Pusley, Florida	*(Richardia scabra)*	A
Rocket, London	*(Sisymbrium irio)*	A
Rush skeletonweed[4]	*(Chondrilla juncea)*	B
Saltbush	*(Atriplex spp.)*	A
Shepherd's-purse	*(Capsella bursa-pastoris)*	A
Spurge, Annual	*(Euphorbia spp.)*	A
Stinging nettle[4]	*(Urtica dioica)*	P
Velvetleaf	*(Abutilon theophrasti)*	A
Yellow starthistle	*(Centaurea solstitialis)*	A
Apply 4-6 pints per acre[1]		
Arrowwood	*(Pluchea sericea)*	A
Canada thistle	*(Cirsium arvense)*	P
Giant ragweed	*(Ambrosia trifida)*	A
Grey rabbitbrush	*(Chrysothamnus nauseosus)*	P
Little mallow	*(Malva parviflora)*	B
Milkweed	*(Asclepias spp.)*	P
Primrose	*(Oenothera kunthiana)*	P
Silverleaf nightshade	*(Solanum eleagnifolium)*	P
Sowthistle	*(Sonchus spp.)*	A
Texas thistle	*(Cirsium texanum)*	P

VINES AND BRAMBLES

COMMON NAME	SPECIES	GROWTH HABIT[2]
Apply 1 pint per acre		
Field bindweed	*(Convolvulus arvensis)*	P
Hedge bindweed	*(Calystegia sequium)*	A
Apply 2-3 pints per acre[1]		
Wild buckwheat	*(Polygonum convolvulus)*	P
Apply 3-4 pints per acre[1]		
Greenbriar	*(Smilax spp.)*	P
Honeysuckle	*(Lonicera spp.)*	P
Morningglory	*(Ipomoea spp.)*	A/P
Poison ivy	*(Rhus radicans)*	P
Redvine	*(Brunnichia cirrhosa)*	P
Wild rose	*(Rosa spp.)*	P
Including:		
Multiflora rose	*(Rosa multiflora)*	P
McCartney rose	*(Rosa bracteata)*	P
Apply 4-6 pints per acre[1]		
*Kudzu[3]	*(Pueraria lobata)*	P
Trumpetcreeper	*(Campsis radicans)*	P
Virginia creeper	*(Parthenocissus quinquefolia)*	P
Wild grape	*(Vitis spp.)*	P

BRUSH SPECIES

COMMON NAME	SPECIES	GROWTH HABIT[2]
Apply 4-6 pints per acre[1]		
American beech	*(Fagus grandifolia)*	P
Ash	*(Fraxinus spp.)*	P
Bald cypress	*(Taxodium distichum)*	P
Bigleaf maple	*(Acer macrophylum)*	P
Black locust[5]	*(Robinia pseudoacacia)*	P
Black gum	*(Nyssa sylvatica)*	P
Box elder	*(Acer negundo)*	P
Cherry	*(Prunus spp.)*	P
Chinaberry	*(Melia azadarach)*	P
Dogwood	*(Cornus spp.)*	P
Elm[6]	*(Ulmus spp.)*	P
Hawthorn	*(Crataegus spp.)*	P
Hickory	*(Carya spp.)*	P
Honeylocust[5]	*(Gleditsia triacanthos)*	P
Maple	*(Acer spp.)*	P
Mulberry	*(Morus spp.)*	P
Oak	(Quercus spp.)	P
Persimmon	*(Diospyros virginiana)*	P
*Pine[5]	*(Pinus spp.)*	P
Poplar	*(Populus spp.)*	P
Privet	*(Ligustrum vulgare)*	P
Red Alder	*(Alnus rubra)*	P
Red Maple	*(Acer rubrum)*	P
Russian Olive	*(Eleagnus angustifolia)*	P
Sassafras	*(Sassafras albidum)*	P
Sourwood	*(Oxydendrum arboreum)*	P
Sweetgum	*(Liquidambar styraciflua)*	P
*Water willow	*(Justica americana)*	P
Willow	*(Salix spp.)*	P
Yellow poplar	*(Liriodendron tulipifera)*	P

[1] The higher rates should be used where heavy or well-established infestations occur.

[2] Growth Habit - A = Annual, B = Biennial, P = Perennial

[3] Use a minimum of 75 GPA - Control of established stands may require repeat applications.

[4] For best results early postemergence applications are required.

[5] Tank mix with glyphosate or triclopyr.

[6] Tank-mix with with glyphosate.

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DISCLAIMER

The label instructions for the use of this product reflect the opinion of experts based on research and field use. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Turf injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the use of, or application of the product contrary to label instructions, all of which are beyond the control of BASF Corporation (BASF). All such risks shall be assumed by the user.

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BASF Corporation

26 Davis Drive

Research Triangle Park, NC 27709

BASF

The Chemical Company

Specimen Label

Dow AgroSciences

Garlon* 3A

Specialty Herbicide

*Trademark of Dow AgroSciences LLC

For the control of woody plants, broadleaf weeds and vines in forests and industrial non-crop areas, including manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, and around farm buildings; including application to grazed areas, and establishment and maintenance of wildlife openings on these sites, and in Christmas tree plantations. Use within production forests and industrial non-crop sites may include applications to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes.

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	44.4%
Inert Ingredients	55.6%
Total	100.0%

Acid equivalent: triclopyr - 31.8% - 3 lb/gal

EPA Reg. No. 62719-37

Keep Out of Reach of Children

DANGER PELIGRO

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.)

Precautionary Statements

Hazard to Humans and Domestic Animals

Corrosive • Causes Irreversible Eye Damage • Harmful If Swallowed Or Absorbed Through Skin • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reaction In Some Individuals

Do not get in eyes or on skin or clothing.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks
- Protective eyewear
- Chemical resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS (40 CFR 170.240(d)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Note to Applicator: Allergic skin reaction is not expected from exposure to spray mixtures of Garlon 3A herbicide when used as directed.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Environmental Hazards

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

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

Physical or Chemical Hazards

Combustible. Do not use or store the product near heat or open flame.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies elsewhere on this label. If terms are unacceptable, return at once unopened.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

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

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 48 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
- Shoes plus socks
- Protective eyewear
- Chemical-resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber

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 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.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal.
Open dumping is prohibited.
Pesticide Storage: Store above 28°F or agitate before use.
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 for Refillable Containers: Seal all openings which have been opened during use. Return the empty container to a collection site designated by Dow AgroSciences. If the container has been damaged and cannot be returned according to the recommended procedures, contact Dow AgroSciences Customer Service Center at 1-800-258-1470 to obtain proper handling instructions.
Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.
Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.
General: Consult federal, state, or local disposal authorities for approved alternative procedures.

General Information for Production Forests and Industrial Non-Crop Areas

Garlon* 3A specialty herbicide is recommended for the control of woody plants, broadleaf weeds and vines in forests and industrial non-crop areas including manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, and around farm buildings, including application to grazed areas, and establishment and maintenance of wildlife openings on these sites, and in Christmas tree plantations. Use within production forests and industrial non-crop sites may include applications to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

General Use Precautions and Restrictions

In Arizona: The state of Arizona has not approved Garlon 3A for use on plants grown for commercial production, specifically forests grown for commercial timber production, or on designated grazing areas.

When applying this product in tank mix combination, follow all applicable use directions, precautions and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Do not apply Garlon 3A directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit spray mists containing it to drift into them.

It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites.

- **Do not** apply to salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply on ditches or canals used to transport irrigation water. It is permissible to treat non-irrigation ditch banks.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.
- When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.
- The use of a mistblower is not recommended.
- Apply no more than 2 lb ae of triclopyr (2/3 gallon of Garlon 3A) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, Garlon 3A may be used at rates up to 6 lb ae of triclopyr (2 gallons of Garlon 3A) per acre per year.
- For all terrestrial use sites other than range, pasture, forestry sites, and grazed areas, the maximum application rate is 9 lb ae of triclopyr (3 gallons of Garlon 3A) per acre per year.

Precautions for Potable Water Intakes for Emerged Aquatic Weed Control

See chart below for specific setback distances near functioning potable water intakes. **Note:** Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

	Garlon 3A Application Rate, qt/acre			
Area Treated	2 qt/acre	4 qt/acre	6 qt/acre	8 qt/acre
(acres)	Setback Distance (ft)			
4	0	200	400	500
>4 - 8	0	200	700	900
>8 - 16	0	200	700	1000
>16	0	200	900	1300

To apply Garlon 3A around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

Grazing and Haying Restrictions

Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals:** Do not allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- Do not harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoiding Injurious Spray Drift

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application: For aerial application on rights-of-way or other areas near susceptible crops, apply through a Microfoil† or Thru-Valve boom†, or use an agriculturally labeled drift control additive. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free as mixtures containing agriculturally labeled thickening agents or applications made with the Microfoil or Thru-Valve boom. Keep spray pressures low enough to provide coarse spray droplets. Spray boom should be no longer than 3/4 of the rotor length. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

† Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

Spray Drift Management

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.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the following Aerial Drift Reduction Advisory. [This information is advisory in nature and does not supersede mandatory label requirements.]

Aerial Drift Reduction Advisory

Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest 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 the recommended practice. Significant deflection from 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.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe 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 aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 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: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud 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 the 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.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Garlon 3A should be used in thickened (high viscosity) spray mixtures using an agriculturally labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. An agriculturally labeled thickening agent may be used to reduce drift.

Plants Controlled by Garlon 3A

Woody Plant Species

alder	Douglas-fir	poplar
arrowwood	dogwood	salt-bush *(Baccharis* spp.)
ash	elderberry	sassafras
aspen	elm	scotch broom
bear clover (bearmat)	gallberry	sumac
beech	hazel	sweetbay magnolia
birch	hornbean	sweetgum
blackberry	kudzu†	sycamore
blackgum	locust	tanoak
Brazilian pepper	madrone	thimbleberry
cascara	maples	tulip poplar
ceanothus	mulberry	waxmyrtle
cherry	oaks	western hemlock
chinquapin	persimmon	wild rose
choke cherry	pine	willow
cottonwood	poison ivy	winged elm
crataegus (hawthorn)	poison oak	salmonberry

†For complete control, retreatment may be necessary.

Annual and Perennial Broadleaf Weeds

bindweed	dandelion	ragweed
burdock	field bindweed	smartweed
Canada thistle	lambsquarter	tansy ragwort
chicory	plantain	vetch
curly dock	Purple loosestrife	wild lettuce

Application Methods

Use Garlon 3A at rates of 3/4 to 9 lb ae of triclopyr (1/4 to 3 gallons of Garlon 3A) per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Use only water suitable for spraying. Use of an agriculturally labeled non-ionic surfactant is recommended for all foliar applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre. The recommended order of addition to the spray tank is water, spray thickening agent (if used), additional herbicide (if used), and Garlon 3A. Surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.

Before using any recommended tank mixtures, read the directions and all use precautions on both labels.

For best results, applications should be made when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, elm, maples, oaks, pines, or winged elm are prevalent and during applications made in late summer when the plants are mature and during drought conditions, use the higher rates of Garlon 3A alone or in combinations with Tordon* 101 Mixture herbicide. (Tordon 101 Mixture is a restricted use pesticide. See product label.)

When using Garlon 3A in combination with 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile ester herbicides, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

On sites where easy to control brush species dominate, rates less than those recommended may be effective. Consult State or Local Extension personnel for such information.

Foliage Treatment With Ground Equipment

High Volume Foliage Treatment

For control of woody plants, use Garlon 3A at the rate of 3 to 9 lb ae of triclopyr (1 to 3 gallons of Garlon 3A) per 100 gallons of spray solution, or Garlon 3A at 3/4 to 3 lb ae of triclopyr (1 to 4 quarts of Garlon 3A) may be tank mixed with 1/4 to 1/2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile ester or Tordon 101 Mixture and diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending on size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. (See General Use Precautions and Restrictions.) Do not exceed maximum allowable use rates per acre (see table below).

Maximum Labeled Rate versus Spray Volume per Acre

Total Spray Volume (gal/acre)	Maximum Rate of Garlon 3A		
	Rangeland and Pasture Sites† (gal/100 gal of spray)	Forestry Sites†† (gal/100 gal of spray)	Other Non-Cropland Sites††† (gal/100 gal of spray)
400	Do not use	0.5	0.75
300	Do not use	0.67	1
200	Do not use	1	1.5
100	0.67	2	3
50	1.33	4	6
40	1.67	5	7.5
30	2.33	6.65	10
20	3.33	10	15
10	6.67	20	30

† Do not exceed the maximum use rate of 2 lb ae of triclopyr (2/3 gal of Garlon 3A)/acre/year.

†† Do not exceed the maximum use rate of 6 lb ae of triclopyr (2 gal of Garlon 3A)/acre/year.

††† Do not exceed the maximum use rate of 9 lb ae of triclopyr (3 gal of Garlon 3A)/acre/year on non-cropland use sites other than rangeland, pasture, forestry, and grazed areas.

Low Volume Foliage Treatment

To control susceptible woody plants, apply up to 15 lb ae of triclopyr (5 gallons of Garlon 3A) in 10 to 100 gallons of finished spray. The spray concentration of Garlon 3A and total spray volume per acre may be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see General Use Precautions and Restrictions). For best results, a surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Tank Mixing: As a low volume foliar spray, up to 9 lb ae of triclopyr (3 gallons of Garlon 3A) may be applied in tank mix combination with 1/2 to 1 gallon of Tordon K or 1 to 2 gallons of Tordon 101 Mixture in 10 to 100 gallons of finished spray.

Broadcast Applications With Ground Equipment

Make application using equipment that will assure uniform coverage of the spray volumes applied. To improve spray coverage, add an agriculturally labeled non-ionic surfactant as described later under Directions for Use. See Maximum Labeled Rate versus Spray Volume per Acre table above for relationship between mixing rate, spray volume and maximum application rate.

Woody Plant Control

Foliage Treatment: Use 6 to 9 lb ae of triclopyr (2 to 3 gallons of Garlon 3A) in enough water to make 20 to 100 gallons of total spray per acre or 1 1/2 to 3 lb ae of triclopyr (1/2 to 1 gallon of Garlon 3A) may be combined with 1 to 2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile esters or Tordon 101 Mixture in sufficient water to make 20 to 100 gallons of total spray per acre.

Broadleaf Weed Control

Use Garlon 3A at rates of 1 to 4 1/2 lb ae of triclopyr (1/3 to 1 1/2 gallons of Garlon 3A) in a total volume of 20 to 100 gallons of water per acre. Apply any time during the growing season. Garlon 3A at 1 to 3 lb ae of triclopyr (1/3 to 1 gallon of Garlon 3A) may be tank mixed with 1/2 to 1 gallon of Tordon K, Tordon 101 Mixture or 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile herbicides to improve the spectrum of activity.

Aerial Application (Helicopter Only)

Aerial sprays should be applied using suitable drift control. (See General Use Precautions and Restrictions.) Add an agriculturally labeled non-ionic surfactant as described under Directions for Use. See Maximum Labeled Rate versus Spray Volume per Acre table above for relationship between mixing rate, spray volume and maximum application rate.

Foliage Treatment (Non-Grazed Rights-of-Way)

Non-grazed areas: Use 6 to 9 lb ae of triclopyr (2 to 3 gallons of Garlon 3A) or 3 to 4 1/2 lb ae of triclopyr (1 to 1 1/2 gallons of Garlon 3A) in a tank mix combination with 1 to 2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile esters or Tordon 101 Mixture, and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions.

Interspersed areas in non-grazed rights-of-ways that may be subject to grazing may be spot treated if the treated area comprises no more than 10% of the total grazable area.

Forest Management Applications

For best control from broadcast applications of Garlon 3A, use a spray volume which will provide thorough plant coverage. Recommended spray volumes are usually 10 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. To improve spray coverage of spray volumes less than 50 gallons per acre, add an agriculturally labeled non-ionic surfactant as described under Directions for Use. Application systems should be used to prevent hazardous drift to off-target sites. Nozzles or additives that produce larger droplets of spray may require higher spray volumes to maintain brush control.

Forest Site Preparation (Not for Conifer Release)

Use up to 6 lb ae of triclopyr (2 gallons of Garlon 3A) and apply in a total spray volume of 10 to 30 gallons per acre or Garlon 3A at 3 to 4 1/2 lb ae of triclopyr (1 to 1 1/2 gallons of Garlon 3A) may be used with 1 to 2 gallons of Tordon 101 Mixture or 2,4-D 3.8 lb low volatile ester in a tank mix combination in a total spray volume of 10 to 30 gallons per acre. Use of a non-ionic agricultural surfactant is recommended for all foliar applications as described under Directions for Use.

Note: Conifers planted sooner than one month after treatment with Garlon 3A at less than 4 lb ae of triclopyr (1 1/3 gallons of Garlon 3A) per acre or sooner than two months after treatment at 4 to 9 lb ae of triclopyr (1 1/3 to 3 gallons of Garlon 3A) per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture should be consulted and the longest recommended waiting period before planting observed.

Directed Spray Applications for Conifer Release

To release conifers from competing hardwoods such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, hickory, alder, birch, aspen, and pin cherry, mix 3 to 6 lb ae triclopyr (1 to 2 gallons of Garlon 3A) in enough water to make 100 gallons of spray mixture. To improve spray coverage, add an agriculturally labeled non-ionic surfactant as described under Directions for Use. The spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after hardwoods have reached full leaf size, but before autumn coloration. The majority of treated hardwoods should be less than 6 feet in height to ensure adequate spray coverage. Care should be taken to direct spray away from contact with conifer foliage, particularly foliage of desirable pines.

Note: Spray may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Broadcast Application for Conifer Release in the Northeastern United States

To release spruce, fir, red pine and white pine from competing hardwoods, such as red maple, sugar maple, striped maple, alder, birch (white, yellow or gray), aspen, ash, pin cherry and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 3A at rates of 1 1/2 to 3 lb ae triclopyr (2 to 4 quarts of Garlon 3A) per acre alone or plus 2,4-D amine, like DMA 4 IVM, or 2,4-D ester to provide no more than 4 pounds acid equivalent per acre from both products. Applications should be made in late summer or early fall after conifers have formed their over wintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Douglas Fir Release in the Pacific Northwest and California

To release Douglas fir from susceptible competing vegetation such as broadleaf weeds, alder, blackberry or Scotch broom, apply Garlon 3A at 1 to 1 1/2 lb ae triclopyr (1 1/3 to 2 quarts of Garlon 3A) per acre alone or in combination with 4 lb per acre of atrazine. Mix all sprays in a water carrier with a non-ionic surfactant. Applications should be made in early spring after hardwoods begin growth and before Douglas fir bud break ("early foliar" hardwood stage) or after Douglas fir seasonal growth has "hardened off" (set winter buds) in late summer, but while hardwoods are still actively growing. When treating after Douglas fir bud set, apply prior to onset of autumn coloration in hardwood foliage. **Note:** Treatments applied during active Douglas fir shoot growth (after spring bud break and prior to bud set) may cause injury to Douglas fir trees.

Cut Surface Treatments

To control unwanted trees of hardwood species such as elm, maple, oak and conifers in rights-of-way and other non-crop areas, apply Garlon 3A, either undiluted or diluted in a 1 to 1 ratio with water, as directed below.

With Tree Injector Method

Applications should be made by injecting 1/2 milliliter of undiluted Garlon 3A or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **Note: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

With Hack and Squirt Method

Make cuts with a hatchet or similar equipment at intervals of 3 to 4 inches between centers at a convenient height around the tree trunk. Spray 1/2 milliliter of undiluted Garlon 3A or 1 milliliter of the diluted solution into each cut.

With Frill or Girdle Method

Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species - for example, maples.

Stump Treatment

Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Garlon 3A. The cambium area next to the bark is the most vital area to wet.

Christmas Tree Plantations

Garlon 3A is recommended for the control of woody plants and annual and perennial broadleaf weeds in established Christmas tree plantations. For best results, applications should be made when woody plants and weeds are actively growing. Garlon 3A does not control weeds which have not emerged at the time of application. If lower rates are used on hard to control woody species, resprouting may occur the year following treatment. Brush over 8 feet tall is difficult to treat efficiently using hand equipment such as backpack or knapsack sprayers. When treating large brush or trees or hard to control species such as ash, blackgum, choke cherry, elm, hazel, madrone, maples, oaks or sweetgum, and for applications made during drought conditions or in late summer when the leaves are mature, use the higher rates of Garlon 3A or use cut surface application methods. For foliar applications, apply in enough water to give uniform and complete coverage of the plants to be controlled. Applications made under drought conditions may provide less than desirable results.

Use Precautions

- Do not use on newly seeded grass until well established as indicated by vigorous growth and development of secondary root system and tillering
- Newly seeded turf (alleyways, etc.) should be mowed two or three times before any treatment with Garlon 3A.
- Do not reseed Christmas tree areas treated with Garlon 3A for a minimum of three weeks after application.
- Do not use Garlon 3A if legumes, such as clover, are present and injury cannot be tolerated.

Spray Preparation

The recommended order of addition to the spray tank is water, drift control agent (if used), non-ionic agricultural surfactant and Garlon 3A. Continue moderate agitation while mixing and spraying. Use of a non-ionic agricultural surfactant is recommended for all applications. When using surfactants, follow use directions and precautions listed on the manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre.

Application

Make applications in late summer or early autumn after terminal growth of Christmas trees has hardened of, but before leaf drop of, target weeds. Apply at a rate of 3/4 to 1 3/4 lb ae triclopyr (2 to 5 pints of Garlon 3A) per acre as a foliar spray directed toward the base of Christmas trees. Use sufficient spray volume to provide uniform coverage of target plants (20 to 100 gallons per acre). **Do not apply with 2,4-D.** Application rates of Garlon 3A recommended for Christmas trees will only suppress some well established woody plants that are greater than 2 to 3 years old (see table below). Broadcast sprays may also be applied in bands between the rows of planted trees. Use spray equipment that will assure uniform coverage of the desired spray volume.

Spray solution from Garlon 3A can cause needle and branch injury to Christmas trees. To minimize injury to Christmas trees, it is recommended that sprays be directed so as to minimize contact with foliage. Blue spruce, white spruce, balsam fir and Frasier fir are less susceptible to injury than white pine and Douglas fir.

Restriction: Apply Garlon 3A only to established Christmas trees that were planted at least one full year prior to application.

Application Rates and Species Controlled:

Garlon 3A		
2 pints/acre (3/4 lb ae triclopyr)	3 to 4 pints/acre (1 1/2 lb ae triclopyr)	5 pints/acre (1 3/4 lb ae triclopyr)
clover	bindweed, field (TG)	arrowwood (SDL)
dandelion	blackberry†	aspen
dock, curly	chicory (s)	beech (SDL)
lambsquarters	fireweed	birch (SDL)
lespedeza	ivy, ground	chinquapin
plantain, broadleaf	lettuce, wild	cottonwood (SDL)
plantain, buckhorn	oxalis	elderberry
ragweed, common	poison ivy	grape, wild
vetch	smartweed (TG)	mulberry (SDL)
	thistle, Canada (TG)	poplar (SDL)
	violet, wild	sassafras (SDL)
	Virginia creeper†	sumac (SDL)
		sycamore (SDL)

(TG) Top growth control, retreatment may be necessary
(S) Suppression
(SDL) Seedlings less than 2-3 years old
†Use 4 pint per acre rate

Directed Applications

To control hardwoods such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, alder, birch, aspen, and pin cherry mix 4 to 20 fluid ounces of Garlon 3A in enough water to make 3 gallons of spray mixture. For directed applications, do not exceed 6 lb ae triclopyr (2 gallons of Garlon 3A) per acre per year. To improve coverage, add a non-ionic agricultural surfactant to the spray. This spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after hardwoods have reached full leaf size, but before autumn coloration (when plants are actively growing). The majority of treated hardwoods should be less than 8 feet in height to ensure adequate spray coverage. **Note:** To prevent Christmas tree injury, care should be taken to direct spray away from contact with Christmas tree foliage.

Cut Surface Treatments

When treating large brush or trees or hard to control species such as ash, blackgum, choke cherry, elm, hazel, madrone, maples, oaks or sweetgum, and for applications made during drought conditions or in late summer when the leaves are mature, use cut surface treatments. (See directions for Cut Surface Treatments in preceding section of this label.)

Wetland Sites in Production Forests and Industrial Non-Crop Areas

Garlon 3A may be used within production forests and industrial non-crop sites to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes and transition areas between upland and lowland sites.

For control of woody plants and broadleaf weeds in these sites, follow use directions and application methods on this label for forestry and terrestrial non-cropland sites.

Use Precautions

Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. **Note:** Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

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Revisions:

1. Corrected Example Calculation 2 on page 10: = (800 x 3.912) – 160/3.33.