ENVIRONMENTAL ASSESSMENT

Invasive Plant Management—Worland and Cody Field Offices

BLM

Worland/Cody Field Offices, Wind River/Bighorn Basin District, Wyoming

December 2010

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

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DOI-BLM-WY-R010-2010-0026-EA

United States Department of the Interior
Bureau of Land Management

Invasive Plant Management – Worland/Cody Field Office

Location: *The BLM Worland and Cody Field Office administrative area is located in North-central Wyoming. The WFO and CYFO include approximately 5.6 million acres of land in Bighorn, Hot Springs, Park, and Washakie Counties.* **Environmental Assessment**
DOI-BLM-WY-R010-2010-0026-EA
December 2010

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1.0 PURPOSE & NEED

1.1 Introduction

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the invasive plant management as proposed by Worland and Cody Field Offices (WFO & CYFO). The EA is a field office analysis of potential effects that could result with the implementation of the *Proposed Action*. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record may be signed for the EA approving the selected alternative, whether the proposed action or another alternative. A Decision Record, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects) beyond those already addressed in the Washakie, Grass Creek, and Cody Resource Management Plans, 1988, 1998, and 1990 respectively.

1.2 Background:

Invasive plants are defined as "non-native plants whose introduction does or is likely to cause economic or environmental harm or harm to human health," based on the definition provided in Executive Order 13112[1]. Invasive plants are compromising the ability to manage BLM lands for a healthy native ecosystem. Invasive plants can create a

[1] EXECUTIVE ORDER 1311 INVASIVE SPECIES (1999) - directs federal agencies to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

host of environmental and other effects, most of which are harmful to native ecosystem processes, including: displacement of native plants; reduction in functionality of habitat and forage for wildlife and livestock; increased potential for soil erosion and reduced water quality; alteration of physical and biological properties of soil; loss of long-term riparian area function; loss of habitat for culturally significant plants; high cost (dollars spent) of controlling invasive plants; and increased cost to maintaining transportation systems and recreational sites.
The Bureau of Land Management (BLM) proposes to manage invasive plants throughout the entire WFO and CYFO (Appendix B, Map 1-2) by utilizing integrated pest management[2]. The methods evaluated in this EA include:

Biological - Biological control involves the intentional use of domestic animals, insects, nematodes, mites, or pathogens (agents such as bacteria or fungus that can cause diseases in plants) that weaken or destroy vegetation. Biological control is used to reduce the targeted weed population to an acceptable level by stressing target plants and reducing competition with the desired plant species.

Chemical - Herbicides are chemicals that kill or injure plants. Herbicides can be categorized as selective or non-selective. Selective herbicides kill only a specific type of plant, such as broad-leaved plants, while non-selective herbicides kill all types of plants.

Physical - Manual treatment involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Treatments include cutting undesired plants above the ground level; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and re-growth; cutting at the ground level or removing competing plants around desired species; or placing mulch around desired vegetation to limit competitive growth.

1.3 Need for the Proposed Action

The WFO and CYFO propose to implement integrated pest management to address the introduction and spread of invasive plants. Increased use of public land has contributed to habitat degradation as invasive plants replace native vegetation. Invasive vegetation reduces soil productivity, water quality and quantity, native plant communities, wildlife habitat, wilderness values, recreational opportunities, and livestock forage. The current untreated, known weed-infested acreage is estimated at 60,000 acres (not including areas infested with cheat grass[3]). However, most of the proposed treatment area has not been inventoried for noxious and invasive species; thus, the actual number of acres needing treatment has not been established. Historically, the two offices, including the County Weed and Pest Control District, combined have treated approximately 2,000

[2] INTEGRATED PEST MANAGEMENT - a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks (DOI Departmental Manual 517)
[3] CHEATGRASS – Refers to downy brome grass (*Bromus tectorum)*

acres of invasive species per year. The current treatment focus is on Wyoming state listed noxious weeds[4]; however, controlling other invasive species (cheat grass) that cause management problems related to livestock, wildlife, and human activities is a secondary focus. Surface disturbing activities associated with natural gas development, bentonite mining, and existing oil fields such as pad, road, and pipeline construction, are increasing the presence of these invasive species. Associated with this development is the need for vegetation control around production facilities. Structures such as tanks, well heads, meter houses, etc., require complete vegetation control to eliminate fire hazards.

The following list contains Wyoming designated noxious plants.

Table 1. Wyoming Weed and Pest Control Act Designated List

Common Name	Common Name	Common Name	Common Name
Canada thistle	Field bindweed	Perennial pepperweed (giant white top)	Skeletonleaf bursage
Common burdock	Hoary cress (white top)	Plumeless thistle	Spotted knapweed
Common St. Johnswort	Houndstongue	Purple loosestrife	Tamarisk
Common Tansy	Leafy spurge	Quackgrass	Yellow toadflax
Diffuse knapweed	Musk thistle	Russian knapweed	
Dalmatian toadflax	Ox-eye daisy	Russian Olive	
Dyers wood	Perennial sowthistle	Scotch thistle	

Source: Wyoming Weed and Pest Council 2008a

1.4 Purpose(s) of the Proposed Action

The WFO and CYFO is proposing to treat invasive plants in accordance to the **Federal Land Policy and Management Act of 1976,** which directs the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resources, and archeological value." ***Executive Order 13112***, ***Invasive Species***, directs federal agencies to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. Several other federal acts provide for management and control of invasive plants. Two weed control acts, the ***Carlson-Foley Act of 1968*** and the ***Plant Protection Act of 2000*** (Public Law 106-224; includes management of undesirable plants on federal lands; authorizes the BLM to manage noxious weeds and to coordinate with other federal and state agencies in activities to eradicate, suppress, control, prevent, or retard the spread of any noxious weeds on federal lands. The ***Federal Noxious Weed Act of 1974*** established and funded an undesirable plant management program, implemented cooperative agreements with state agencies, and established integrated management systems to control undesirable plant species. The objectives of the ***Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands***

[4] WYOMING NOXIOUS WEED – Legal designation by the Wyoming Department of Agriculture

Administered by the Bureau of Land Management in the State of Wyoming (1997) are to "promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions…and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands."

In addition to federal mandates, the State of Wyoming, **Weed and Pest Act of 1973**, requires the federal government to control undesirable plant species by the use of integrated weed management.

Reducing the number of infested acres of invasive plants would meet the objective of sustaining biological communities as directed by the **BLM Operating Plan 2004-2008**. It would also meet the objectives of the **Bighorn Basin Noxious Weed Management Plan**, which includes best management practices for surface disturbances, roads, vehicles, livestock grazing, recreation sites, and wild land or prescribed fire, that are designed to eliminate or minimize impacts from noxious and invasive weeds.

Other objectives of the *Proposed Action* are to provide methods for invasive vegetation treatment on public lands within the WFO and CYFO and to describe the conditions and limitations that apply to their use.

1.5 Conformance with WFO and CYFO Land Use Plans

The proposed action and alternatives described below are in conformance with the Worland Resource Management Plan, approved in 1988 and the Cody Resource Management Plan, approved in 1990, and the Grass Creek Resource Management Plan, approved in 1998. The management objective is to control the introduction and proliferation of noxious and invasive species and reduce the established populations to acceptable levels determined through consultation, and coordination with local, state, and other federal plans, policies, and agency agreements. Management actions would include:

1) The priority for control of noxious and invasive species would be to reduce and eliminate, where possible, small new infestations and to control large infestations;

2) Vegetation treatments (mechanical, biological, chemical, and prescribed fire) would be applied to meet the standards for rangeland health and watershed function, and to achieve the desired plant community, while considering habitat for wildlife, including Special Status Species.

1.6 Relationship to Statutes, Regulations, or other Plans

The following provides a description of the authorities that apply to *Proposed Action*. This is not an all-inclusive list of statutes, limitations, and guidelines, but is a representative list of the types of laws and policy that guide the management of the

public land. All laws, regulations, and policies, including BLM manuals, handbooks and internal memoranda, would be followed unless otherwise stated.

Vegetation Treatments in 17 Western States, Programmatic EIS (BLM, 2007)
This document will be tiered to and incorporated by reference in this EA to address the general effects on the environment of using herbicide and non-herbicide treatment methods, including mechanical, manual, and biological control methods.

ENVIRONMENTAL POLICY

The National Environmental Policy Act (1969)

- requires the preparation of Environmental Impact Statements (EIS) for federal projects that may have a significant effect on the environment
- requires systematic, interdisciplinary planning to ensure the integrated use of natural and social sciences and environmental design arts in making decisions about major federal actions that may have a significant effect on the environment

LAND USE AND NATURAL RESOURCES MANAGEMENT

Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision (BLM, 2007)
The ROD approved:

- the use of 18 herbicide active ingredients
- the use of a scientific protocol to guide the analytical methodology for consideration of the use or non-use of herbicides by the BLM

Federal Land Policy and Management Act (1976)
Directs the BLM to "take any action necessary to prevent unnecessary and undue degradation of public land"

Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the Bureau of Land Management in the State of Wyoming (1997)
The objectives of the rangeland health regulations are to:

- promote healthy sustainable rangeland ecosystems;
- to accelerate restoration and improvement of public rangelands to properly functioning conditions;
- and provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands.

Carlson-Foley Act (1968)
Directs agency heads to enter upon land under their jurisdiction with noxious plants and destroy noxious plants growing on such land.

Federal Noxious Weed Act (1974), as amended by Sec. 15, Management of Undesirable Plants on Federal Lands, 1990
Congress amended the Federal Noxious Weed Act of 1974 and this amendment was signed into law November 28, 1990. This Act requires that each Federal Agency:

- designate a lead office and person trained in the management of undesirable plants;
- establish and fund an undesirable plant management program;
- complete and implement cooperative agreements with State Agencies;
- and establish integrated management systems to control undesirable plant species.

Executive Order 13112, Invasive Species (1999)
Directs federal agencies to prevent the introduction of invasive species and provide for control, and to minimize the economic, ecological, and human health impacts that invasive cause.

Public Rangelands Improvement Act (1978)
Requires the BLM to manage, maintain, and improve the condition of the public rangelands so that they become as productive as feasible.

BLM Manual 9014 – *Use of Biological Control Agents of Pests on Public Lands* – This manual outlines policy, defines responsibilities, and provides guidance for the release, maintenance, and collections of biological control agents for integrated pest management programs on the lands administered by the BLM.
BLM Manual 9220 – *Integrated Pest Management* – This manual outlines policy, defines responsibilities, and provides guidance for implementing integrated pest management programs on lands administered by the BLM.
BLM Manual 9011 and **Manual Handbook H-9011-1** - *Chemical Pest Control* – This manual and handbook outline policy and provide guidance for conduction pest control programs on public land.
BLM Manual 9015 – *Integrated Weed Management* – This manual addresses the BLM's policy relating to the management and coordination of noxious weed activities among activities of the BLM, organizations, and individuals.

AIR QUALITY
The **Clean Air Act (1990) ,** as amended (42 U.S.C. 7401, 7642), requires BLM to protect air quality, maintain federal- and state-designated air quality standards, and abide by the requirements of the State Implementation Plans.
Wyoming Air Quality Standards and Regulations specify the requirements for air permitting and monitoring to implement Clean Air Act and state ambient air quality standards.

CULTURAL RESOURCES

The **Historic Sites Act** (16 U.S.C. 461) declares national policy to identify and preserve historic sites, buildings, objects, and antiquities of national significance, thereby providing a foundation for the National Register of Historic Places.

The **National Historic Preservation Act** (**1966**), as amended (16 U.S.C. 470), expands protection of historic and archeological properties to include those of national, state, and local significance. It also directs federal agencies to consider the effects of proposed actions on properties eligible for or included in the National Register of Historic Places.

The **Archaeological Resources Protection Act** (**1979)**, as amended (16 U.S.C. 470a, 470cc, 470ee), requires permits for the excavation or removal of federally administered archeological resources, encourages increased cooperation among federal agencies and private individuals, provides stringent criminal and civil penalties for violations, and requires federal agencies to identify important resources vulnerable to looting and to develop a tracking system for violations.

The **Native American Graves Protection and Repatriation Act (1990)** (Public Law 101-601) provides a process for federal agencies to return certain Native American cultural items (e.g., human remains, funerary objects, sacred objects, and objects of cultural patrimony) to lineal descendants and culturally affiliated Native American tribes.

Protection and Enhancement of the Cultural Environment (EO 11593) directs federal agencies to locate, inventory, nominate, and protect federally owned cultural resources eligible for the National Register of Historic Places and to ensure that their plans and programs contribute to preservation and enhancement of nonfederal owned resources.

HAZARDOUS MATERIALS

The **Comprehensive Environmental Response, Compensation, and Liability Act (1980)** (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601–9673), provides for liability, risk assessment, compensation, emergency response, and cleanup (including the cleanup of inactive sites) for hazardous substances. The Act requires federal agencies to report sites where hazardous wastes are or have been stored, treated, or disposed and requires responsible parties, including federal agencies, to clean up releases of hazardous substances.

The **Resource Conservation and Recovery Act** (RCRA), as amended by the Federal Facility Compliance Act of 1992 (42 U.S.C. 6901–6992), authorizes the Environmental Protection Agency (EPA) to manage, by regulation, hazardous wastes on active disposal operations. The Act waives sovereign immunity for federal agencies with respect to all federal, state, and local solid and hazardous waste laws and regulations. Federal agencies are subject to civil and administrative penalties for violations and to cost assessments for the administration of the enforcement.

The **Emergency Planning and Community Right-To-Know Act (1986)** (42 U.S.C. 11001–11050) requires the private sector and federal, state, local, and tribal governments to inventory chemicals and chemical products, to report those in excess of threshold planning quantities, to inventory emergency response equipment, to provide annual reports and support to local and state emergency response organizations, and to maintain a liaison with the local and state emergency response organizations and the public.

PESTICIDE REGULATIONS

Federal Insecticide, Fungicide, and Rodenticide Act (EPA)

- provides for the registration of pesticides, certification of applicators to apply restricted use pesticides, and enforcement of pesticide regulations
- provides for individual states to obtain primacy for enforcement of FIFRA regulations as long as the states' requirements are at least equal to federal requirements

STATE REGULATION

Weed and Pest Act (State of Wyoming 1973)

Requires the federal government to control undesirable plant species by the use of integrated weed management.

WATER QUALITY

The **Clean Water Act** (**1987**), as amended (33 U.S.C. 1251), establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water. The Act also requires permits for point source discharges to navigable waters of the United States and the protection of wetlands and includes monitoring and research provisions for protection of ambient water quality.

Wyoming Water Quality Regulations implement permitting and monitoring requirements for the National Pollutant Discharge Elimination System, operation of injection wells, groundwater protection requirements, prevention and response requirements for spills, and salinity standards and criteria for the Colorado River Basin and the Bighorn River Basin.

Protection of Wetlands (EO 11990) requires federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Floodplain Management (EO 11988) provides for the restoration and preservation of national and beneficial floodplain values, and enhancement of the natural and beneficial values of wetlands in carrying out programs affecting land use.

USGS, 2004. Water Quality in the Yellowstone River Basin, Wyoming Montana, and North Dakota, 1999-2001. Circular 1234. U.S Department of Interior. http://water.usgs.gov/nawqa

BLM, 1997. A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic and Lentic Areas. Technical Reference 1737-15 and Technical Reference 1737-16. U.S Department of the Interior.

WILDLIFE

The **Endangered Species Act (1973)** (ESA), as amended (16 U.S.C. 1531, et seq.), directs federal agencies to ensure that their actions do not jeopardize threatened and endangered species, and that through their authority they help bring about the recovery of such species.

The **Bald Eagle Protection Act (1940)** (16 U.S.C. 668), amended in 1962 to include the golden eagle, prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions.

Fish and Wildlife Coordination Act (1958) (16 U.S.C. 661 et seq.) provides that, whenever the waters or channel of a body of water are modified by a department or agency of the United States, the department or agency first will consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur, with a view to the conservation of wildlife resources.

Fish and Wildlife Improvement Act (1978) (16 U.S.C. 742l) authorizes the Secretary of the Interior and the Secretary of Commerce to assist in training of state fish and wildlife enforcement personnel, to cooperate with other federal or state agencies for enforcement of fish and wildlife laws, and to use appropriations to pay for rewards and undercover operations.

Fish and Wildlife Conservation Act (1980), as amended, (16 U.S.C. 2901–2911, commonly known as the Nongame Act) encourages states to develop conservation plans for nongame fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic, or scientific value. The states may be reimbursed for a percentage of the costs of developing, revising, or implementing conservation plans approved by the Secretary of the Interior. Amendments adopted in 1988 and 1989 also direct the Secretary to undertake certain activities to research and conserve migratory nongame birds.

Migratory Bird Treaty Act (1918) (16 U.S.C. 703–711) manages and protects migratory bird species through consultation with state and local governments and protection of

land and water resources necessary for the conservation of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.

The Sikes Act (1960) (16 U.S.C. 670a–670o), as amended, Public Law 86-797, provides for cooperation by the Departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States. Public Law 93-452, signed in 1974, authorized conservation and rehabilitation programs on BLM lands. Public Law 97-396, approved in 1982, provided for the inclusion of endangered plants in conservation programs developed for BLM lands. It also defined "cooperative agreements" with states and clarified section 209 concerning purchases and contracts for property and services from states.

WILDERNESS STUDY AREAS

Invasive plant control on public lands within Wilderness Study Areas (WSAs) must comply with and be managed consistent with BLM's Interim Management Policy Handbook (H-8550-1) For Lands Under Wilderness Review. The law provides for, and the BLM's policy is to allow, invasive species control on lands under wilderness review in the manner and degree that does not degrade wilderness quality. Invasive plant control methods within WSAs are subject to reasonable regulations, policies, and practices.

1.7 Identification of Issues:

During the scoping of the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM, 2007),* comments from the public and agencies were used to identify significant issues that would be analyzed in the EIS. The BLM separated the issues into two groups: significant and non-significant. The Council on Environmental Quality regulations state: "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). 40 CFR 1500.4(g) directs that the scoping process should be used "not only to identify significant environmental issues deserving of study but also to deemphasize insignificant issues narrowing the scope of the EIS process accordingly." Significant issues directly influence the initiation, development, and technical design of the proposal; are disclosed in the analysis; and were used to develop alternatives to the proposed action. Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict.

Non-significant issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, or other higher level decision; 3) unrelated to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues

which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

Key issues identified and considered in the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, (BLM, 2007)* are listed in Appendix A. Those key issues are also applicable to this field office-wide analysis and are incorporated either by tiering and/or by addressing specific issues of field office concern.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Introduction

This EA tiers to the analysis contained in the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM, 2007)* for the 18 herbicide active ingredients listed under the *Preferred Action*.

The use of non-herbicide control methods is discussed in the *Vegetation Treatments, Programmatic Environmental Report (BLM, 2007).* This EA will incorporate by reference the biological, mechanical, and physical control methods for invasive plants.

A primary focus of this field office wide analysis is the discussion of invasive plant control methods that comply with the *Bighorn Basin Noxious Weed Management Plan and the Washakie, Grass Creek, and Cody Resource Management Plan and any updates or revisions to those plans.*

2.2 ALTERNATIVE A – PROPOSED ACTION

Where applicable, noxious and invasive plant control would be accomplished by using an integrated pest management approach, utilizing a combination of biological, mechanical, chemical methods. The *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM, 2007)* analyzed the effects of using herbicides for treating vegetation on public land in the western United States. The *Record of Decision's* preferred alternative approved the use of the following 18 herbicide active ingredients[5]: 2, 4-D, bromacil, chlorsulfuron, clopyralid, dicamba, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, tebuthiuron, triclopyr, imazapic, diquat, diflufenzopyr (in formulation with dicamba), and fluridone. All of these herbicide active ingredients may also be used in the WFO and CYFO. The use of herbicides would be applied either

[5] ACTIVE INGREDIENT – the chemical or biological component that kills or controls the target pest (*Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement(BLM 2007)*

aerially or by ground throughout the field office, with no one treatment area more than 300 acres. In many cases, these treatments would be spot treatments of a few plants or small infestations of less than one acre. Total acres of all vegetation treatments under this *Proposed Action* would not exceed 4,000 acres per year. Under this proposed action, treatments may be conducted by BLM staff in the Worland and Cody Field Offices, industry applicators/contractors, and any of the four Weed and Pest Control Districts within the two field offices, (Bighorn, Hot Spring, Park, and Washakie).

Vegetation Management

Although this EA primarily focuses on invasive plant control methods, control of undesired vegetation[6] on industrial locations and associated anthropogenic features is also necessary to meet various management objectives.

In the WFO and CYFO, surface disturbing activities associated with natural gas development, bentonite mining, and existing oil fields, such as pad, road, and pipeline construction, require not only invasive plant control, but elimination of vegetation around production facilities. Structures such as tanks, well heads, meter houses, etc., require complete vegetation control to eliminate fire hazards. Additionally, road rights-of-way may also require vegetation control to suppress vegetation that restricts vision or pose a safety hazard.

Emergency Stabilization and Burned Area Rehabilitation

The goals of Emergency Stabilization and Burned Area Rehabilitation should mitigate the adverse effects of fire on the soil and vegetation in a cost-effective and expeditious manner and to minimize the possibility of wildland fire recurrence or invasion of weeds. The primary invasive plant of concern in fire rehabilitation is cheatgrass. For broad scale control in burned areas, fall applications of imazapic may be the most effective treatment methods.

Treatment Methods

Proposed treatment methods may include biological control, hand pulling, cutting, mowing, aerial spraying, hand/selective herbicide applications, stem injection, spot herbicide spraying, broadcast herbicide spraying, and grazing. These treatment methods are summarized in Table 2 Appendix E. The timing for herbicide treatments would be dependent on the species, as well as any label restrictions, which vary by herbicide. The application method chosen depends upon the treatment objectives (removal or reduction); the accessibility, topography, and size of the treatment area; the characteristics of the target species and the desired vegetation; the location of sensitive areas and potential environmental impacts in the immediate vicinity; the anticipated

[6] Vegetation that does not meet a specific management objective.

costs and equipment limitations; and the meteorological and vegetative conditions of the treatment area at the time of treatment.
For BLM permitted activities associated with industrial development, there is the need for vegetation control around facilities and associated anthropogenic features. Structures such as tanks, well heads, meter houses, etc., require complete vegetation control to eliminate fire hazards. In most of these situations, the most effective, both from a practical and cost standpoint, should be the use of herbicides. In some cases, biological control (goats or sheep) or mechanical control (disking) may also be used.

Integrated Pest Management[7]

Although it may be preferable to control invasive plants without using herbicides[8], this approach would not meet the purpose and immediate need for action. The BLM has treated invasive plants with non-herbicide methods for many years. These treatment methods, used exclusively, however, have not effectively controlled invasive plant infestations. In addition, research and anecdotal evidence have demonstrated that herbicide treatments have been found to be the most effective treatment for many of the invasive plants proposed for treatment in the WFO and CYFO. One of the most effective non-herbicide strategies for invasive plant control may be to incorporate cultural practices to reduce the likelihood of plant establishment. The Bighorn Basin Weed Management Plan addresses practices that can be used to prevent the introduction of invasive plants. Some examples of these practices include: 1) minimizing the amount of surface disturbance to reduce the area for noxious and invasive plant establishment; 2) reestablish native vegetation on all disturbed soil from construction, reconstruction, and maintenance activities; 3) avoid trailing livestock through noxious weed infested areas; and 4) require certified noxious weed-free straw or hay for use as mulch. Another important element of preventing the establishment of invasive plants may be utilizing an early detection/rapid response strategy. Early detection/ rapid response refers to the immediate treatment of newly discovered invasive plant infestations, particularly those small infestations that are new to the field office or new to a particular area of the field office.
For some invasive plant infestations, the integrated pest management approach may be the most effective approach for treatment. No single management technique could be perfect for all invasive plant control situations. Multiple management actions may be required for effective control. The strategy of using an integrated selection of

[7] This section is references the *Final Environmental Impact Statement Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16(March 2008)* and the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, (BLM 2007)*
[8] Based on public comments of the Draft *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement*

management techniques has been developed for use in a variety of invasive plant control situations.

Integrated pest management can be an approach for selecting methods for preventing, containing, and controlling invasive plants in coordination with other resource management activities to achieve desired vegetation condition. This approach uses a combination of treatment methods that, taken together, would control a particular invasive plant or infestation efficiently and effectively, with minimum adverse impacts to non-target organisms. Integrated pest management seeks to combine two or more treatment methods that would interact to provide better control than any one action might provide alone. The integrated pest management approach contrasts with the traditional approach of using a single control action, such as applying herbicides, to treat all invasive plant problems.

Herbicides are one useful technique, but they are not the only method to control invasive plants and may not always be the most effective. Integrated pest management should be species-specific, tailored to exploit the weaknesses of a particular invasive plant, and designed to be practical with minimal risk to the organisms and their habitats. Integrated pest management requires an ecologically based, interdisciplinary approach. Selection of treatment methods is based on information such as the biology of particular invasive plant species, site location, proximity to water, and size of the infestation. Multiple treatments may be required to appropriately treat the invasive plants and meet the treatment strategies for each treatment area. Treatments may be repeated as needed on an annual basis. Similarly, the herbicide used at a treatment area may change over time as the mixture of invasive plants present and/or site conditions change.

Site Restoration

After treatments take full effect, some areas may require the re-establishment of native vegetation if areas of bare ground are present. The *Wyoming Reclamation Policy* outlines the requirements for rehabilitation of disturbed sites. In regards to NEPA compliance, any seeding or planting activities conducted under this *Proposed Action* would be covered by other NEPA documents.

Approval Process

As per *BLM Manual 9011 (Chemical Pest Control*), all pesticide applications on BLM lands require the submission of a *Pesticide Use Proposal*. This *Proposal* requires information on the target pests, chemicals to be used, rates of application, locations of applications, and identification of any issues of concern. For herbicides, only those formulations on the BLM approved list may be used. [9]

Additionally, for biological control introductions, a *Biological Control Agent Release Proposal* must be approved prior to any releases to the environment.

[9] The *BLM Approved List of Herbicides* is located at: http://www.blm.gov/style/medialib/blm/wy/weeds/forms.Par.54383.File.dat/ApprovedHerbicideFormulations_092807.pdf

Minimizing Herbicides Effects

To reduce the effects to environmental and human resources from herbicide use, the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, (BLM 2007),* includes *Standard Operating Procedures (*Appendix C*) and Conservation Measures.*[10]

Additional *Mitigation Measures* were also developed to address risks to environmental and human resources from the use of specific herbicides (Appendix D).

To provide for protection of the human and natural environment, this EA will adopt and adhere to the *Conservation Measures, Standard Operating Procedures, and Mitigation Measures.*

In addition to the *Standard Operating Procedures and Mitigation Measures,* herbicide application must be in accordance to label requirements. Herbicide labels provide valuable information about proper handling, use, storage, potential risks, and instructions on minimizing risks. The *Federal Insecticide, Fungicide, and Rodenticide Act* mandates that pesticide applicators have legal responsibility to read, understand, and follow all label directions.

Monitoring

To ensure all mitigation measures are implemented and the treatment methods are achieving their goals, monitoring is a key component of an integrated pest management strategy. A detailed discussion on monitoring is included in *Appendix D* of the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision (BLM 2007).*

2.3 ALTERNATIVE B – CONTINUE PRESENT MANAGEMENT (NO ACTION)

Under a previous Record of Decision[11], the WFO and CYFO would be able to continue to use 20 herbicide active ingredients.

2.4 ALTERNATIVE C – NO HERBICIDE USE

No herbicide use would occur under this alternative. The WFO and CYFO would be able to treat vegetation using mechanical, manual, and biological control methods. No herbicide use would limit the tools the BLM has to address invasive non-native species.

2.5 ALTERNATIVES CONSIDERED, BUT NOT ANALYZED FURTHER

During the scoping of the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007),* many issues identified were considered, but not analyzed and, subsequently, will not be analyzed in this EA. Alternatives specific to this EA that will not be analyzed in detail, are discussed below.

[10] The Conservation Measures are located in Appendix C of the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision, (BLM 2007)*

[11] *Northwest Area Noxious Weed Control Program EIS (BLM, 1985)* and the Vegetation Treatment on BLM Lands in 13 Western States EIS (BLM, 1991)

Prescribed Fire

The use of prescribed fire to control invasive plants was not considered in this EA. Many of the invasive plants considered in this proposal would respond positively to burning, thus, exacerbating the existing situation. Additionally, the size of the treatment areas proposed is not conducive to successful burning. When situations arise where prescribed fire is an appropriate integrated pest management option, a site specific EA will be completed.

Biological, Cultural, Herbicide, Manual, or Physical Control Alone

As directed by various guidance documents, including the Department of Interior, *Integrated Pest Management Policy*[12]; the *Federal Insecticide, Fungicide, and Rodenticide Act; Partners Against Weeds: An Action Plan for the Bureau of Land Management (BLM 1996*); federal agencies are directed to use an integrated pest management approach to managing invasive species. Thus, the use of any one technique, exclusively, was not considered in this EA.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes aspects of the environment likely to be affected by the *Proposed Action,* the *No Action,* and the *No Herbicide* alternatives. Also described are the environmental effects (direct, indirect, and cumulative) that would result from undertaking the *Proposed Action,* the *No Action,* and the *No Herbicide* alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects in Chapter 2.

This EA references detailed information on the direct, indirect, and cumulative effects of integrated pest management found in the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007)* and the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Report (BLM 2007),* respectively.

Direct Effects are caused by the action and occur at the same time and place.

Indirect Effects are caused by the action and occur later in time or farther removed in distance.

Cumulative Effects are effects on the environment which result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

[12] Department of the Interior, *Integrated Pest Management Policy*, Environmental Quality Series, Part 517, Chapter 1

3.2 INVASIVE PLANT SPECIES

Affected Environment

A summary of specific information on invasive plant species addressed in the analysis is provided below in Appendix F. [13]
Treatment schedules vary by species depending on elevation.

ENVIRONMENTAL CONSEQUENCES

Alternative A – Proposed Action

Direct and Indirect Effects

Under the *Proposed Action,* the WFO and CYFO would be able to use four new herbicide active ingredients, in addition to the previously approved herbicides, to treat approximately 4,000 acres per year of invasive plants with a combination of manual, mechanical, and herbicide treatments. This alternative would result in control or eradication of invasive plants where treatments are conducted. Biological control will be used when they are available and reasonably effective, resulting in containment of invasive plant in terms of both numbers and vigor of invasive plants. Additionally, complete vegetation control would be conducted on industrial locations.

Approximately 1000 acres per year of herbicide treatments would involve the use of imazapic-based herbicides to treat cheatgrass. The use of imazapic may be an important tool for emergency stabilization and rehabilitation of wildfire burned areas. Cheatgrass is especially competitive with perennial plants after a wildfire when additional nitrogen is released by the burning of standing biomass and litter.

With the additional acreage treated using imazapic under the *Proposed Action,* there would be a potential increase of adverse effects to some native plants. Adverse impacts would be reduced in most situations because treatments would be primarily conducted in burned areas or areas that are dominantly cheatgrass and at reduced rates. In addition, this alternative would allow the WFO and CYFO the greatest opportunity to meet healthy land initiatives and meet or make progress towards meeting the Standards for Healthy Rangelands in Wyoming.

Overall, there is a slight risk of damage to native plants from unforeseen environmental conditions. Severe thunderstorms or windstorms, for example, could move some herbicides away from their intended target species. Because of the protection of non-target species by the direct application method; the implementation of the *Standard Operating Procedures;* following the herbicide label requirements; the relatively short degradation time of the herbicides; and the small amount of herbicide being used; no long term adverse effects are expected from *Proposed Action*.

[13] Species descriptions referenced from www.invasive.org, the USDA, Forest Service, Weed Eradication and Control on the Inyo National Forest - Environmental Assessment (August 2007), the Colorado State University Cooperative Extension, and the Colorado Weed Management Association.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Under the *No Action* alternative the WFO and CYFO would be able to use previously approved herbicide active ingredients. Without the use imazapic-based herbicides, total invasive plant treatments would be reduced to 3,000 acres per year using a combination of manual, mechanical, and herbicide treatments.

This alternative would result in eradication of most invasive plants where herbicide treatment is conducted, and control and/or eradication of invasive plant populations where biological or manual treatment is proposed, resulting in reduced invasive plant infestations in terms of both number and size of infestations. Additionally, complete vegetation control would be conducted on industrial locations.

Not having the ability to use imazapic-based herbicides for cheatgrass treatments would remove an effective tool for cheatgrass control. *Emergency Stabilization and Burned Area Rehabilitation* efforts would be less effective and potentially would allow continued cheatgrass invasion and spread in wildfire burned areas. For rangeland infested with cheatgrass, imazapic can provide a window of opportunity to allow sagebrush seedlings and perennial grasses and forbs to establish with normal precipitation.[14]

Adverse effects under this alternative are addressed in the *Proposed Action*.

Alternative *C* – No Herbicide Use
Direct and Indirect Effects
Many of the invasive plants proposed for treatment could be most effectively controlled with herbicide methods, making non-herbicide methods ineffective and unsuccessful when used exclusively.[15] For many invasive plants, manual and mechanical treatment is difficult and often ineffective regardless of the size of the population. Examples include hawkweed species (orange, meadow or yellow, and common), yellow star thistle, and knapweed species (spotted and diffuse). Manual treatment is not recommended for many invasive plants because digging out roots or rhizomes, in addition to being extremely labor-intensive, tends to spread rhizome fragments, which would produce new plants.
It is not generally recommended to exclusively manually or mechanically treat salt cedar because disturbance to the plant would stimulate the growth of new plants from fragmented roots and redistribute the plants, increasing their rate of spread. Although

[14] *Effects of Cheatgrass Control on Wyoming Big Sagebrush in Southeastern Utah,* Daniel B. Eddington, Brigham Young University,
[15] *Final Environmental Impact Statement Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16(March 2008)*

manual and mechanical treatments may be effective for yellow star thistle, plants would survive if leaves and buds are still attached at the base of the plant, even if a fragment of a stem less than 2 inches in length is left behind. Further, yellow star thistle plants are capable of producing 50 to 100 million seeds per acre and the seeds are spread through wind dispersal, which makes manual and mechanical treatments more difficult. Manual treatment for knapweed is difficult due to the species' tough perennial root crown, and repeated mechanical treatment of diffuse knapweed may increase populations by spreading seeds.

No herbicide use for control efforts would allow invasive plants to continue to spread and increase, eventually becoming impossible to eradicate. Seeds from invasive plant populations will continue to be transported to and infest new sites throughout the area. Invasive plants will increasingly impact native ecosystems, affecting flora and fauna diversity, including sensitive species, as well as surface water availability. Native plant diversity and wildlife habitat quality will be significantly reduced over time due to increasing dominance by invasive plants. Few, if any, existing invasive plant populations would be controlled, eradicated, or reduced under this alternative.

There could be a high risk that seeds or propagative parts from invasive plants will migrate off site, resulting in increased infestations and subsequent mechanical and chemical treatments over a wider area adjacent to BLM land. Increased populations and subsequent spread onto non-BLM lands will result in greater herbicide use over the long term, vs. eradication of weed sources on the BLM now. Herbicide use in the region could potentially be higher overall as weeds spread off BLM land, and control efforts are implemented on adjacent lands, resulting in an increased risk of non-target species exposure to herbicides and/or residues.

Cumulative Effects

Vectors (livestock, vehicles, recreationists, water, wind, wildlife) and disturbances (roads, natural gas development, grazing, fuel treatments, water developments, recreation developments, etc.) will continue to be present in the WFO and CYFO. These factors have contributed in the past and currently to the establishment of invasive plant populations on BLM lands. Project-specific mitigations, incorporated into all new projects help to reduce the risk of new infestations and the spread of weeds associated with new disturbance. Several projects, including mineral development, have measures included for post project invasive plant control, as well as weed prevention measures, (e.g. equipment cleaning, weed free hay/mulch, re-vegetation, etc). Adjacent to the BLM lands, on Forest Service, State, and private lands, invasive plant control efforts are underway for state listed noxious weeds.

Under the *No Herbicide* alternative, existing infestations will continue to spread unchecked, gaining increasing vegetative dominance over the long term, contributing significantly to the cumulative effects of past and present invasive plant infestations. The *Proposed Action* and *No Action* alternative would have less cumulative effects overall than the *No Herbicide* alternative

3.3 NATIVE VEGETATION

Affected Environment

Vegetation resources within the WFO and CYFO are diverse and in some areas unique. The precipitation, elevation, and temperature extremes, combined with soil and geology variability, create a variety of vegetation habitat types. The Planning Area lies within two MLRA: the Northern Intermountain Desertic Basins – 32, (5-9 inch and 10-14 inch precipitation zones) containing 19 rangeland site types and Central Rocky Mountains – 43B, (15-19 inch and 20+ inch precipitation zones) containing 14 rangeland site types (USDA 2008). Vegetation communities currently containing invasive plants are varied, including meadows; willow dominated riparian areas, cottonwood forest, desert grassland, greasewood, sagebrush, mountain shrub, and desert scrub. In many cases, weed populations could be established where previous disturbance has occurred, disrupting the existing native plant community; however, invasive weeds have also moved into undisturbed native plant communities as well.

Riparian bottoms and sagebrush areas are currently most at risk of degradation due to invasive plants. Several of the more aggressive tenacious invasive plants often occur in riparian areas. These areas are also subject to disturbances, natural and human caused (flooding, road crossings, dispersed recreation use, grazing, etc.), creating favorable sites for weed establishment. They are highly important areas for native plant and wildlife diversity.

The greatest threat to sagebrush communities may result from ecological interactions with non-native annual grasses, i.e. cheatgrass. These species respond favorably to disturbance, including fire, and once established, they increase the susceptibility of these communities to repeated frequent fires. Over time, this can potentially lead to changes in the fire regime that can negatively affect and potentially exclude native plant species, resulting in complete vegetation type conversion. In addition, these species can compete directly with native plant species, affecting biodiversity and wildlife habitat quality.

ENVIRONMENTAL CONSEQUENCES

Alternative A – Proposed Action

Direct and Indirect Effects

Some of the herbicides proposed for treating invasive plants could be selective for particular kinds of plants (e.g., dicots versus monocots). Dicots include broadleaved and woody plant species. Broadleaved refers to plants having broad leaves as opposed to those having needle-like or scale-like leaves (e.g., conifers). Monocots include grasses, sedges, rushes, lilies, irises, and orchids. The ability to damage or kill only certain plant species or families but not others makes an herbicide selective. The use of selective herbicides such as picloram, dicamba, and 2, 4-D may injure non-target broadleaf species on sites where weed control activities occur. In general, plants in the asteraceae (composite), fabaceae (legume), polygonaceae (buckwheat), and apiaceae (parsley) families will be affected by picloram. Dicamba and 2, 4-D will affect these species, in addition to plants in the brassicaceae (mustard) family. Metsulfuron methyl will affect

plants in the legume, composite, and mustard family, and clopyralid affect plants in the composite, legume, and buckwheat family. Application of these herbicides may reduce abundance of plants within these families especially within areas where higher herbicide rates are necessary to control persistent weeds such as leafy spurge and Russian knapweed.

Using manual or mechanical treatments exclusively could be ineffective and often highly difficult for moderate to large populations of invasive plants that could reproduce by seed or vegetative by stolons, rhizomes, or root fragments. Anecdotal evidence has demonstrated how challenging and time-consuming it could be to dig entire plants out of the ground without disturbing the plants in the process. Disturbing the plants or failing to remove the entire plant could leave stolons, rhizomes, or root fragments behind from which the plants could reproduce. These challenges increase when dealing with moderate to large populations.

Herbicides could be the only known effective way to control, contain, or eradicate invasive plant species that could reproduce from vegetative fragments. For example, herbicide treatment with picloram is the only effective way to treat all but small populations of leafy spurge species due to their extensive root system. Without the option to treat infestations of invasive plants with a combination of techniques that include herbicide treatment, existing populations of highly invasive plant species are difficult to treat manually, mechanically or culturally. As a result, infestations would continue to expand and new populations would become established across the landscape, reducing or displacing native vegetation, habitat for wildlife, and forage for native ungulates and grazing livestock.

Grazing animals, such as sheep or goats, eat both weeds and desirable species. Both have been shown to selectively graze leafy spurge reducing seed production. Goats are likely to browse more heavily on shrubs that may provide important wildlife food and habitat within riparian areas. The level of management will determine impact of grazing animals on non-target species. Invasive plant seeds can be spread to non-infested sites by adhering to grazing animals or passing through their digestive tract. Restricting livestock use in weed infested areas during seed ripening and dispersal will help reduce weed spread to uninfested sites.

Biological control agents can provide good control on target invasive plants. Insects would be the preferred biological control agents as they have high host specificity. They are not intended for eradication of invasive plants, but rather to reduce the vigor and productivity of invasive plants to allow for competition from native vegetation. No adverse effects to native plant species are expected from the use of biological control agents, since these insects and pathogens generally do not affect non-target plant species or habitats. Under the review process, biological control agents undergo an extensive screening and testing process by USDA Animal and Plant Health Inspection Service before an organism can be released. Despite these safeguards, there is always a

risk that the release of an agent into a habitat in which it does not occur could result in unforeseen ecological repercussions.

The risk of herbicide applications to non-target plants is minimized with the use of ground application equipment. Risk to off-site plants from spray drift is greater under scenarios with smaller buffer zones and application from greater heights (i.e., aerial application or ground application with a high boom). Persistent herbicides (e.g., bromacil) adsorbed to soil particles could also be carried off-site by wind or water, affecting plants in other areas. There is a slight risk of damage to native plants from accidental herbicide spills under this alternative. In the event of a spill, effects would range from decreased productivity or injury to plant death. This risk is minimized through the use of the *Standard Operating Procedures* and following label requirements when applying herbicides.
Manual or mechanical treatment of invasive plant infestations could also negatively affect native plants. Direct effects would be unintentional removal or trampling of flowers, fruits, or root systems of native plants. Other direct effects would be reduced plant vigor due to plants being damaged, reduced native seed production, soil disturbance, and canopy removal (understory, shrub layer, or overstory depending on the species). Indirect effects brought about by these direct effects could include microsite shifts such as reduction in productivity, reduction in soil moisture, disruption of mycorrhizal connections, and increase in soil temperature. These effects could produce a shift in species composition further away from a native community, and the removal of one invasive species could encourage another invasive species to take its place via windborne seeds or human transport.[16]

Although this alternative would result in the most extensive impacts to vegetation (both negative and positive) because it proposes the most acres for treatment, it provides the best long term protection overall for native vegetation communities, due to the greater effectiveness of invasive plant eradication methods under this alternative. This is true in particular for riparian plant communities, as the deeper-rooted riparian invasive plants are more resistant to manual treatments. Under this alternative, invasive plants will be controlled or eradicated from approximately 4,000 acres, resulting in improved quality of native vegetation communities in these areas. Manual treatments will be prioritized and are not expected to eradicate some of the primary invasive plant species of concern due to their widespread distribution, e.g. cheatgrass, Russian thistle.

Despite the potential for negative effects from herbicide, manual or mechanical treatment described above, the effects of not treating invasive plants far outweigh the potential adverse effects of these treatments on native plants and plant communities.

[16] Paragraph adapted from *Final Environmental Impact Statement Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16(March 2008)*

Without treatment, invasive plant infestations would increase and spread, displacing native plants.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Under this alternative there would be a continuation of current invasive plant and vegetation control management. However, control of cheatgrass would not be as effective without the use of imazapic-based herbicides. Imazapic has been reported to successfully control the spread of aggressive invasives, including cheatgrass, Russian knapweed, and perennial pepperweed, and has had positive effects on native prairie restoration.[17]

The risk associated with herbicide applications to non-target plants is less under this alternative compared to the *Proposed Action,* due to 1,000 fewer acres treated.

All other direct and indirect effects under this alternative are addressed in the *Proposed Action.*

Alternative C – No Herbicide Use
Direct and Indirect Effects
Biological, manual, and mechanical treatment of invasive plants would be allowed under this alternative and would continue within the WFO and CYFO. These treatment methods could be limited in their effectiveness as far as controlling or containing invasive plant infestations, especially large infestations and those species that could reproduce vegetative from rhizomes, stolons, or root fragments.

Improvement in ecosystem health as a result of vegetation management may be less than under the *Proposed Action*, as there are certain invasive species for which herbicide use is the only effective method of treatment or for which treatment by other methods is impractical due to cost, time, accessibility, or public concerns (e.g., saltcedar in riparian areas). For example, rough terrain may prevent treatment by methods that require ground vehicle and foot access, while aerial treatment with herbicides would be possible in these areas. Vegetation treatments on ROW and oil and gas production facilities would have to be done by manual and mechanical means, or not done at all. Both options may be unfeasible for ROW, while the latter option would compromise the safety of oil and gas production facilities.

There would be no risk of herbicide damage to native plants under this alternative. The anticipated continued increase in invasive plant populations in the WFO and CYFO in the absence of control efforts would result in degradation of native ecosystems. This degradation of native plant communities could result from direct competition for

[17] *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement(BLM 2007)*

moisture, light, and/or nutrients between weeds and native plant species, as well as from changes in ecosystem processes such as fire and flooding. Approximately 117,000 acres would continue to be weed infested, with reduced native plant diversity and habitat quality. This acreage would likely increase over time across the planning area, and the severity of the existing infestations would worsen, further impacting native plant communities. Over the long term, the lack of control efforts in the WFO and CYFO could also contribute to a loss or degradation of native plant communities off BLM lands, as uncontrolled invasive plant populations spread onto adjacent lands. This could lead to greater overall herbicide use and risk to non-target species in the region, as control efforts on adjacent lands are accelerated to deal with weeds spreading off BLM lands.

Cumulative Effects

Under the *Proposed Action*, expanded use of herbicides to treat invasive plants may harm or kill non-target plants. For example, more persistent herbicides, such as picloram, could move readily to non-target plants through root translocation or runoff. A treatment schedule for persistent infestations that may require herbicide application for three to five years would increase the potential for non-target plants being negatively affected (harmed, weakened, or killed) by herbicides. Many of the invasive plant populations in the treatment areas could require successive years of herbicide application to be effectively treated depending on the extent and severity of the infestation and how invasive plant populations respond to a given treatment. Non-target plants in the sunflower (*Asteraceae*), legume (*Fabaceae*), or mustard (*Brassicaceae*) families may be the most sensitive to herbicide treatment. Species in the lily family (*Liliaceae*) may be more sensitive to some of the sulfonylurea herbicides.

Manual and mechanical treatments could also harm native plants. Manual and mechanical treatments could also alter the composition and structure of native plant communities, as released growing space previously occupied by invasive plants is made available. Certain native plants would be able to compete out other native plants for this growing space. The growing space could also be re-invaded by invasive plants. Active restoration would help in preventing re-invasion of invasive plants following treatment.

Over several years time, the cumulative effects of not treating invasive plants would be biologically significant and outweigh most concerns about effects on non-target plants and native plant communities. For example, saltcedar is an example of a highly invasive plant that is already present within the WFO and CYFO and spreading rapidly in riparian zones in stream and river corridors. Without additional treatment options (herbicide use), populations of invasive plants, including saltcedar, are expected to continue to expand in size, increase in number, and spread elsewhere, displacing native plants and plant communities, and, in the process, degrading native ecosystems. Overall, manual, mechanical, cultural, and herbicide treatments would have an insignificant biological effect as far as harming native plants and plant communities if the project is implemented with the appropriate mitigation measures. Treatments could be expected

to benefit native plants and plant communities and special status plants by restoring native habitats and plant communities.

Many other activities have historically impacted, and in some cases continue to impact upland and riparian native plant communities to varying degrees on BLM land, including roads, oil/gas activities, grazing, fuel treatments, water developments, recreation developments, and special use activities. Effects range from direct removal of or damage to native plants, effects on plant health and the overall productivity of native communities, to effects on ecosystem processes integral to the long term health of native plant communities.
As new activities are undertaken, measures are implemented to minimize the risk of new invasive plant infestations or further spread of existing populations. However, existing populations continue to affect native plant communities. The *No Herbicide* alternative would contribute the most to the cumulative effects of past, present, and reasonably foreseeable actions on native plant communities, as one of the more significant existing threats to native communities, i.e. invasive plants, would continue to the greatest degree under this alternative.
This proposal contributes an insignificant amount to the cumulative level of risk to native plant communities from herbicides in the region.

3.4 SOIL PRODUCTIVITY

Affected Environment
Soils in the WFO and CYFO are diverse and highly variable. They include shallow-to-deep and fine-to-coarse-textured soils. They vary in salt content, organic matter content, and parent material. Soil characteristics can differ significantly over relatively short distances, reflecting differences in parent material, position on the landscape, elevation, aspect and climatic variables such as precipitation and temperature. Soil characteristic such as soil depth and surface texture can significantly affect the treatment of invasive species particularly with the use of herbicides. The plant communities supported by such a wide diversity of soils are equally diverse, ranging from sparsely vegetated desert saltbush and sagebrush- bunchgrass communities to forests and alpine meadows. Over 60 ecological sites have been identified in the planning area. The soil characteristics are further developed by the plant communities they support. In the planning area, low annual precipitation, salinity, alkalinity, and shallow depths have the greatest effect on soil productivity and thus the plant communities they support.

ENVIRONMENTAL CONSEQUENCES
Alternative A – Proposed Action
Direct and Indirect Effects
Herbicide Use

Herbicide treatments methods to eliminate or reduce invasive species would result in no or minimal surface disturbance. Adequate cover would remain to provide protection against the forces of rain drop impact and overland flow. Assuming that the invasive species are replaced by desirable herbaceous species, there could be a slight reduction is runoff and erosion.

The effect of an herbicide treatment on the soil depends on the particular characteristics of the herbicide used, how it is applied, and soil physical, chemical and biological conditions. Herbicides may indirectly affect soil through plant removal resulting in changes in physical and biological soil parameters. As vegetation is removed, there is less plant material to intercept rainfall and less to contribute organic material to the soil. Loss of plant material and soil organic matter can increase the risk of soil susceptibility to wind and water erosion. The risk for increased erosion would be temporary, lasting only until native vegetation was reestablished. If herbicide treatments lead to re-vegetation with native plants, soil stability may be improved relative to sites dominated by invasive plants. Of the herbicides most often used by the BLM, chlorsulfuron, picloram, and tebuthiuron are persistent in soil for a year or more, while glyphosate and 2, 4-D is relatively non-persistent in soil. None of these herbicides appears to result in severe adverse impacts to soil. Of these, glyphosate has been shown to have little or no impact on biological crusts cover after 1 year. Soil organisms are important to the human environment because they could affect soil productivity. None of the herbicides under consideration has notable effects to overall long term soil productivity or permanent impairment of soil ecosystems. Information about specific herbicide effects to each of the myriad of soil organisms is scarce. Therefore, caution will be used when applying these chemicals to soils supporting biological soil crusts.
To reduce the impacts to soil productivity, treatments would be minimized or eliminated in areas of the WFO and CYFO that have steep slopes or the potential for significant soil mobility.
Herbicide treatments would benefit soil by removing invasive plants and other unwanted vegetation and allowing restoration of native vegetation and return of natural fire regimes. In many situations, herbicides are the only, or the most effective, method for controlling invasive vegetation. For many of the small or spot treatments of invasive plants along roadways in the planning area, manual or physical treatments may not be most cost effective and efficient treatment option. Positive effects to soils associated with the presence of invasive plants could be greater because more acres would be treated under this alternative, particularly cheatgrass.

Manual/Physical
Treatment of invasive species by manual methods would result in minimal surface disturbance and minimal impacts to the soil resource. Assuming that disturbed areas and the invasive species are replaced by desirable herbaceous species, there could be a slight reduction is runoff and erosion.

Mechanical treatment of invasive species results in minimal surface disturbance but the litter left behind would provide protection against the forces of rain drop impact and overland flow. Soil compaction could result in areas where there are repeated passes with equipment or support vehicles. It is not anticipated that this would be a long term impact. Assuming that the areas of surface disturbance and the invasive species are replaced by desirable herbaceous species, there could be a slight reduction in runoff and erosion.

The specific effects to soils would depend on the type and area of treatment, site soil texture and structure, and soil moisture at the time of treatment. Use of certain mechanical treatments would directly disrupt biological soil crusts. Crusts are sensitive to compaction by vehicles and other heavy equipment. The removal or destruction of biological soil crusts could adversely affect soil quality by increasing susceptibility to erosion, reducing nitrogen inputs, infiltration, and potentially encouraging weed establishment. In general, use of heavy equipment on treatment sites would be expected to result in increased soil compaction, and heavy equipment can shear and rut wet soils. Compaction by vehicles and other heavy machinery can reduce soil pores and limit water infiltration, soil aeration, and root penetration.
Although, the manual treatment of invasive plants removes vegetation, loosens soil and creates a potential source for wind and water erosion and stream sedimentation, the planned amount of treatments in the planning area is very limited and site specific. There is a low risk that treatment would result in adverse effects to soil quality. Replacement of invasive plants with native plants would maintain soil quality in the long-term. Implementation of appropriate project designs would result in maintaining water quality and not causing an adverse effect. Mechanical treatments that ultimately result in improved plant cover and diversity can improve habitat for soil organisms.

Biological Control
Biological control of vegetation using domestic animals would result in some effects to soil on public lands. The effects would be dependent on the type of animal used and the intensity and duration of the treatment in a particular area. Goats and other browsing animals are used more frequently than cattle. The action of animal hooves would cause some disturbance, shearing, and compaction of soil, increasing its susceptibility to both water and wind erosion. These effects can be severe in heavily grazed areas, but may be less so under light and moderate grazing intensities.

The use of other biological methods such as insects to treat invasive species should not result in any surface disturbance with no impacts to the soil resource. Assuming that the invasive species are replaced by desirable herbaceous species, there could be a slight reduction in runoff and erosion.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects

Negative effects to soils associated with the presence of invasive plants could be greater because fewer acres would be treated under this alternative, particularly cheatgrass. Research has shown how cheatgrass alters physical and biological properties of soils, thus impairing ecosystem health.[18] Additionally, as cheatgrass infested areas are prone to wildfires that would potentially alter the physical properties of soil by consuming organic matter, modifying soil structure, and harming soil organisms.[19]

It is not anticipated that the areas of surface disturbance or areas of soil compaction would change under this alternative. Impacts to the soil resource would be similar to the preferred alternative.

All other direct and indirect effects under this alternative are addressed in the *Proposed Action.*

Alternative C – No Herbicide Use

Direct and Indirect Effects

Invasive plants would have negative effects on soil properties. Invasive plants may increase the proportion of bare ground, increase or decrease the amount of organic matter in the soil, deplete the soil of nutrients or enrich the soil with certain nutrients, change fire frequency, and produce toxic herbicides that affect soil organisms. Some of these changes may be difficult to reverse and could lead to long-term soil degradation and difficulty in re-establishing native vegetation.

Under this alternative, it is anticipated that there would be an increased reliance on manual and mechanical treatments. This could not result in some increases surface disturbance. Any resulting areas of surface disturbance would be protected from the erosive forces of rain drop impact and over land flow from the litter left behind. Soil compaction could result in areas where there are repeated passes with equipment or support vehicles. It is not anticipated that this would be a long term impact. Assuming that the invasive species are replaced by desirable herbaceous species there could be a slight reduction in runoff and erosion.

Cumulative Effects

The cumulative effects of an invasive plant infestation could be dramatic and irreversible. Soil lost to erosion may take years to replace. The loss of soil biota also could lead to degradation of soil properties that are not easily re-established. Changes

[18] *Cheatgrass Invasion Alters Soil Morphology and Organic Matter Dynamics in Big Sagebrush-Steppe Rangelands.* USDA Forest Service Proceedings RMRS-P-31. 2004. Jay B. Norton, Thomas A. Monaco, Jeanette M. Norton,Douglas A. Johnson, Thomas A. Jones

[19] *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement(BLM 2007)*

in the soil biota could lead to changes in nutrient cycling that lead to a loss of nutrients from the ecosystem. Although very little research has been done on the restoration of soil biological communities, it stands to reason that large persistent invasive plant infestations would detrimentally effect the re-establishment of soil biota and native plant communities. Preventing the spread of invasive plants would have a positive impact on soils.

Cumulative effects of each alternative would be similar to its direct effects. Non-herbicide treatments may result in nutrient decrease, erosion, reduction in mycorrhizal hyphae, increased bare ground, and decreased litter layer, which transient effects are given re-vegetation with native or non-invasive species. Soil compaction, loss of microbiotic crusts, formation of hydrophobic surface layer on soil, and loss of volatized nitrogen, phosphorus and potassium may have longer term effects and need to be minimized or eliminated through site-specific *Standard Operating Procedures*. Some herbicides are metabolized by soil bacteria, while others are toxic to soil microorganisms or no information about effects to these organisms is available. Picloram, chlorsulfuron, and imazapic are relatively water soluble and could move off-site in water. These herbicides are moderately adsorbed to soil particles and could be moved off-site with wind or mass soil movement.

Many other natural (i.e., wildland fire) and human influences (land development and use) may result in adverse effects on soils and soil productivity. The potential adverse effects to soils from the *Proposed Action* are small in comparison to the potential effects of invasive plants themselves and other influences. In the long term, restoration of healthy native plant communities proposed in this EA will have beneficial impacts on soils.

3.5 WATER QUALITY

Affected Environment

The Bighorn Basin is a semi-arid desert, receiving little moisture and extreme temperatures. Lower elevations of the Basin are the driest part of Wyoming. Mean annual precipitation ranges from less than 5 inches to more than 40 inches at higher elevations of mountain ranges. The majority of precipitation at lower elevations of the basin is received as periodic rainfall from April-June. During these months is when the vast majority of smaller stock reservoirs in the Planning Area are dependent on these rainfall events to capture and store surface runoff. Snow is very light with annual averages from 15 to 20 inches on the lower elevations and 3 to 4 feet at 5,000 to 6,000 feet. Large snowfall events at lower elevations in the basin are limited, with less than three days annually receiving five or more inches. Surface water resources found within the Planning Area fall within United States Geological Survey Water Resources Region 10 and are all tributaries to the Missouri River. The Bighorn River, Wind River, Clarks Fork Yellowstone River, and their associated tributaries, including the Nowood, Greybull and Shoshone rivers systems, comprise the main source of surface water within the Bighorn Basin. The Bighorn River begins at the Wedding of the Waters and flows through the center of the Bighorn Basin into Big Horn Lake on the Wyoming –Montana

border. Prior to Wedding of the Waters it is referred to as the Wind River. The Wind River and its tributaries flow into Boysen Reservoir, which is managed by the United States Bureau of Reclamation (BOR). The Clarks Fork of the Yellowstone River, flowing out of the Absaroka Mountains, comprises an important source of surface water along the northwest corner of the Planning Area.

Groundwater resources within the Planning Area occur within the structural basin of the Bighorn Basin. Geologic formations aging from Precambrian to the shallow Quaternary deposits produce water throughout the basin. The most reliable and accessible shallow groundwater supplies are from aquifers in unconsolidated deposits along the larger streams such as the Bighorn, Greybull, Nowood, and Shoshone Rivers (Plafcan et al. 1993). The Clarks Fork Yellowstone River also provides reliable and accessible supplies of groundwater. Larger producing wells also originate in deep limestone and dolomite aquifers of the Madison Limestone and Bighorn Dolomite formations. These formations crop out along the flanks of the basin and are found at extensive depths that produce large amounts of water for municipalities and agricultural purposes.

ENVIRONMENTAL CONSEQUENCES

Alternative A – Proposed Action

Direct and Indirect Effects

Herbicide

Invasive plants can create conditions that modify water quantity and quality. Directly or indirectly, invasive plants can affect stream bank stability, sediment, turbidity, shade and stream temperature, dissolved oxygen, and pH. Invasive plants can also reduce water quantity. For example, saltcedar can alter stream form and can use more water than native vegetation. The effect of Russian Olive and Tamarisk on water quality has been examined by a Tamarisk Coalition task group involving private, state, and federal agencies. Tamarisk evapotranspiration varies depending on many interacting factors, such as climate; canopy cover, age, and health; water table depth; water quality and salinity. (Tamarisk Coalition, 2009).

Vegetation treatments could affect both surface water and groundwater quality and quantity. Invasive plant eradication has the potential to temporarily leave treatment areas with reduced groundcover which in turn has the potential for increased erosion and resulting sedimentation. In addition, equipment used in invasive plant treatment has the potential to disturb or displace soil, making the soil more vulnerable to erosion. Herbicide treatments do not kill all invasive plants immediately. Repeated treatments over several successive years are often needed for invasive plant eradication, containment, and control. Short term erosion would be mitigated by creation of a restoration plan that would identify specific measures to ensure protection against erosion and resulting sedimentation. These measures would be implemented as part of the project.

The WFO and CYFO currently use four herbicides in riparian and aquatic habitats—2, 4-D, glyphosate, imazapyr, and triclopyr—and may use diquat and fluridone in these areas as well. The remaining herbicides available to the planning area, or proposed for use, are registered for use on terrestrial sites. The aquatic labeled herbicides would not impact water quality if used according to label rates of application. Herbicides registered for use in terrestrial habitats may affect surface water and groundwater primarily as a result of unintentional spills or movement of herbicides from the upland sites into aquatic systems. The United States Geological Survey completed an assessment of Water Quality in the Yellowstone River Basin as part of the National Water Quality Assessment Program (USGS, 2004). Tables, box charts, and other detailed information for selected herbicides and pesticides that have been detected in the Yellowstone River Basin are available at the following website http://water.usgs.gov/nawqa/graphs.

Herbicide drift can degrade surface water quality. Herbicides can reach water through drift, the airborne movement of herbicides beyond the treatment area. Three factors contribute to drift: 1) application technique; 2) weather conditions; and 3) applicator error. Aerial and broadcast applications could most likely reach water through drift, because the herbicide is sprayed from a helicopter/plane or through a boom and must settle through the air to reach the treatment area. Spot and localized applications are less likely to result in drift because these applications are targeted to specific plants, and less herbicide is applied. Wind speed and air temperature, and their effect on herbicide evaporation, affect the potential for drift. During application when winds are over 5 mph and temperatures are warm, the potential for drift is greater. Peak concentrations from aerial spraying of fine droplets with 50- to 70-foot buffer zones commonly range from 0.130 to 0.148 ppm. Well-vegetated buffers can intercept herbicides and reduce the potential for herbicides to reach surface water. The BLM typically uses nozzles that produce large droplets, and requires 100-foot or wider buffers, to minimize the risk of herbicides drifting into surface waters.
The potential for spray drift to impact perennial and intermittent streams would be low because minimum 10-foot (ground-hand application), 25-foot (ground-vehicle), or 100-foot (aerial) buffers would be provided between treatment areas and water bodies.[20]

Manual/Mechanical/Biological
Proposed manual, mechanical, and cultural treatment measures such as pulling, mowing, weed whacking, or grazing by goats are not likely to cause much soil disturbance or increase the potential for measurable surface erosion/sedimentation. Hand-pulling involves manually pulling the invasive plant/roots out of the ground. When invasive plants are pulled, some surface soil may be exposed during the process, but the amount of off-site sediment movement is expected to be insignificant due to the small amount of soil exposure expected.

[20] *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement(BLM 2007)*

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
Potential negative effects to water quality would be less because fewer acres would be treated under this alternative. There would be no potential for the new additional herbicides to be used that are considered under alternative A to be introduced into groundwater or surface water resources. The frequencies of detection and concentration of pesticides and herbicides originating from public lands would remain unchanged from current levels.

All other direct and indirect effects under this alternative are addressed in the *Proposed Action.*

Alternative C – No Herbicide Use
Direct and Indirect Effects
The most pronounced effect of the *No Herbicide Use* alternative on aquatic organisms and ecosystems is the continued existence and spread of invasive plants that could compete out native vegetation. Severe infestations of some invasive plants could negatively affect a variety of riparian functions at the site-specific scale including shade and soil stability. Although not every infestation would reduce aquatic habitat quality, there is an increase in the risk of accelerated impairment without aggressive treatment.

Cumulative Effects
Even if the invasive weed treatments are occurring at the same time on both Federal and nonfederal lands, the potential for sediment-related cumulative effects is very low considering the negligible amount of sediment expected to reach perennial streams from either biological, manual, or mechanical treatments of invasive plants.
The potential for cumulative effects is negligible considering the insignificant amount of herbicide or sediment expected to reach surface water due to implementation of *Standard Operating Procedures* that would minimize the amount and type of herbicides that actually reach surface water, and the distance between potential treatment areas.

3.6 GREATER SAGE-GROUSE

Affected Environment
The greater sage-grouse occupies sagebrush habitats throughout the WFO and CYFO. Essential habitat features such as strutting grounds (leks) and adjacent nesting areas are displayed in Appendix B. During the spring, grouse concentrate for courtship and breeding in these areas, which are typically in openings surrounded by sagebrush, with an average canopy density of 10 to 30 percent. Greater sage-grouse nest under sagebrush, with 60 percent of hens nesting within a 2-mile radius of the lek, and 70 percent of hens nesting within a 4-mile radius of the lek. Young birds rely initially on insects. During warm, dry summer periods, grouse tend to stay within 1.5 miles of intermittent and perennial streams, where they feed on succulent forbs. Greater sage-grouse diets shift to a majority of sagebrush later in the year. Wintering areas for

greater sage-grouse typically contain tall sagebrush that is available above the snow for cover and food.

After a thorough analysis of the best available scientific information, the Fish and Wildlife Service has concluded that the greater sage-grouse warrants protection under the Endangered Species Act. However, the Service has determined that proposing the species for protection is precluded by the need to take action on other species facing more immediate and severe extinction threats. As a result, the greater sage-grouse will be placed on the list of species that are candidates for Endangered Species Act Protection. The Service will review the status of the species annually, as it does with all candidate species, and will propose the species for protection when funding and workload priorities for other listing actions allow. (USFWS 2010; see internet citation below).

Population levels throughout the Planning Area declined during the mid 1990's. Since 2004 the levels have maintained or slightly increased. It is thought this resurgence was as a result of well-timed precipitation events (WGFD 2000 and WGFD 2004). These precipitation events promoted grass growth which aided young survival. Populations have varied throughout the Planning Area based on specific local conditions with some areas showing little change, but other areas have had the recent increase in lek count numbers. Some greater sage-grouse leks have become active again after many years of non-use with recent improvement in spring and summer conditions in many parts of the Bighorn Basin. Winter conditions generally are not a limiting factor in the Bighorn Basin as snow depths are not as severe as in other parts of Wyoming.

Cheatgrass, mustards, and Russian thistle are generally the principal invasive plants that occur widespread throughout greater sage-grouse habitat. Cheatgrass, in particular, is a major threat to greater sage- grouse habitat in the planning area, and has substantively degraded sage-grouse habitat across the BLM. Once established after wildfire it may prevent the return of native plants, including sagebrush, to greater sage-grouse habitat.

ENVIRONMENTAL CONSEQUENCES

Alternative A – Proposed Action

Direct and Indirect Effects

Herbicides

Although field studies suggest that appropriate herbicide use in not likely to affect wildlife species in general, there is potential for herbicides to directly harm individuals or populations of wildlife. Possible adverse direct effects to individual animals include death, damage to vital organs, change in body weight, decrease in healthy offspring, and increased susceptibility to predation. Of the proposed herbicides to be used in the WFO

and CYFO, the following herbicide active ingredients pose some risk to greater sage-grouse:[21]

2, 4-D – Moderate to high risk if contaminated insects or vegetation are ingested
Clopyralid – Low risk if contaminated insects or vegetation are consumed at the maximum application rate
Gloyphosate – Low to medium risk if contaminated insects or vegetation are ingested
Imazapyr – Low risk if contaminated insects are ingested
Triclopyr – Low to medium risk if contaminated insects or vegetation are ingested

Assumptions for risk factors include, but are not limited to: broadcast spraying; amount of absorption; and an assumption that 100% diet is contaminated food. Additionally, toxicological data does not exist for specific wildlife species, including the greater sage-grouse. Consequently, toxicological data for surrogate wildlife receptors, obtained from a literature review, were evaluated and used to establish quantitative benchmarks (i.e., toxicity reference values for the ecological species of concern). Based on these factors, along with the proposed small treatment areas, incorporating the *Standard Operating Procedures*, by avoiding herbicide application during critical breeding or nesting periods, the potential risks to greater sage-grouse will be significantly reduced.

In general, adverse indirect effects of herbicides to wildlife could include a reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; a decrease in population densities within the first year following application as a result of limited reproduction; habitat and range disruption (as wildlife may avoid sprayed areas for several years following treatment), resulting in changes to territorial boundaries and breeding and nesting behaviors; and an increase in predation due to loss of ground cover.

Manual or Physical Treatment
For individual treatments near the *Proposed Action* limit of 300 acres per individual treatment, manual or physical manipulations could make habitats less suitable for some wildlife species, including the greater sage-grouse. There is a possible indirect effect of disturbance to nesting birds. Some birds would be flushed during the nesting season from personnel that are conducting manual, mechanical or cultural treatments. Most of these birds would return to the nest if only flushed once or twice because nest fidelity is high.

Biological Control

[21] Details on risk assessment are found in the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, (BLM 2007)*

The effects of biological treatment using insects and pathogens would be insignificant. In most cases, the target plants would remain standing, although weakened or unable to reproduce. One of the more promising research areas under investigation is the use of a biocontrol agent such as the seed fungus (*Ustilago bullata)* to control cheatgrass. This fungus cause's head smut disease in cheatgrass by infecting its germinating seeds. Although the fungus allows cheatgrass to grow to maturity, when the cheatgrass plant flowers, the head smut pathogen prevents the plant from producing seeds and thus prevents it from reproducing.

The *Proposed Action* would rehabilitate sagebrush habitat by eradicating, controlling and containing invasive plants, particularly cheatgrass. This rehabilitation would return these areas to native vegetation degraded by human-related activities. Besides benefiting the greater sage-grouse, the *Proposed Action* would also remove or control competing vegetation that would improve species diversity and habitat quality for all sagebrush obligate species. Without control activities, cheatgrass and other invasive plants would likely continue to exist and spread throughout their current range and continue to threaten the long-term stability of the sagebrush ecosystems.

Alternative B – Continue Present Management (No Action)
Direct and Indirect Effects
With fewer acres treated under this alternative, there would potentially be less great sage-grouse habitat improved, particularly associated with the control of cheatgrass.

All other direct and indirect effects under this alternative are addressed in the *Proposed Action.*

Alternative C – No Herbicide Use
Direct and Indirect Effects
Under this alternative, the greater sage-grouse would not be affected by herbicide use. Improved wildlife habitat as a result of vegetation management could be reduced under this alternative, as there are certain invasive species for which herbicide use is the only effective method of treatment or for which other methods are impractical due to cost, time, accessibility, or public concerns (e.g., saltcedar in riparian areas).

Cheatgrass would continue to spread throughout sage-grouse habitats, primarily below 9,000 feet in elevation, and pose a long-term substantive threat to the suitability of greater sage-grouse habitat. Other invasive plants such as saltcedar, pepperweed, hoary cress, and halogeton, would likely continue to spread throughout sage grouse habitat and would continue to slowly reduce sage grouse habitat quality.

Cumulative Effects
Herbicide use occurs on other federal, state, and county ownerships, state and private forestry lands, rangeland, utility corridors, road rights of way, agricultural lands and

private residences. Herbicide use on BLM land within the planning area could contribute to some cumulative effects, but data is lacking that would permit any quantitative estimates of cumulative exposure or risk. Since greater sage-grouse move and migrate, they could be exposed to herbicides on adjacent lands or along their migration routes. They could be exposed to the same herbicide on multiple ownerships, or a combination of different herbicides. Greater sage-grouse could also be exposed to other chemicals, such as insecticides, rodenticides, fungicides, and others.

3.7 Wildlife

Affected Environment

BLM-administered public lands in the Bighorn Basin supports a variety of game and non-game wildlife species, including several special status species. These lands contain a variety of habitats that possess the biological and physical attributes important in the life cycles of many wildlife species. The diversity of habitats and landscapes provide important areas for breeding, birthing, foraging, wintering and migration Wildlife and their habitats are representative of Great Basin fauna and flora. Wildlife habitat is best characterized by vegetation types, water resources, geology, and topography. Habitats in the planning area include sagebrush-steppe shrublands, coniferous forests, juniper woodlands, aspen stands, mountain shrub, canyons and rim rock, badlands, grasslands, and wetland/riparian. Elevations on BLM lands range from 3,350 feet to 11,400 feet. Each habitat type supports an assemblage of species. Wildlife species have unique inter-relationships, which link assemblages on a landscape to one another and to specific habitats within the landscape.

Environmental Consequences

Alternative A-Proposed Action

This alternative would result in the most extensive effects to wildlife because it proposes the most acres for herbicide treatment. The *Proposed Action* would rehabilitate wildlife habitat by eradicating, controlling and containing invasive plants, particularly cheatgrass. This rehabilitation would return these areas to native vegetation degraded by human-related activities. The *Proposed Action* would also remove or control competing vegetation that would improve species diversity and habitat quality for all sagebrush obligate species. Without control activities, cheatgrass and other invasive plants would likely continue to exist and spread throughout their current range and continue to threaten the long-term stability of the sagebrush ecosystems and other wildlife habitat.

Alternative B-No Action

Under the No Action Alternative the WFO and CYFO would continue its ongoing vegetation treatment program. Under this alternative the BLM would be able to use the 20 herbicides previously approved. Wildlife impacts (positive and negative) would be similar to those that have occurred in the past years. Impacts would include loss of non-target vegetation used by wildlife, and effects to wildlife health from exposure to herbicides. Long-term positive impacts on wildlife communities would be much less

under this alternative. Invasive plant populations would likely continue to expand at the current rate or greater, increasing damage to native plant communities and wildlife habitat and inhibiting ecosystem functions associated with those communities.

Alternative C-No Herbicide Use

Under Alternative C, wildlife would not be affected by herbicide use. Primary effects would stem from other vegetation treatment methods. Positive ecosystem and habitat benefits as a result of vegetation management could be reduced under this alternative, as there are certain invasive species for which herbicide use is the only effective method of treatment or for which other methods are impractical due to cost, time, accessibility, or public concerns (e.g., saltcedar in riparian areas). For example, rough terrain may prevent treatment by methods requiring terrestrial vehicle and/or foot access, while aerial treatment with herbicides in these areas would be possible. In addition, it is often difficult to eradicate some species, such as shrubs that resprout from rhizomes, by means other than herbicide application. Similarly, pre-emergent herbicides that persist in the soil are the most effective means of controlling invasive plants with seeds that remain viable for long periods of time. Under this alternative, in the absence of herbicide treatments, invasive plant populations would likely continue to spread, possibly at increasing rates, and cause further damage to susceptible native plant communities and wildlife habitat, particularly in areas and for species where other treatment methods are not effective or possible (e.g., large tracts of rangeland or grassland dominated by invasive, resprouting shrubs or without enough fine fuels to carry prescribed fires). However, it is uncertain how potential negative impacts from this alternative (mostly indirect) would compare with negative direct and indirect impacts from herbicide use.

Cumulative Effects

Non target plants would be impacted while conducting herbicide treatments; however, treatments are targeted using spot spraying techniques so non target plants are less affected than broad applications. Since all treatments will be scoped, if broad applications do occur, the application will be scoped with plant specialists who will ensure known populations of Sensitive and Listed Species (ESA) are not impacted. They may be mitigated by use of selective herbicide and or spatial/temporal mitigation.

With mitigation measures incorporated into the weed control strategy, habitat for wildlife would improve with more native vegetation becoming established where non-native plants have outcompeted and degraded native habitats and plant communities. These treatments would allow recovery of important habitats for Sensitive Species and other important game species. Habitat for native pollinators and migratory birds would improve with more access to native flowers and an opportunity to improve ecological function of plant communities by linking habitats with the insect, microbial and vertebrate components facilitating nutrient cycling and energy flow.

Range condition would improve and would improve forage quantity and quality for ungulates. Sage grouse habitat would improve by actively controlling cheatgrass which has highly degraded habitat throughout the west. Cheatgrass can compete out native plants and with a combination of appropriate grazing management treatments can be successful and expedite recovery of native habitats. The level of cheatgrass infestation in the Bighorn Basin is still low enough to control, but without action it may increase to a point where sage grouse habitat becomes unsuitable across the Bighorn Basin.

Since there would be no possibility of take because habitat or the occupation of these habitats for Grizzly Bear, Black-footed Ferret, Grey Wolf, and Canada Lynx would not be affected; there will be "no effect" on these listed species.

Treatments would be in riparian and upland sites throughout the Bighorn Basin, therefore, potential habitat exists and would be affected. However, since Ute Ladies-Tresses' have not been observed in the Bighorn Basin, and the application of the Conservation Strategy Measures specific to herbicide and biological control listed in the mitigation section would be followed, the proposed action would "not likely affect" this listed plant species. If this plant is ever confirmed to be in the Bighorn Basin, the BLM will reinitiate consultation with USFWS.

3.8 Recreation

Areas where weed management activities will take place are located on BLM-administered public lands that are managed as extensive recreation management areas (ERMA), and special recreation management areas (SRMA). Recreation resources and associated uses are one of the dominant resources and uses within the SRMAs. Recreation management for SRMAs are elevated in priority so as to manage for the identified desired recreational setting character conditions, activities, experiences, and beneficial outcomes. SRMAs located within the Bighorn Basin can be found in Table 2.

Table 2 Special Recreation Management Areas within the Bighorn Basin:

Worland Field Office	Cody Field Office
West Slope of the Bighorns SRMA	West Slope SRMA
Absaroka Mountain Foothills SRMA	Worland Caves SRMA
Bighorn River SRMA	The Rivers SRMA
Badlands SRMA	Historic Trails SRMA
	Bighorn River SRMA

Recreation uses within these areas include, but are not limited to, hunting, hiking, camping, fishing, rock hounding, sightseeing, wildlife viewing, education/interpretation, driving for pleasure, boating, caving, rock climbing, horseback riding, and ATV/motorcycle hill climbing. Recreation management actions within these areas are to

support these activities, to protect natural recreational resources, and to manage for desired settings, experiences, and beneficial outcomes.

BLM-administered public lands not managed as a SRMA are managed as an ERMA. Recreation management within ERMAs are more custodial, and in response to address user conflicts, public health and safety, and resource protection. Recreation resources and associated uses are recognized within the ERMAs, but are not the dominant resource or use, or the priority management objective. There are, however, recreational sites constructed within the ERMAs so as to sustain and enhance these activities, as well as to address resource protection. Table 3 contains major recreation sites located within the Bighorn Basin. This table is not the entire list of BLM managed recreation sites.

Table 3 – Major Recreation Sites within the Bighorn Basin

Worland Field Office	Cody Field Office
Salt Lick Trail (West Slope of the Bighorns SRMA)	North Fork Shoshone River Access (The Rivers SRMA)
Canyon Creek Area (West Slope of the Bighorns SRMA)	Hogan & Luce Campground/Bald Ridge Trailhead and Trail (ERMA)
Dinosaur Tracksite (ERMA)	Twin Creek Trail (The Rivers SRMA)
Gooseberry Trail (Badlands SRMA)	Bobcat - Houlihan Trailhead (The Rivers SRMA)
Castle Gardens Scenic Area (ERMA)	Four Bear Trailhead/Trail (The Rivers SRMA; ERMA)

Visual Resource Management

The weed treatment areas will be located within scenic quality rating units (SQRU) that are managed as VRM Class I, II, III, and IV. The Wilderness Study Areas (WSA) and the Five Springs Falls Area of Critical Environmental Concern (ACEC) are the only BLM-administered public lands that are managed as VRM Class I. The west slope of the Bighorns, Absaroka Mountain Foothills, Carter Mountain, Sheep Mountain, the Bear Tooth Range, and portions of the Badlands are managed as Class II due to Class "A" scenic quality, high sensitivity levels, and foreground distance zones. VRM Class III and IV encompass the majority of the basin. Class I objectives are to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. Class II objectives are to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Class III objectives are to partially retain the existing character of the landscape. The level of change to the characteristic landscape

should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. Class IV objectives are to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Areas of Critical Environmental Concern

9 Areas of Critical Environmental Concern (ACEC) are located within the Bighorn Basin; four managed by the Worland Field Office, and five managed by the Cody Field Office. An ACEC is defined in FLPMA, Public Law 94-579, and Section 103(a) as an area within the public lands where special management attention is required to protect and prevent irreparable damage to important historical, cultural, and scenic values, fish and wildlife and other natural systems or processes, and to protect life and safety from natural hazards. The BLM prepared regulations for implementing the ACEC provisions of FLPMA. These regulations are found at 43 CFR 1610.7-2(b).

The Washakie Resource Management Plan (September 1988) designated approximately 11,200 acres of BLM-administered public land, private lands, and United States Forest Service lands in the west slope of the Bighorn Mountains as the Spanish Point Karts ACEC. This area consists of deeply incised and dramatic canyons, rugged mountainous terrain, Medicine Lodge and Trapper Creek wilderness study areas (WSA); Trapper Creek, Medicine Lodge Creek, and Dry Medicine Lodge Creek all of which are eligible and suitable for Wild and Scenic River designations; 4 significant cave and Karst systems, sinking stream segments, and important groundwater quantity and quality. Recreational opportunities are abundant due to the sizeable amount of public access, wide array of opportunity spectrum from primitive and back country to middle country natural resource recreational settings, high scenic values, and abundant activities ranging from hiking, sightseeing, climbing, and caving. Management objectives for the Spanish Point Karst ACEC are to protect the important cave resources, sinking stream segments, groundwater quantity and quality.

An amendment to the Washakie Resource Management Plan designated approximately 1,800 acres of BLM-administered public lands as the Red Gulch Dinosaur Tracksite ACEC. The Red Gulch Dinosaur Tracksite is the largest tracksite in Wyoming, and one of only a few worldwide from the Middle Jurassic Period (160 million to 180 million years old). The area consists of the Red Gulch Dinosaur Tracksite recreation area, a small portion of the Red Gulch/Alkali National Backcountry Byway, and abundant paleontological resources dating back to the Middle Jurassic era. In the late 1990s, Middle Jurassic dinosaur megatracksites were discovered in this area in carbonate units once thought to be totally marine in origin. This discovery questioned and changed the paleogeographic

reconstructions for Wyoming for this period. (Kvale et al., 2000) An abundance of paleontological resources cover the area which includes marine fossils such as belemoties, gryphaea, trilobites, brachiopods, and ammonites. Management objectives for the ACEC are to protect and maintain the paleontological resources.

An amendment to the Washakie Resource Management Plan designated approximately 260 acres of BLM-administered public lands as the Big Cedar Ridge ACEC. This area is abundant with paleontological resources in particular abundant fossilized plants. The fossil plants were discovered in the Meeteetse Formation in 1990 and represent a complete, well-preserved Late Cretaceous age vegetative community. The outstanding paleontological resources are the result of volcanic ash fall which swept over and buried the standing vegetation on a low coastal plain 72 million years ago. The flora in this outcrop represents a true instant in time preserving relationships between ancient landscapes and vegetation. The plants were preserved in the base of the ash, in many cases still rooted in the underlying soils. Such in situ preservation is extremely rare. The vegetative community preserved in this ash fall and flow was a mixture of flowering plants, ferns, palms, and coniferous trees suggesting a mosaic of forest and open glades. This is possibly the oldest site in the world where such association has been determined. Fossil collecting in this area is a popular recreational activity as well as a popular activity for school groups, paleontological groups, and university studies. The BLM allows for fossil collecting in this area in reasonable amounts. Management objectives for the Big Cedar Ridge ACEC is to protect and maintain the paleontological resources and to provide an educational, hands on experiences for visitors and groups.

The Grass Creek Resource Management Plan (September 1998) designated approximately 16,300 acres of BLM-administered public lands as the Upper Owl Creek Area ACEC. The ACEC is located in the upper foothills of the Absaroka Mountains surrounding the Owl Creek, Rock Creek, Klicker Creek, Slab Creek, and Vass Creek drainages. The Washakie Wilderness managed by the Shoshone National Forest, and the Wind River Indian Reservation surround the area and provides for very limited access into this region. The unique qualities for the ACEC include an abundant variety of wildlife including wolves, grizzly bears, and wolverines. Primitive recreational opportunities are exceptional due to the backcountry (semi-primitive non-motorized and motorized natural ROS settings) natural resource recreational settings, the mountainous and deeply incised drainages, and the high scenic quality of the area. The management objective is to protect overlapping and important big game habitats and migration corridors, fisheries habitat, shallow soils, alpine vegetation and rare plants, diverse cultural resources and Native American traditional values, primitive recreational opportunities, and high scenic quality.

The Cody RMP designated approximately 7,819 acres of BLM-administered public lands as the Carter Mountain ACEC. This ACEC is located on the east slope of the Absaroka Mountains west of Meeteetse. The objective for management of the Carter Mountain ACEC is to protect areas of unique alpine tundra and fragile soils. The ACEC is scenic and

provides crucial winter range for elk and mule deer, as well as opportunities for hunting to local, state, and national visitors.

An amendment to the Cody RMP designated the Brown/Howe Dinosaur Area ACEC on about 5,457 acres of BLM-administered public lands. This ACEC is located north of Shell, Wyoming and was designated to protect world class paleontological resources. Designation of this area was based on the remarkable dinosaur specimens that have been recovered there. The Brown/Howe Dinosaur Area ACEC attracts domestic and international researchers. The Brown Howe Quarries on nearby private land have produced hundreds of dinosaur bones, beginning in the 1930's. The fossil bearing sediments probably continue, in part, onto neighboring BLM land. The Big Al Quarry, on BLM-administered land just north of the Brown Howe Quarries, was the site of the discovery of a nearly complete *Allosaurus* ("Big Al") skeleton. This specimen has been the subject of several scientific studies, and formed the basis for the central figure in the Discovery Channel's TV program entitled "Walking with Dinosaurs – Allosaurus." Additional quarrying is ongoing in the Big Al Quarry, and the area will probably continue to produce important dinosaur specimens.

The Cody Record of Decision and Approved Resource Management Plan (November 1990) designated approximately 22,270 acres of BLM-administered public lands as the Little Mountain ACEC. The ACEC is located on the west slope of the Bighorn Mountains northeast of Lovell, Wyoming. The objectives for management of the ACEC are to protect and manage important cave, cultural, and paleontological resources, and to maintain scenic values.

The Cody Record of Decision and Approved Resource Management Plan (November 1990) designated approximately 160 acres of BLM-administered public lands as the Five Springs Falls ACEC. The ACEC is located on the west slope of the Bighorn Mountains east of Lovell, Wyoming. The objective for management of the ACEC is to protect existing populations of four near-endemic rare and sensitive plant species in the Five Springs Falls area.

The Cody Record of Decision and Approved Resource Management Plan (November 1990) designated approximately 12,285 acres of BLM-administered public lands as the Sheep Mountain Anticline ACEC. The ACEC is located north of Greybull, Wyoming. The objective for management of this ACEC is to protect an important natural area with unique geological features.

Travel and Transportation Management

The transportation network in the Bighorn Basin consists of federal and state highways, county roads, as well as roads built to facilitate industrial development. There is also an extensive network of official BLM roads that range from ditched and crowned gravel

roads that are regularly maintained to an extensive array of unofficial roads and vehicle routes which were never formally constructed and which rarely receive maintenance. Many are "two-track" vehicle trails that were created and are maintained simply by the passage of motor vehicles.

The BLM is required to establish OHV management areas for all public lands. Areas must be classified as Open, Limited, or Closed to motorized travel activities. For legislative purposes, 42 CFR 8340.0-5 defines an OHV as "any motorized vehicle capable of or designated for, travel on or immediately over land, water, or other terrain." Certain authorized vehicles were excluded from this definition including non-amphibious registered motor boats; any military, fire, emergency, or law enforcement vehicles while being used for emergency purposes; vehicles whose use is expressly authorized by the authorized officer, or otherwise officially approved; vehicles in official use; and any combat or combat support vehicle when used in times of national defense emergencies. The national objectives for OHV management are to provide for OHV use while protecting natural resources, promoting public safety, and minimizing conflicts among the various users of public lands.

The BLM-administered public lands within the Bighorn Basin are all managed as motorized use limited to designated roads, existing roads, or closed to motorized use.

The Worland and Cody Field Offices have successfully implemented travel management plans and cooperative agreements within basin. Travel Management Plans have been written and implemented for Rattlesnake Mountain, Carter Mountain ACEC, Upper Nowood, LU Ranch Cooperative Travel Management Area, South Brokenback area, Upper and Lower Renner and Medicine Lodge Wildlife Habitat Management Units, Little Mountain, and McCullough Peaks. These plans designated, closed, and developed travel routes within areas that support crucial wildlife habitat, hiking, camping, horseback riding, interpretive environmental education, and OHV use. In 1990, the WFO implemented the *Off-Road Vehicle Designations for Wilderness Study Areas (WSA)*. The plan effectively closed all roads and trails within the Sheep Mountain, Bobcat Draw Badlands, and Red Butte WSAs to motorized use.

Wilderness Study Areas

In 1964, Congress passed the Wilderness Act, thereby establishing a national system of lands for the purpose of preserving a representative sample of ecosystems in a natural condition for the benefit of future generations. Until 1976, most land considered for, and designated as, wilderness was managed by the National Park Service and USFS. With the passage of FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated wilderness. To be designated as wilderness, an area must have the following characteristics:

Size: road-less areas of at least 5,000 acres of public lands or of a manageable size.

Naturalness: generally appears to have been impacted primarily by the forces of nature.

Opportunities: provides outstanding opportunities for solitude or primitive and unconfined types of recreation.

Ten wilderness study areas (WSA) are located within the project areas:

1. Alkali Creek WSA (WY-010-241)
2. Bobcat Draw Badlands WSA (WY-010-126)
3. Cedar Mountain WSA (WY-010-222)
4. Honeycombs WSA (WY-010-221)
5. Medicine Lodge WSA (WY-010-240)
6. McCullough Peaks WSA (WY-010-335)
7. Owl Creek WSA (WY-010-104 a, b, c)
8. Red Butte WSA (WY-010-131)
9. Sheep Mountain WSA (WY-010-130)
10. Trapper Creek WSA (WY-010-242)

Areas with Wilderness Characteristics

As mandated by FLPMA, Section 202, the BLM Worland and Cody field offices had recently completed an inventory of all BLM-administered public lands for wilderness characteristics. The inventory evaluates wilderness characteristics as discussed in Section 2(c) of the Wilderness Act of 1964, and incorporated in FLPMA, which states:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Throughout the Bighorn Basin, 572,507 acres of BLM-administered public lands were identified as containing wilderness characteristics. These areas are scattered throughout the basin and along the foothills of the Absaroka and the Big Horn Mountain Ranges.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (WSRA) provides for the protection of certain free-flowing rivers and immediate environments that possess outstandingly remarkable values.

As guided from BLM Manual 8351 – Wild and Scenic Rivers, the BLM is committed to carrying out the provisions of the WSRA and shall identify and evaluate all rivers located on BLM-administered lands to determine if they are appropriate for addition to the National Wild and Scenic River System (NWSRS). As appropriate, BLM shall make recommendations for legislative actions to accomplish such additions. BLM shall take actions as necessary to ensure proper management of river corridors.

The NWSRS is a system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in a free-flowing condition. The system consists of three types of streams:

1. Recreation—rivers or sections of rivers that are readily accessible by road or railroad and that may have some development along their shorelines and may have undergone some impoundments or diversion in the past.
2. Scenic—rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped but accessible in places by roads.
3. Wild—rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted.

A WSR study was not completed for the Worland Field Office during the 1988 Washakie RMP, and the 1998 Grass Creek RMP determined that there were no stream segments or BLM-administrative lands along those segments which were eligible or suitable for Wild and Scenic River designation. In December 2002 a final report was completed evaluating BLM-administered lands along streams and waterways for potential Wild and Scenic River designation within the Washakie Resource Area. The final report resulted in nine waterway segments found to be eligible for Wild and Scenic designation. A quarter mile buffer from the middle of the stream segment, or from rim-to-rim, has been determined to be the area to enjoy the interim management prescriptions.

Eligible	Suitable	Length	Classification	Current Mgmt.
Canyon Creek	No	1.3 Mi.	Scenic	
Deep Creek	Yes	5.07Mi.	Wild	
Dry Medicine Lodge Creek	Yes	11.54 Mi.	Scenic	WSA, ACEC
Kirby Creek	No	2.11 Mi.	Recreational	

Medicine Lodge Creek	Yes	5.77 Mi.	Wild	WSA, ACEC
Paint Rock Creek Unit	Yes, partial	10.5 Mi.	Recreational	
Powder River (Middle Fork)	Yes	1.2 Mi.	Recreational	
Trapper Creek	Yes	7.01 Mi.	Wild	WSA, ACEC
White Creek	Yes	5.73 Mi.	Wild	

A review of waterways in the Cody Field Office area occurred in 1993 with an update to management prescriptions in 2003. An addendum was completed in 2009. The following table shows the findings.

Eligible	Suitable	Length	Classification	Current Mgmt.
Porcupine Creek	Yes	10.8 Mi.	Wild/Scenic	ACEC
Deer Creek	Yes	1.45 Mi.	Scenic	ACEC
Oasis Spring Creek*	Yes*	2.4 Mi.	Wild	
Trout Creek	Yes	0.96 Mi.	Wild	ACEC
Cow Creek (Seg 1 and 2)	Yes	1.92 Mi.	Wild/Scenic	
Cottonwood Creek (Seg 2)	Yes	4.05 Mi.	Scenic	
Clarks Fork of the Yellowstone River (Seg 3)	Yes	4.74 Mi.	Scenic	
Clarks Fork of the Yellowstone River (Seg 2)	No	3.77 Mi.	Scenic	
Meeteetse Creek	No	3.31 Mi.	Wild	
North Fork Shoshone River	No	4.87 Mi.	Recreational	
Pat O'Hare Creek	No	7.63 Mi.	Scenic	
South Fork Shoshone River	No	19.15 Mi.	Recreational	

Note: The finding for Oasis Spring Creek was reviewed and will be updated in 2010/2011. It is not eligible.

Environmental Consequences

Alternative A-Proposed Action
Recreation

Impacts to recreation under Alternative A would be minor and temporary if the standard operating procedures are adhered to. Recreational users will be temporarily displaced in areas undergoing treatment. This displacement would be caused by goal interference from a visitor desiring to experience solitude and a natural surrounding environment by weed treatment activities. However, impacts to recreation will be beneficial from weed treatments. Eradicating non-desirable vegetation and noxious and invasive weeds enhances the recreational settings conditions and supplemental

recreational resources, such as wildlife and vegetation that benefit from the weed treatments.

Alternative A-Proposed Action
Visual Resource Management
Weed treatment activities, and the presence of dead vegetation may introduce contrasting elements of line, form, color, and texture. These contrasts, however, may go unnoticed to the casual observer due to the naturalness of these contrasts. Treatment activities while closely following the standard operating procedures will not adversely impact VRM.

Alternative A-Proposed Action
Areas of Critical Environmental Concern
Weed treatments within the ACECs will help in protecting the important and relevant resources within these areas. The use of insecticides and herbicides will be considered on a case-by-case basis within the Spanish Point Karst ACEC under specific guidelines established in the Washakie Resource Area ROD (September, 1988). Adherence to these guidelines, found in the standard operating procedures, will ensure impacts to the Spanish Point Karst ACEC will be negligible. Adherence to the standard operating procedures including the one which requires a pre-treatment survey for sensitive habitat and special status species within or adjacent to the proposed treatment areas will ensure impacts to sensitive plants within the Five Springs Falls ACEC will be negligible.

Alternative A-Proposed Action
Travel and Transportation Management
Weed treatment activities could introduce new two-tracks which would be used by other motorized users, thus establishing the two-track as a route. These new two-tracks may be undesirable and would not meet the objectives of the areas, such as the ACECs or SRMAs. Limiting motorized use to either existing or designated routes will minimize the potential for new two-tracks. Sheep Mountain and Spanish Point Karst ACEC are areas that are managed as closed to motorized use. Adherence to these motorized restrictions will ensure that impacts to travel and transportation management will be negligible.

Alternative A-Proposed Action
Wilderness Study Areas
Weed treatment activities within the WSAs may temporarily impact the wilderness characteristics during times of treatment and immediately following. The presence of weed treatment activities will temporarily impact outstanding opportunities of solitude, and the dead vegetation present after treatment activities will temporarily impact the naturalness, but may go unnoticed to the casual observer. However, weed treatment within the WSAs consistent with guidance from the Interim Management Policy for

Lands under Wilderness Review (IMP) and under the standard operating procedures will enhance the wilderness characteristics.

Alternative A-Proposed Action
Areas with Wilderness Characteristics
Weed treatment activities within areas containing wilderness characteristics will temporarily compromise the characteristics of naturalness and solitude. The presence of weed treatment activities will temporarily impact outstanding opportunities of solitude, and the dead vegetation present after treatment activities will temporarily impact the naturalness, but may go unnoticed to the casual observer. Certain treatment activities may impair the wilderness characteristics by leaving surface disturbing impacts such as new two-tracks, noticeable treatment mosaics, and chemical drifts which may kill the local non-targeted vegetation. Long term impacts of the weed treatments will enhance the vegetation component which will further maintain and benefit the wilderness characteristics. Treatments analyzed and planned on a case-by-case basis will minimize the risks of impairing wilderness characteristics.

Alternative A-Proposed Action
Wild and Scenic Rivers
Weed treatment activities within the eligible waterway segments may temporarily impact the outstanding recreational values (ORV) during times of treatment and immediately following. The presence of weed treatment activities will temporarily impact the ORVs, and the dead vegetation present after treatment activities will temporarily impact the naturalness, but may go unnoticed to the casual observer. However, weed treatment within the eligible waterway segments consistent with interim guidance applied to the waterway segments and under the standard operating procedures will enhance the identified ORVs.

Alternative B-No Action
Recreation
Impacts to recreation under Alternative B would be the same as Alternative A.

Alternative B-No Action
Visual Resource Management
Impacts to VRM under Alternative B will be the same as Alternative A.

Alternative B-No Action
Areas of Critical Environmental Concern
Impacts to ACECs under Alternative B will be the same as Alternative A.

Alternative B-No Action
Travel and Transportation Management

Impacts to Travel and Transportation Management under Alternative B will be the same as Alternative A.

Alternative B-No Action
Wilderness Study Areas
Impacts to WSAs under Alternative B will be the same as Alternative A.

Alternative B-No Action
Areas with Wilderness Characteristics
Impacts to wilderness characteristics under Alternative B will be the same as Alternative A.

Alternative B-No Action
Wild and Scenic Rivers
Impacts to eligible waterway segments under Alternative B will be the same as Alternative A.

Alternative C-No Herbicide Use
Recreation
Impacts to recreation under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use
Visual Resource Management
Impacts to VRM under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use
Areas of Critical Environmental Concern
Impacts to ACECs under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use
Travel and Transportation Management
Impacts to Travel and Transportation Management under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use
Wilderness Study Areas
Impacts to WSAs under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use
Areas with Wilderness Characteristics
Impacts to wilderness characteristics under Alternative C will be the same as Alternative A.

Alternative C-No Herbicide Use

Wild and Scenic Rivers

Impacts to eligible waterway segments under Alternative C will be the same as Alternative A.

Cumulative Effects

Recreation

Continuation of weed management will enhance the vegetative component, which enhances recreational opportunities, experiences, settings, and supplemental resources such as wildlife. Managing for a healthier rangeland will enhance visitors' experiences, and ultimately manage for desired beneficial outcomes.

Visual Resource Management

Continuation of weed management will enhance the scenic quality of these areas by removing undesirable vegetation and noxious and invasive weeds. However, continuing treating undesirable vegetation may result in visual contrasts created by the standing skeletons, dead vegetation, and cleared mosaics. Long term, appropriate weed treatments will enhance the scenic qualities within the treatment areas.

Areas of Critical Environmental Concern

Continuation of treatments within the ACECs will benefit the important and relevant resources that are protected in these areas.

Travel and Transportation Management

Continuation of treatments may introduce additional routes to the existing transportation network, some of which may be undesirable and conflict with the resource objective within the areas.

Wilderness Study Areas

Continuation of weed treatments under the guidance of the IMP within the WSAs will enhance the wilderness characteristics. However, continuing treating undesirable vegetation may result in visual contrasts created by the standing skeletons, dead vegetation, and cleared mosaics, which may impact the wilderness characteristics. These impacts will be negligible if treatments meet the non-impairment standard.

Areas with Wilderness Characteristics

Continuation of weed treatments will enhance the wilderness characteristics for these areas. However, continuing treating undesirable vegetation may result in visual contrasts created by the standing skeletons, dead vegetation, and cleared mosaics, which may impact the wilderness characteristics. These impacts will be negligible if treatments are coordinated and planned on a case-by-case basis.

Wild and Scenic Areas

Continuation of weed treatments under interim management prescriptions applied to the eligible waterway segments will enhance the identified ORVs. However, continuing treating undesirable vegetation may result in visual contrasts created by the standing skeletons, dead vegetation, and cleared mosaics, which may influence the scenic and naturalness ORVs. These impacts will be negligible if treatments are consistent with interim management prescriptions.

3.9 Livestock/Range

Affected Environment

Presently, the Worland Field Office administers 443 grazing allotments covering approximately 2.1 million acres of public lands. The Cody Field Office administers 235 allotments covering approximately 1.1 million acres of public lands. The kinds of livestock grazing on public lands consist primarily of cattle, but also include sheep, domestic horses, and small numbers of bison. Goats and sheep are sometimes authorized for the purpose of suppressing weeds. The majority of livestock forage is produced in the sagebrush steppe, desert grassland, and meadows discussed in the Native Vegetation section of this document. Perhaps the greatest risk to livestock forage is cheatgrass invasion in the sagebrush/grass vegetation types. The risks discussed in Section 3.3 to the native vegetation plant communities would also affect forage production and availability for livestock grazing.

Alternative A-Proposed Action

The Proposed Action would result in the most beneficial impacts to livestock grazing. In the short term (2 to 5 years), available forage and cover for livestock would be reduced in the treated areas. In the long term the proposed action would generate the greatest benefits for livestock grazing by reducing undesirable invasive forage species and increase available desirable forage and cover species. This alternative would provide the greatest assistance in meeting or making progress towards meeting the Standards for Healthy Rangelands in Wyoming. The variety of control methods and the acreage treated would likely result in the greatest amount of productive vegetative communities available as livestock forage. The replacement of invasive plant species with desirable native herbaceous species would benefit the forage base.

Alternative B-No Action

This alternative would provide for similar effects as the proposed action. However, this alternative would not allow for as many acres to be treated for cheatgrass control resulting in fewer acres of desirable forage for livestock grazing in the long term. This alternative would assist in meeting or making progress towards meeting the Standards

for Healthy Rangelands in Wyoming but to a lesser degree when compared to the proposed action.

Alternative C-No Herbicide Use
This alternative would allow noxious and invasive species to persist, expand, and continue to compete with desirable native trees, shrubs, and herbaceous plant species. Under this alternative the forage base for livestock grazing would continue to decrease. With the no herbicide use alternative there would be no assistance in the attempt to meet or achieve Standards for Healthy Rangelands and potentially more acres each year would fail standards.

Cumulative Effects:
The proposed action and no action alternatives would have similar cumulative effects on the environment. Some short term impacts can be expected with invasive species control and these impacts will be incrementally increased when combined with other activities. Livestock grazing, invasive species control and many other activities have historically and in some cases continue to impact natural resources and the entire environment. With improved livestock grazing practices, invasive species control, and other mitigation measures and special stipulations permitting uses of varies resources more positive cumulative effects may be witnessed in the long term. Improved management on public lands, including invasive species control equates to improved land health and benefits humans and the entire ecosystem.
The no herbicide treatment alternative combined with other uses would contribute the greatest to cumulative effects of past, present and reasonable foreseeable actions on the ecosystem.

3.10 Heritage Resources

Affected Environment
Cultural resource studies indicate that the Big Horn Basin has been occupied for at least 12,000 years and cultural resource sites should be anticipated within specific project areas. Due to the potential to affect historic properties, each project will need to be evaluated by a cultural resource specialist prior to implementation of the project.

Environmental Consequences
Alternative A-Proposed Action – Integrated pest management approach
Per Appendix B.24 of the Wyoming State Protocol Agreement between the BLM and the State Historic Preservation Officer (SHPO), herbicide applications in areas unlikely to affect rock art or traditional Native American plant gathering areas are in most circumstances exempt from case-by-case review. However, a cultural inventory may be necessary based on the area to be treated or method of application used. The level of inventory needed will be determined by a cultural resource specialist at the project specific level.

Standard cultural stipulations apply to all projects.

Alternative B–continue present management
No additional consequences would be expected under this alternative. Standard cultural stipulations apply to all projects.

Alternative C-No Herbicide Use
No additional consequences would be expected under this alternative. Standard cultural stipulations apply to all projects.

Cumulative Effects
Under the Proposed Action, an integrated pest management approach may affect cultural resource sites. Project specific mitigations will minimize or prevent adverse affect to historic properties.

3.11 Wetland and Riparian

Affected Environment
There are over 900 miles of intermittent or perennial stream riparian habitat that occur in the Worland and Cody field office areas. These riparian areas provide habitat forage and cover for numerous aquatic, wildlife and plant species. These areas are managed by the BLM for Proper Functioning Condition (PFC) according to BLM Technical Reference Manuals 1737-15 and 1737-16 for lotic and lentic type environments. There is also riparian habitat from produced water and are typically located downstream from outfall channels of oil and gas facilities. The anthropogenic modifications have provided additional water and transformed many areas from ephemeral channels to riparian areas. There are also numerous stock reservoir impoundments that have created lentic habitat around facilities that are able to store and capture amounts of water for additional plant growth. All of these areas are susceptible to encroachment of invasive species and have experienced a change in vegetation type and frequencies from historic impacts. Riparian areas that are rated as PFC are less susceptible for invasion; other areas that are rated Functioning at Risk or Non-Functioning generally have invasive species as a component of the vegetative community.

Environmental Consequences
Alternative A-Proposed Action
This alternative would allow for the expanded use of additional herbicides to be treated to the public lands. This alternative would allow for additional removal of invasive plants located along wetlands and riparian areas. The removal would allow for these riparian and wetland areas to function properly with the proper vegetative components of a healthy biotic system. In areas where invasive species are not successfully replaced by native species these areas would likely degrade due to the absence of vegetation.

Alternative B-No Action

The continued expansion of invasive species in riparian and wetland areas would likely remain at the same rate or increase or decrease due to climatic conditions. The areas that have extensive infestations would continue to decline and degrade riparian conditions. In areas where invasive species are not successfully replaced by native species these areas would likely degrade due to the absence of vegetation.

Alternative C-No Herbicide Use
The removal of herbicide use would allow riparian and wetland areas to be susceptible to invasive species. The invasive species such as Tamarisk and Russian Olive would likely continue and habitat and other hydrologic functions would degrade without the proper components to function properly.

Cumulative Effects
The cumulative effects on the riparian and wetland areas would be from additional chemicals being introduced into surface and groundwater resources. The amounts and frequencies of detection limits would gradually increase with future applications in the future. In areas where invasive species are not successfully replaced by native species these areas would likely degrade due to the absence of vegetation.

3.12 Areas with Wilderness Characteristics

Affected Environment

As mandated by FLPMA, Section 202, the BLM Worland and Cody field offices had recently completed an inventory of all BLM-administered public lands for wilderness characteristics. The inventory evaluates wilderness characteristics as discussed in Section 2(c) of the Wilderness Act of 1964, and incorporated in FLPMA, which states:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Throughout the Bighorn Basin, 572,507 acres of BLM-administered public lands were identified as containing wilderness characteristics, with 223,111 acres within the weed

management area. These areas are scattered throughout the basin and along the foothills of the Absaroka and the Big Horn Mountain Ranges.

Environmental Impacts

Weed treatment activities within areas containing wilderness characteristics will temporarily compromise the characteristics of naturalness and solitude. The presence of weed treatment activities will temporarily impact outstanding opportunities of solitude, and the dead vegetation present after treatment activities will temporarily impact the naturalness, but may go unnoticed to the casual observer. Certain treatment activities may impair the wilderness characteristics by leaving surface disturbing impacts such as new two-tracks, noticeable treatment mosaics, and chemical drifts which may kill the local non-targeted vegetation. Long term impacts of the weed treatments will enhance the vegetation component which will further maintain and benefit the wilderness characteristics. Treatments analyzed and planned on a case-by-case basis will minimize the risks of impairing wilderness characteristics.

Alternative B-No Action

Impacts to wilderness characteristics under Alternative B will be the same as Alternative A.

Alternative C-No Herbicide Use

Impacts to wilderness characteristics under Alternative C will be the same as Alternative A.

Cumulative Effects

Continuation of weed treatments will enhance the wilderness characteristics for these areas. However, continuing treating undesirable vegetation may result in visual contrasts created by the standing skeletons, dead vegetation, and cleared mosaics, which may impact the wilderness characteristics. These impacts will be negligible if treatments are coordinated and planned on a case-by-case basis.

4.0 MITIGATION MEASURES

The *Proposed Action* incorporates planning processes that includes: compliance with statutory mandates and other BLM program guidance pertaining to vegetation management; compliance with vegetative management goals outlined in land use plans; utilizing integrated pest management; coordination with other local, state, federal agencies, private landowners, and industry; requiring soil and vegetation disturbances be minimized in all BLM actions; requiring preventative measures to reduce invasive plant introductions in all BLM actions; and education and outreach.

Specific mitigation measures for vegetation treatments include:

1) compliance with label requirements for herbicide use;
2) following the *Conservation Measures, Standard Operating Procedures, Mitigation Measures*, addressed in the *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, Record of Decision (BLM 2007); See Appendix D*

3) post treatment monitoring;
4) and restoration, if applicable.

5.0 RESIDUAL EFFECTS

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Most adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The majority of the residual effects would be associated with herbicide use. The possible adverse residual effects are detailed in Chapter 4 of the V*egetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement, (BLM 2007).*
http://www.blm.gov/wo/st/en/prog/more/veg_eis.html

6.0 MONITORING AND/OR COMPLIANCE

The monitoring framework for the *Proposed Action* is presented in accordance with the *Record of Decision*, *Appendix D (Monitoring*) of the V*egetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007)* and the *BLM National Monitoring Strategy (2006).*
This framework describes the monitoring needed to assure the desired future condition and treatment strategies are achieved. The framework includes implementation / compliance and effectiveness monitoring components. Some components of the framework are outlined below.

Implementation/Compliance Monitoring
• Develop a project work plan for herbicide use.
• Ensure contracts and agreements include appropriate prescriptions and that herbicide ingredients and application rates meet label requirements and that all *Standard Operating Procedures* are followed.
• Document and report herbicide use and certified applicator information in the Pesticide Use Proposals and Pesticide Application Records.

Effectiveness Monitoring
• Implementation monitoring would occur to ensure objectives of the *Proposed Action* are implemented as planned. Post-treatment reviews would occur on a sample basis to determine whether treatments were effective and whether or not passive/active restoration occurred as expected.
• Post-treatment monitoring would be used to detect whether the *Standard Operating Procedures* were appropriately applied.
• Contract and agreement administration and other existing mechanisms would be used to correct deficiencies.

• Herbicide use would be reported to the Environment Protection Agency, as required by BLM regulations.
• Re-treatment and active restoration prescriptions would be developed based on post treatment results. Changes in treatment methods would occur based on effectiveness of treating the invasive plant infestations. For example, an invasive plant population treated with a broadcast herbicide may be retreated with a spot spray or hand pulled, once the size of the infestation is reduced.

Site-Specific Invasive Plant Treatments
Monitoring requirements would be accomplished using trained BLM employees or through partnership with the herbicide applicators, such as the counties located within the WFO, CYFO and/or private applicators working for industry. Currently, the herbicide applicators who work on BLM lands complete a *Pesticide Application Record* that documents and monitors the site treated, treatment methods, herbicide used, and method of application. The monitoring records require a follow-up visit and an assessment of effects on non-target species. Similar records may be developed in the future to meet the monitoring needs. Additional monitoring would be completed as part of the *BLM National Monitoring Strategy (2006)* and other required monitoring processes.

7.0 CONSULTATION AND COORDINATION

Persons, Groups, and Agencies Consulted

List of all Persons, Agencies and Organizations Consulted for Purposes of this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
USFWS	Informal Consultation	Concur

List of Preparers:

Non-BLM Preparers

Name	Title	Responsible for the Following Section(s) of this Document

BLM:

Name	Title	Responsible for the Following Section(s) of this Document
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APPENDIX A

Key Issues Identified During the Scoping of the V*egetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement*

Program Purpose and Need
1. Focus on long-term ecosystem sustainability and biological diversity; clearly define restoration objectives 2. Need to address all invasive plants, not just weeds 3. Evaluate land use impacts, such as grazing and fire suppression, on the decline of ecosystem health 4. Focus on addressing the causes rather than treating the symptoms 5. Address how PEIS will impact Resource Management Plans and other local planning 6. Work closely with agencies, conservation groups, and private landowners on vegetation management

Proposed Action

1. Ensure that adequate funds are available to treat enough land and monitor treatment success
2. Consider all treatment methods
3. Naturally-occurring fires should be allowed to burn and restored to public lands
4. Use newer, less toxic herbicides where feasible, and limit use or avoid use of herbicides
5. Describe how herbicides were chosen and evaluated in the PEIS
6. Describe where acres will be treated and method of accounting for acres that receive multiple treatments

Other Potential Alternatives

1. Reduce or eliminate the use of herbicides; apply from the ground rather than from the air
2. Fuels reduction should only occur in WUI or where there is a threat of significant wildfire
3. Treat more acres; treat fewer acres
4. Develop a no-grazing alternative; develop a no-logging alternative; develop a no-OHV alternative
5. Develop restrictions on motorized vehicle use on public lands
6. Develop an alternative based on an ecosystem management approach

Restoration Goals and Best Management Practices

1. Identify restoration objectives and focus on preventative measures to eliminate the causes of land degradation
2. Restoration efforts should focus on restoring natural disturbance regimes and ecosystem processes
3. Improve management of public lands for multiple use and maximum public benefit
4. Use native plants and certified native seed, where practical, for re-vegetation
5. Restrict grazing on lands that are being rehabilitated or that have not been impacted by livestock
6. Monitor success of treatments and establish performance measures to determine treatment success
7. Include public education as part of the vegetation treatment program

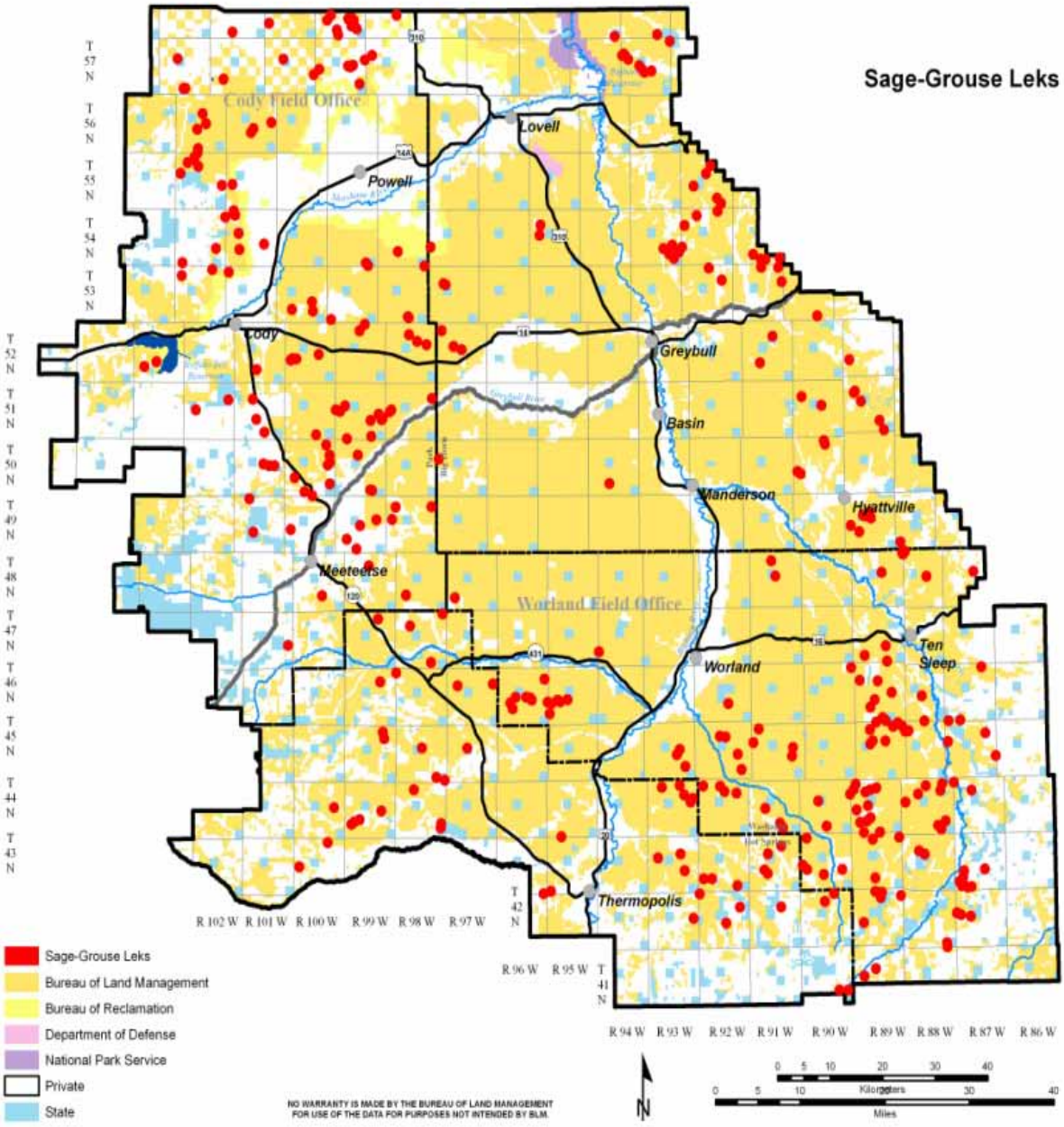
Environmental Consequences

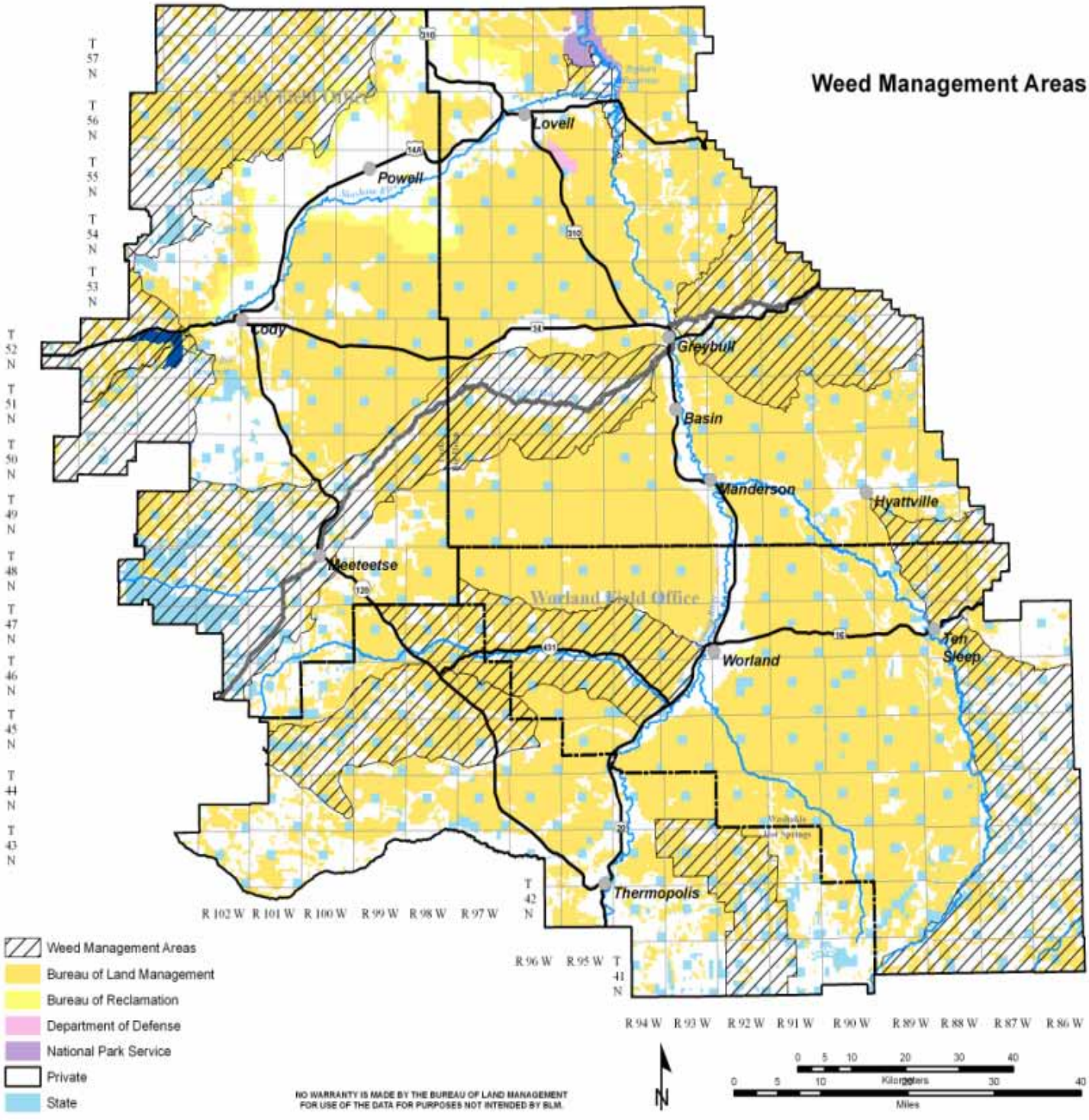
1. Address the impacts on air quality from prescribed burning
2. Address the impacts of herbicides on water quality
3. Assess the role of fire in contributing to weed growth
4. Evaluate the effects of herbicide treatments on non-target species

5. Address the role of grazing in controlling weeds and other invasive vegetation and hazardous fuels
6. Vegetation treatments should focus on restoring habitat and natural ecological processes
7. Address the impacts of treatments on species of concern
8. Describe how treatments will occur in wilderness areas
9. Address the impacts of prescribed fire on power line operations and safety
10. Evaluate the impacts to subsistence crops used by Native Americans and Alaska Natives
11. Address the risks to humans and fish and wildlife from use of herbicides and smoke from prescribed fire
12. Address how will vegetation treatments will affect the local economy

APPENDIX B

Maps




Weed Management Areas
Lovell
Powell
Cody
Greybull
Basin
Manderson
Hyattville
Meeteetse
Worland Field Office
Worland
Ten Sleep
Thermopolis
T 57 N
T 56 N
T 55 N
T 54 N
T 53 N
T 52 N
T 51 N
T 50 N
T 49 N
T 48 N
T 47 N
T 46 N
T 45 N
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R 102 W R 101 W R 100 W R 99 W R 98 W R 97 W
R 96 W R 95 W
R 94 W R 93 W R 92 W R 91 W R 90 W R 89 W R 88 W R 87 W R 86 W
Weed Management Areas
Bureau of Land Management
Bureau of Reclamation
Department of Defense
National Park Service
Private
State
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT FOR USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM.
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0 5 10 20 30 40
Kilometers
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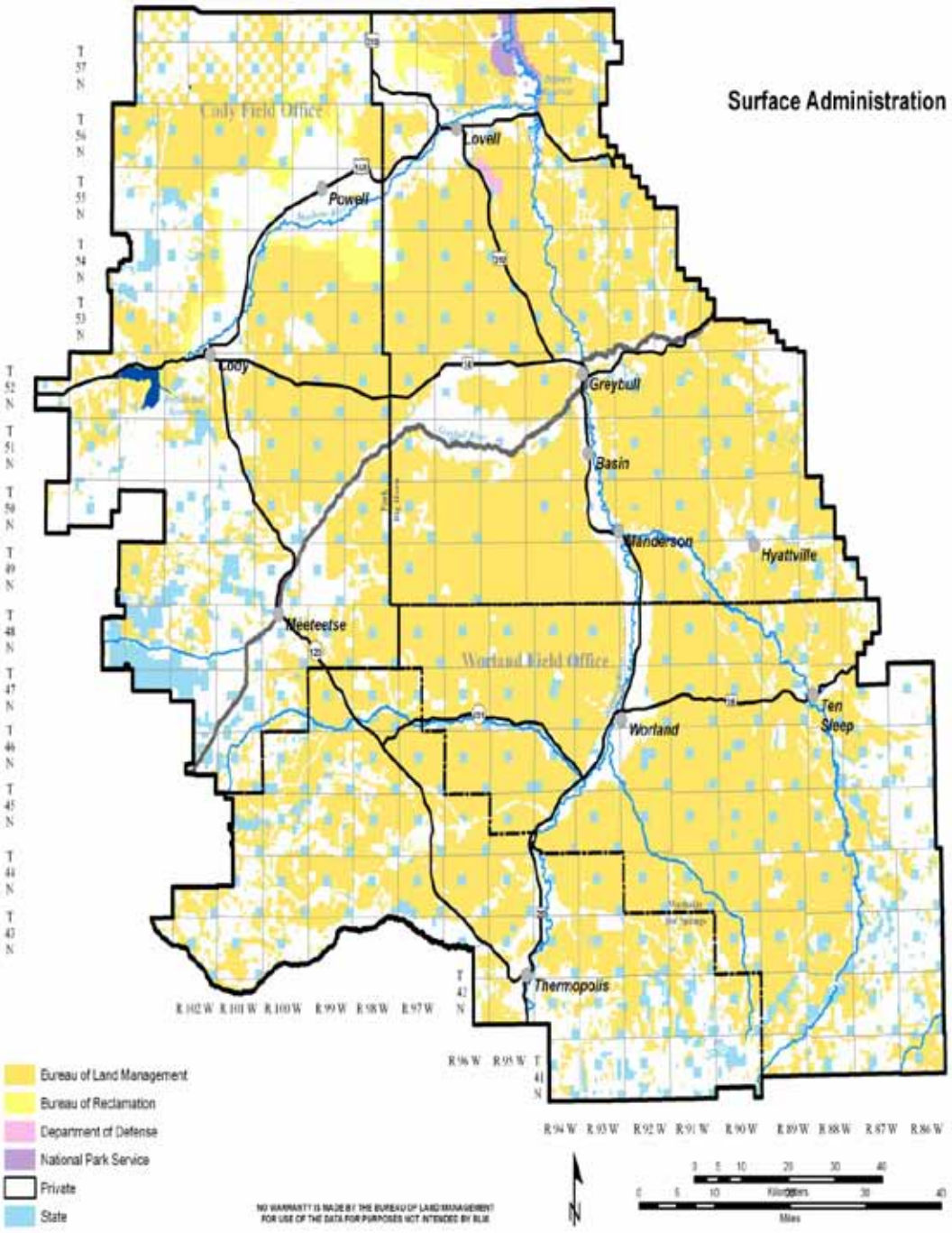
Surface Administration
Cody Field Office
Worland Field Office
Lovell
Powell
Cody
Greybull
Basin
Manderson
Hyattville
Meeteetse
Worland
Ten Sleep
Thermopolis
Bureau of Land Management
Bureau of Reclamation
Department of Defense
National Park Service
Private
State
Miles

APPENDIX C

Standard Operating Procedure

BLM Activity	Preventative Measures
Project Planning	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds. • Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning. • Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes. • Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations. • Pre-treat high-risk sites for weed establishment and spread before implementing projects. • Post weeds awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. • Coordinate project activities with nearby herbicide applications to maximize the cost effectiveness of weed treatments.
Project Development	• Minimize soil disturbance to the extent practical, consistent with project objectives. • Avoid creating soil conditions that promote weed germination and establishment. • To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives. • Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely. • Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material. • Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested

	sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material. • Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled. • Prevent weed establishment by not driving through weed-infested areas. • Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area. • Avoid acquiring water for dust abatement where access to the water is through weed-infested sites. • Identify sites where equipment can be cleaned. Clean equipment before entering public lands. • Clean all equipment before leaving the project site if operating in areas infested with weeds. • Inspect and treat weeds that establish at equipment cleaning sites. • Ensure that rental equipment is free of weed seed. • Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Re-vegetation	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans. • Retain bonds until reclamation requirements, including weed treatments, are completed, and based on inspection and documentation. • To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques. • Maintain stockpiled, uninfested material in a weed-free condition. • Re-vegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover re-vegetation. Re-vegetation may include topsoil replacement,

	planting, seeding, fertilization, liming, and weed-free mulching, as necessary. • Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings). • Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules. • Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project. • Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. • Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines). • Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way (ROW), and other areas of disturbed soils.
Standard Operating Procedures for Applying Herbicides	
Resource Element	**Standard Operating Procedure**
Guidance Documents	*BLM Handbook H-9011-1 (Chemical Pest Control); and manuals 1112 (Safety), 9011 (Chemical Pest Control), 9012 (Expenditure of Rangeland Insect Pest Control Funds), 9015 (Integrated Weed Management), and 9220 (Integrated Pest Management)*
General	• Prepare operational and spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to the environment while providing the desired results. • Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures. • Apply the least amount of herbicide needed to achieve the desired result. • Follow herbicide product label for use and storage.

	• Have licensed applicators apply herbicides. • Use only USEPA-approved herbicides and follow product label directions and “advisory” statements. • Review, understand, and conform to the “Environmental Hazards” section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment. • Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas. • Minimize the size of application area, when feasible. • Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners. • Post treated areas and specify reentry or rest times, if appropriate. • Notify adjacent landowners prior to treatment. • Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at ttp://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spill conditions to minimize risks to resources. • Consider surrounding land uses before aerial spraying. • Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence). • Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground. • Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent. • Use drift control agents and low volatile formulations. • Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas. • Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.

	• Turn off applied treatments at the completion of spray runs and during turns to start another spray run. • Refer to the herbicide product label when planning re-vegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Clean OHVs to remove seeds.
Air Quality See Manual 7000 (Soil, Water, and Air Management)	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil See Manual 7000 (Soil, Water, and Air Management	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected. • Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility. • Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.
Water Resources See Manual 7000 (Soil, Water, and Air Management)	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs. • Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments. • Use local historical weather data to choose the month of treatment. Considering the phenology of the target species, schedule treatments based on the condition of the water body and existing water quality conditions. • Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase

	water movements, and to avoid potential storm water runoff and water turbidity. • Review hydro-geologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies. • Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies. • Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment
Wetlands and Riparian Areas	• Use a selective herbicide and a wick or backpack sprayer. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications
Vegetation See Handbook H-4410-1 (National Range Handbook), and manuals 5000 (Forest Management) and 9015 (Integrated Weed Management)	• Refer to the herbicide label when planning re-vegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Use native or sterile species for re-vegetation and restoration projects to compete with invasive species until desired vegetation establishes. • Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for re-vegetation and other activities. • Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.
Pollinators	• Complete vegetation treatments seasonally before pollinator foraging plants bloom. • Time vegetation treatments to take place when foraging

	pollinators are least active both seasonally and daily. • Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment. • Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources. • Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources. • Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula. • Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)	• Use appropriate buffer zones based on label and risk assessment guidance. • Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)	• Use herbicides of low toxicity to wildlife, where feasible. • Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife • Adhere to Sage-Grouse Management IM WY-2010-12/13
Threatened, Endangered, and Sensitive Species See Manual 6840	• Survey for special status species before treating an area. Consider effects to special status species when designing herbicide treatment programs. • Use a selective herbicide and a wick or backpack sprayer

(Special Status Species)	to minimize risks to special status plants. • Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.
Livestock See Handbook H-4120-1 (Grazing Management)	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible. • As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable. • Use herbicides of low toxicity to livestock, where feasible. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources. • Avoid use of diquat in riparian pasture while pasture is being used by livestock. • Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary. • Provide alternative forage sites for livestock, if possible.
Wild Horses and Burros	•Minimize potential risks to wild horses by applying diuron, gyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible. •Consider the size of the application area when making application of 2, 4-D, bromacil, dicamba, diuron, Overdrive, picloram, and triclopyr in order to reduce potential impacts to wild horses. •Apply herbicide label grazing restriction for livestock to herbicide treatment areas that support populations of wild horses. •Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. •Do not apply bromacil or diuron in grazing land within herd management areas, and use appropriate buffer zones to limit contamination of vegetation in off-site foraging areas. •Do not apply 2; 4-D, bromacil, or diuron in herd management areas during the foaling season (Feb. 1 through July 31) and do not exceed the typical application

	rate of Overdrive or hexazinone in HMA's during the foaling season. • Minimize using herbicides in areas grazed by wild horses and burros. • Use herbicides of low toxicity to wild horses and burros, where feasible. • Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock. • No aerial spraying between Feb 1 and July 31 in the McCullough Peaks and Fifteen mile HMA's. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources
Cultural Resources and Paleontological Resources See handbooks H-8120-1 (Guidelines for Conducting Tribal Consultation) and H- 8270-1 (General Procedural Guidance for Paleontological Resource Management), and manuals 8100 (The Foundations for anaging Cultural Resources), 8120 (Tribal Consultation Under Cultural Resource Authorities), and 8270 (Paleontological Resource Management) See also: Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes. • Follow BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts. • Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments. • Work with tribes to minimize impacts to these resources. • Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.

Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation	
Visual Resources See handbooks H-8410-1 (Visual Resource Inventory) and H-8431-1 (Visual Resource Contrast Rating), and manual 8400 (Visual Resource Management)	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation. • Consider the surrounding land use before assigning aerial spraying as an application method. • Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area. • If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II). • Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low-growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) re-vegetating the site following treatment. • When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management (VRM) objectives.
Wilderness and Other Special Areas See handbooks H-8550-1 (Management of Wilderness Study Areas (WSAs)), and H- 8560-1 (Management of Designated Wilderness Study Areas), and Manual 8351 (Wild and Scenic Rivers)	• Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area. • Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation. • Re-vegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration. • Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds. • Use the “minimum tool” to treat noxious and invasive vegetation, relying primarily on the use of ground-based

	tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness. • Give preference to herbicides that have the least impact on non-target species and the wilderness environment. • Implement herbicide treatments during periods of low human use, where feasible. • Address wilderness and special areas in management plans. • Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (Land Use Planning Handbook, Appendix C)	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas. • Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post signs noting exclusion areas and the duration of exclusion, if necessary. • Use herbicides during periods of low human use, where feasible.
Social and Economic Values	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas. • Post treated areas and specify reentry or rest times, if appropriate. • Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions. • Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Control public access until potential treatment hazards no longer exist, per herbicide product label instructions. • Observe restricted entry intervals specified by the herbicide product label. • Notify local emergency personnel of proposed treatments. • Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating

	non-target food and water sources, especially vegetation over areas larger than the treatment area. • Consult with Native American tribes and Alaska Native groups to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide treatments. • To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies, including chemicals, for herbicide treatment projects through local suppliers. • To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated pest management program for projects proposing local use of herbicides.
Rights-of-way	• Coordinate vegetation management activities where joint or multiple use of a ROW exists. • Notify other public land users within or adjacent to the ROW proposed for treatment. • Use only herbicides that are approved for use in ROW areas.
Human Health and Safety	• Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide product label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide product label. • Provide public notification in newspapers or other media where the potential exists for public exposure. • Have a copy of MSDSs at work site. • Notify local emergency personnel of proposed treatments. • Contain and clean up spills and request help as needed. • Secure containers during transport. • Follow label directions for use and storage. • Dispose of unwanted herbicides promptly and correctly.

Standard Operating Procedures:
Spanish Point Karst ACEC

The use of insecticides and herbicides will be considered on a case-by-case basis and, if approved, will be conducted under the following guidelines:

Noxious Weed Controls

1. Before chemical control of noxious weeds is approved by the BLM thorough consideration will be given to all forms of physical and biological control, including, but not limited to hand pulling, the use of hand tools, mowing, prescribed burning, livestock grazing, and the use of insects.
2. If chemical application is determined to be the most economically acceptable and feasible method of control, the proposal shall detail the areas of infestation, the type and method of chemical control, the proposed location of any mixing facilities or storage tanks around the area, and a plan for the containment and clean-up of accidental spills of the chemical.
3. Aerial spraying will be discouraged.
4. The applicator will be required to conduct pre-and post-application water quality sampling to detect and control and surface water contamination that may occur.

Wild and Scenic Rivers

The following lists stipulations relevant to weed management activities:

1. Continue interim management into perpetuity on the following WSR eligible waterways (Map 74):
   - Deep Creek: 5.29 miles (Wild)
   - Dry Medicine Lodge Creek: 10.61 miles (Scenic)
   - Medicine Lodge Creek: 5.72 miles (Wild)
   - Middle Fork of the Powder River: miles (Recreational)
   - Paint Rock Creek Unit (Includes Paint Rock: 6.61miles, South Fork of Paint Rock: 3.27 miles, and a portion of Laddie Creek: 0.69 miles): 10.57 miles (Recreational)
   - Trapper Creek: 9.88 miles (Wild)
   - White Creek (downstream portion): 5.72 miles (Wild)
   - Porcupine Creek: 10.8 miles (Wild and Scenic)
   - Deer Creek: 1.45 miles (Scenic)
   - Oasis Spring Creek: 2.07 miles (Wild)
   - Trout Creek: 0.96 miles (Wild)
   - Cow Creek: Segments 1 and 2- 1.92 miles (Wild)
   - Cottonwood Creek (Segment 2): miles (Scenic)
   - Clarks Fork of the Yellowstone River (Segment 3): 4.74 miles (Scenic)
2. Unless otherwise noted, interim management on the following waterways is based on case-by-case evaluations of discretionary actions:
   - Clarks Fork of the Yellowstone (Segment 2) (3.77 miles)

- Meeteetse Creek (2.78 miles)
- North fork Shoshone River (0.85 miles)
- Pat O'Hare Creek (2.17 miles)
- South Fork Shoshone River (1.98 miles)
- Canyon Creek (1.3 miles)
- Kirby Creek (0.15 miles)
- Paint Rock Creek Unit (upstream portion of Laddie Creek) (0.7 miles)
- White Creek (upstream portion) (1.26 miles)

See the WSR Report for a complete description of the above waterway segments.

3. Allow surface-disturbing activities on BLM-administered land within the following scenic and recreational waterway segments on a case by case basis:
   - Middle Fork of the Powder River
   - Paint Rock Creek Unit (a portion of Laddie Creek, Paint Rock, and South Fork Paint Rock)
   - Dry Medicine Lodge Creek

   Allow for activities such as recreation, range, and wildlife habitat improvements.
4. Prohibit surface-disturbing activities such as construction of major recreation developments, wildlife habitat improvements, and range improvements on BLM-administered land within the following waterway segments:
   - Deep Creek
   - Medicine Lodge Creek
   - Trapper Creek
   - White Creek (downstream portion)
   - Porcupine Creek
   - Deer Creek
   - Oasis Spring Creek
   - Trout Creek
   - Cow Creek
   - Cottonwood Creek
   - Clarks Fork of the Yellowstone River (Segment 3)
5. BLM-administered land within the following wild waterway segments is closed to motorized vehicle use and the use of motorized or mechanized vehicle ground equipment to suppress fires is prohibited, except were life is at risk:
   - Deep Creek
   - Medicine Lodge Creek
   - Trapper Creek
   - White Creek (downstream portion)
   - Canyon Creek
6. Motorized vehicle use is limited to existing roads and trails, and the use of motorized and mechanized vehicle ground equipment off existing roads and trails to suppress fires is prohibited on BLM-administered land within the

following scenic and recreational waterway segments, except where life is at risk:

- Dry Medicine Lodge Creek
- Middle Fork of the Powder River
- Paint Rock Creek Unit (a portion
- of Laddie Creek, Paint Rock, and
- South Fork Paint Rock)
- Kirby Creek

7. Motorized vehicle use is limited to designated roads and trails within the following areas to maintain the outstanding remarkable values associated with wild and scenic waterway segments:
   - Porcupine Creek
   - Deer Creek
   - Oasis Spring Creek
   - Trout Creek
   - Cow Creek
   - Clarks Fork of the Yellowstone River (Segment 3)
   - Meeteetse Creek
   - North Fork of the Shoshone River
   - South Fork of the Shoshone River
   - Cottonwood Creek is closed to motorized vehicle use.
   - Allow motorized and mechanized vehicles to suppress fires.
8. Prohibit fire retardant along BLM-administered land within the following wild and scenic waterway segments:
   - Deep Creek
   - Medicine Lodge Creek
   - Middle Fork of the Powder River
   - Paint Rock Creek Unit (Laddie Creek, Paint Rock, and South Fork Paint Rock)
   - Trapper Creek
   - White Creek
   - Porcupine Creek
   - Oasis Spring
   - Trout Creek
   - Deer Creek
9. Close BLM-administered land within the following wild and scenic waterway segments to timber sale or harvesting:
   - Deep Creek
   - Dry Medicine Lodge Creek
   - Medicine Lodge Creek
   - Middle Fork of the Powder River
   - Trapper Creek
   - White Creek (downstream portion)
   - Porcupine Creek
   - Deer Creek

- Oasis Spring Creek
- Trout Creek
- Cow Creek
- Cottonwood Creek
- Clarks Fork of the Yellowstone River(Segment 3)

10. Manage to prevent an increase in actual grazing use on BLM-administered land within all waterway segments.
11. Close BLM-administered land within all waterway segments tentatively classified as **wild** to vegetation treatment or manipulation by means other than hand or aerial seeding methods using species that will restore natural vegetation. Undesirable and exotic species could be removed by hand or backpack/hand application of appropriate herbicides.
12. Close BLM-administered land within all waterway segments to vegetation treatment or manipulation by means other than hand or aerial seeding methods using species that will restore natural vegetation. Undesirable and exotic species could be removed by hand or backpack/hand application of appropriate herbicides, or other means that remain compatible with the **scenic** or **recreational** classifications.

APPENDIX D

Mitigation Measures

Resource	Mitigation Measures
Air Quality	None proposed
Soil Resources	None proposed
Water Resources and Quality	• Establish appropriate (herbicide-specific) buffer zones to downstream water bodies, habitats, and species/populations of interest • Areas with potential for groundwater for domestic or municipal water use shall be evaluated through the appropriate, validated USEPA model(s) to estimate vulnerability to potential groundwater contamination, and appropriate mitigation measures shall be developed if such an area requires the application of herbicides and cannot otherwise be treated with nonchemical

	methods.
Wetland and Riparian Areas	• See mitigation for Water Resources and Quality and Vegetation.
Vegetation	• Minimize the use of terrestrial herbicides (especially bromacil, diuron, and sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are identified. • Establish appropriate (herbicide-specific) buffer zones around downstream water bodies, habitats, and species/populations of interest. Consult the ecological risk assessments (ERAs) prepared for the PEIS for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. • Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible. Do not apply sulfometuron methyl aerially. • To protect special status plant species, implement all conservation measures for plants presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*.
Fish and Other Aquatic Organisms	• Limit the use of diquat in water bodies that have native fish and aquatic resources. • Limit the use of terrestrial herbicides (especially diuron) in watersheds with characteristics suitable for potential surface runoff that have fish-bearing streams during periods when fish are in life stages most sensitive to the herbicide(s) used. • To protect special status fish and other aquatic organisms, implement all conservation measures for aquatic animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*. • Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest • Consider the proximity of application areas to salmonid habitat and the possible effects of herbicides on riparian and aquatic vegetation. Maintain appropriate buffer zones around salmonid-bearing streams • Avoid using the adjuvant R-11® in aquatic environments and either avoid using glyphosate formulations containing

	polyoxyethyleneamine (POEA), or seek to use formulations with the least amount of POEA, to reduce risks to aquatic organisms in aquatic environments. • At the local level, consider effects to special status fish and other aquatic organisms when designing treatment programs.
Wildlife	•To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, diuron, glyphosate, hexazinone, tebuthiuron, or triclopyr, where feasible. • Minimize the size of application areas, where practical, when applying 2,4-D, bromacil, diuron, and Overdrive® to limit impacts to wildlife, particularly through contamination of food items. • Where practical, limit glyphosate and hexazinone to spot applications in rangeland and wildlife habitat areas to avoid contamination of wildlife food items. • Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones to limit contamination of off-site vegetation, which may serve as forage for wildlife. • Do not aerially apply diquat directly to wetlands or riparian areas. • To protect special status wildlife species, implement all conservation measures for terrestrial animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*. • Adhere to Sage-Grouse Management IM WY-2010-12/13
Livestock	• Minimize potential risks to livestock by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible. • Do not apply 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through the contamination of food items. • Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. • Do not aerially apply diquat directly to wetlands or riparian areas used by livestock.

	• Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones to limit contamination of off-site rangeland vegetation.
Wild Horses and Burros	• Minimize potential risks to wild horses and burros by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use. • Consider the size of the application area when making applications of 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to wild horses and burros. • Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros. • Where practical, limit glyphosate and hexazinone to spot applications in rangeland. • Do not apply bromacil or diuron in grazing lands within herd management areas (HMAs), and use appropriate buffer zones identified in Tables 4-12 and 4-14 in Chapter 4 of the Final PEIS to limit contamination of vegetation in off-site foraging areas. • Do not apply 2,4-D, bromacil, or diuron in HMAs during the peak foaling season (Feb 1st through July 31st , and especially in May and June), and do not exceed the typical application rate of Overdrive® or hexazinone in HMAs during the peak foaling season in areas where foaling is known to take place.
Paleontological and Cultural Resources	• Do not exceed the typical application rate when applying 2, 4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr in known traditional use areas. • Avoid applying bromacil or tebuthiuron aerially in known traditional use areas. • Limit diquat applications to areas away from high residential and traditional use areas to reduce risks to Native Americans and Alaska Natives.
Visual Resources	None Proposed
Wilderness and Other Special Areas	Mitigation measures that may apply to wilderness and other special area resources are associated with human and ecological health and recreation (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, Recreation, and Human Health and Safety).
Recreation	Mitigation measures that may apply to recreational resources

	are associated with human and ecological health (see mitigation measures for Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, and Human Health and Safety).
Health and Safety	• Use the typical application rate, where feasible, when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr to reduce risk to occupational and public receptors. • Avoid applying bromacil and diuron aerially. Do not apply sulfometuron methyl aerially. • Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. • Limit diquat application to ATV, truck spraying, and boat applications to reduce risks to occupational receptors; limit diquat applications to areas away from high residential and subsistence use to reduce risks to public receptors. • Evaluate diuron applications on a site-by-site basis to avoid risks to humans. There appear to be few scenarios where diuron can be applied without risk to occupational receptors. • Do not apply hexazinone with an over-the-shoulder broadcast applicator.

Conservation Strategy Modified from the Statewide Programmatic Biological Assessment: Ute Ladies'-Tresses (Spiranthes diluvialis) (BLM 2005)

#3 In portions of the authorized use area known, predicted or essential habitat. Prior to conducting any onsite activities, the lessee/permittee or work agent federal or private will be required to conduct inventories or studies in accordance with Bureau and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. Presence absence survey requirements in predicted habitat would be two consecutive years. Seasonal timing restriction for treatments of July 1 through September 30 would be applied in predicted habitat if not surveyed.

#15 Biological control of noxious plant species will be prohibited within 1.0 mile from known orchid habitat until the impact of the control agent has been fully evaluated and determined not to adversely affect the plant population. The Bureau will monitor biological control vectors.

#16 Except in cases of extreme ecological health (insect or weed outbreaks/infestation), herbicide treatment of noxious plants/weeds will be well-regulated within .25 miles of known populations of the orchid and

insecticide/pesticide treatments will be well regulated within 1.0 mile of known populations of the orchid to protect pollinators.

Where insect or weed outbreaks have the potential to degrade area ecological health inside the buffers listed above the following will apply: where needed and only on a case-by-case basis, a pesticide use proposal or other site specific plan will address concerns of proper timing, methods of use, and chemicals. Pesticides specific to dicots will be preferred where these are adequate to control the noxious weeds present.

Aerial application of herbicides will be carefully planned to prevent drift in areas near known populations of the orchid (outside of the 0.25 mile buffer). The Bureau will work with the Animal and Plant Health Inspection Service, the Service, and County Weed and Pest Agencies to select pesticides and methods of application that will most effectively manage the infestation and least affect the orchid.

#17 If re-vegetation project are conducted within 0.25 miles of known habitat for the orchid, only native species will be selected. This conservation measure will reduce the possibility that non-native species will be introduced and will compete with Ute ladies'- tresses orchids.

Further Management Actions not described in the Conservation Strategy:

#1 Each treatment will be coordinated with the local field office plant specialist which has knowledge of habitat and population distribution for Ute-ladies'-tresses and the other BLM Sensitive Plant Species. If Ute ladies'-tresses is observed in the Bighorn Basin, then the BLM will reinitiate consultation with the USFWS. Treatments will be designed to avoid and mitigate effects on Sensitive Plant Species.

Appendix E

Treatment Methods and Descriptions

Table 2

Method	Description
Manual	
Hand pulling	Pulling or uprooting plants can be effective against some shrubs, tree saplings, and herbaceous invasive plants. Annuals and tap-rooted plants are particularly susceptible to control by hand pulling. It is not as effective against many perennial invasive plants with deep underground stems and roots that are often left behind to re-sprout. The advantages of pulling include its small ecological impact, minimal damage to neighboring plants, and low (or no) cost for equipment or supplies. The key to effective hand pulling is to remove as much of the root as possible while minimizing soil disturbance. For many species, any root fragments left behind have the potential to re-sprout, and pulling is not effective on plants with deep and/or easily broken roots.
Pulling Using Tools	Most plant-pulling tools are designed to grip the plant stem and provide the leverage necessary to pull its roots out. Tools vary in their size, weight, and the size of the invasive plant they can extract. The Root Talon is inexpensive and lightweight, but may not be as durable or effective as the all-steel Weed Wrench, which is available in a variety of sizes. Both tools can be cumbersome and difficult to carry to remote sites. Both work best on firm ground as opposed to soft, sandy, or muddy substrates.
Clipping	“Clipping” means to cut or remove seed heads and/or fruiting bodies to prevent germination. This method is labor-intensive and effective for small and spotty infestations.
Clipping and pulling	Clipping and pulling means cutting a portion of the invasive plant stem and pulling it from its substrate, generally the bole of a tree. This method is labor intensive, but can be effective for larger infestations.

Stabbing	Some plants can be killed by severing or injuring (stabbing) the carbohydrate storage structure at the base of the plant. Depending on the species, this structure may be a root corm, storage rhizome (tuber), or taproot. These organs are generally located at the base of the stem and under the soil. Cutting off access to these storage structures can help "starve" or greatly weaken some species.
Mechanical	
Mowing, cutting, brushing, trimming, weed eating, and mulching.	Mowing and cutting can reduce seed production and restrict invasive plant growth, especially in annuals cut before they flower and set seed. Some species however, re-sprout vigorously when cut, replacing one or a few stems with many that can quickly flower and set seed. These treatments are used as primary treatments to remove aboveground biomass in combination with herbicide treatments to prevent resprouting, or as follow up treatments to treat target plants missed by initial herbicide use. Also, mowing and cutting can be used, in conjunction with herbicide treatments, to reduce vegetative materials and to promote vigorous growth in order to decrease the amount of herbicide application needed, and to increase herbicide effectiveness. Mechanical treatment projects requiring the use of heavy equipment will require either a site specific DNA or EA.
Biological	
Grazing goats, sheep, livestock, classical biological control (insects, pathogens, nematodes, mites)	Grazing could either promote or reduce invasive plant abundance at a particular site. When grazing treatments are combined with other control techniques, such as herbicides, severe infestations could be reduced and small infestations may be eliminated. Grazing animals may be particularly useful in areas where herbicides cannot be applied (e.g., near water) or are prohibitively expensive (e.g., large infestations). Animals also could be used as part of a restoration program by breaking up the soil and incorporating in seeds of desirable native plants. Goats prefer broadleaf herbs and have been used to control leafy spurge (Euphorbia esula), Russian knapweed (Acroptilon repens), and toadflax (Linaria spp.). These animals appear to be able to neutralize the phytochemicals toxic to other animals that is present in these and other forbs. Goats could control woody species because they climb and stand on their hind legs, and browse on

	vegetation other animals cannot reach. Classical biological control agents can be introduced to an invasive plant infestation to directly damage plant tissue. Although invasive plants do not die quickly, increasing plant stress allows native plants to compete better. Biological control treatments are best used in larger infestation sites where invasive plants are well established and where short term control is not a management objective. Biological control does not eradicate invasive plants and is commonly used in conjunction with herbicide applications.
Herbicide	
Hand/Selective Treatment	Selective treatment of individual plants to avoid spraying other desirable plants. There is a low likelihood of drift or delivery of herbicides away from treatment sites. This method is used in sensitive areas, such as near water, to avoid getting any herbicide on the soil or in the water. Hand/Selective methods could be done under more variable conditions than spot spraying or broadcast spraying). Specific methods include: a. Wicking and Wiping - Involves using a sponge or wick on a long handle to wipe herbicide onto foliage and stems. Use of a wick eliminates the possibility of spray drift or droplets falling on non-target plants. Herbicide can drip or dribble from some wicks. b. Foliar Application - These methods apply herbicide directly to the leaves and stems of a plant. An adjuvant or surfactant is often needed to enable the herbicide to penetrate the plant cuticle, a thick, waxy layer present on leaves and stems of most plants. There are several types of foliar application tools available. c. Basal Bark - This method applies a 6 to 12 inch band of herbicide around the circumference of the trunk of the target plant, approximately one foot above ground. The width of the sprayed band depends on the size of the plant and the species' susceptibility to the herbicide. The herbicide can be applied with a backpack sprayer, hand-held bottle, or wick. d. Frill or Hack and Squirt - The frill method, also called the "hack and squirt" treatment, is often used to treat woody species with large, thick trunks. The tree is cut using a sharp knife, saw, or ax, or drilled with a power drill or other device.

	Herbicide is then immediately applied to the cut with a backpack sprayer, squirt bottle, syringe, or similar equipment. e. Stem Injection - Herbicides can be injected into herbaceous stems using a needle and syringe. Herbicide pellets can also be injected into the trunk of a tree using a specialized tool. f. Cut-stump - This method is often used on woody species that normally resprout after being cut. Cut down the tree or shrub, and immediately spray or squirt herbicide on the exposed cambium (living inner bark) of the stump. The herbicide must be applied to the entire inner bark (cambium) within minutes after the trunk is cut. The outer bark and heartwood do not need to be treated since these tissues are not alive, although they support and protect the tree's living tissues. The cut stump treatment allows for a great deal of control over the site of herbicide application, and therefore, has a low probability of affecting non-target species or contaminating the environment. It also requires only a small amount of herbicide to be effective.
Spot Spraying	Spot applicators spray herbicide directly onto small patches or individual target plants only and avoid spraying other desirable plants. These applicators range from motorized rigs with spray hoses to backpack sprayers, to hand-pumped spray or squirt bottles, which can target very small plants or parts of plants.
Broadcast (Boom) Spraying	A boom, a long horizontal tube with multiple spray heads, may be mounted or attached to a tractor, ATV (all terrain vehicles) or other vehicle. The boom is then carried above the invasive plants while spraying herbicide, allowing large areas to be treated rapidly with each sweep of the boom. Offsite movement due to vaporization or drift and possible treatment of non-target plants can be of concern when using this method. The herbicide is carried in a tank and reaches the nozzles via tubing. All herbicides are metered out from the nozzles in a controlled manner. The nozzle controls the droplet size, the area (or cone) being covered by the herbicide and it could be turned on/off with ease. Some nozzles could rotate. All this flexibility permits the operator to carefully apply herbicide at specific rates over specific areas. Many of the new boom spray operations have very sophisticated electronic monitoring that delivers exact amounts of

	herbicides and keeps records on rates and areas covered. Offsite movement due to drift and possible treatment of non-target plants could be of concern when using this method. Not all broadcast methods include a boom; boom-less nozzles are currently in use that can reduce the risk of non-target effects. Backpacks may also be used as a broadcast tool, if not directed at individual plants.
Aerial	Herbicides applied aerially by helicopter or fixed-wing aircraft. Aerial applications will require either a site specific DNA or Ea.

Appendix F

Invasive Species and Noxious Weeds
Treatment schedules vary by species depending on elevation.

Leafy Spurge *(Euphorbia esula L.)*
Leafy spurge is an erect, perennial herbaceous plant that grows from 2 to 3.5 feet tall. The plant is easily identified by its showy yellow flower bracts and the milky sap that flows if the stem is broken or a leaf is removed. Flower parts are in threes and the stem is smooth. Leaves are oval-shaped and smooth. Large infestations give the landscape a yellowish tinge due to the yellow bracts. Leafy spurge invades prairies, pastures and other open areas. It can completely overtake large areas of land and displace native vegetation. Leafy spurge is native to Europe and was introduced accidentally into America in the early 1800s as a seed contaminate.
Location: Bighorn and Shoshone River Corridors
Wyoming Noxious Weed: Yes
Treatment Dates: May-June

Spotted Knapweed (*Centaurea stoebe ssp. micranthos* **)**
Spotted knapweed is an herbaceous biennial or perennial plant that invades open areas throughout most of the United States. Its name is derived from the black margins of the flower bract tips which give the flower heads a spotted look. A basal rosette of deeply lobed leaves is produced the first year. Flowering stems are 8-50 inches tall and branched. Stem leaves are alternate and may be slightly lobed or linear. Flowers are purple to pink in color and occur on small flower heads. Spotted knapweed invades a wide variety of habitats including pastures, open forests, prairies, meadows, old fields, and disturbed areas. It displaces native vegetation and reduces the forage potential for wildlife and livestock. Spotted knapweed is native to Europe and western Asia. It was accidentally introduced into the United States in contaminated alfalfa and clover seed in the late 1800s.
Location: Isolated locations throughout the WFO and CYFO

Wyoming Noxious Weed: Yes
Treatment Dates: July-Sep

Diffuse Knapweed (*Centaurea diffusa*)
A short-lived perennial, a biennial, or occasionally an annual. It reproduces and spreads from seed. The plant develops a single shoot (stem), 1 to 2 feet tall that is branched toward the top. Grazed plants may produce multiple stems. Rosette and lower shoot leaves are finely divided. Leaves become smaller toward the top of the shoot and have smooth margins. Many solitary flowering heads occur on shoot tips. They are about 1/8 inch in diameter and 1/2 to 2/3 inch long. Flowers usually are white but may be purplish. Involucre bracts are divided like teeth on a comb and tipped with a slender spine that makes them sharp to the touch. Sometimes the bracts are dark-tipped or spotted like spotted knapweed. The long terminal spine differentiates diffuse from spotted knapweed.
*Location***:** Burlington
Wyoming Noxious Weed: Yes
Treatment Dates: July-Sep

Russian Knapweed *(Acroptilon repens*)
A long-lived perennial herb that can spread vegetative or by seed. Roots can grow 6 to 8 feet deep during the first growing season, and 16 to 23 feet deep in the second growing season. The primary method of reproduction is vegetative from the creeping root system. In addition to these traits, it exhibits allelopathic effects, suppressing other plant species. Hand pulling of this species reportedly has limited effectiveness and repeated pulling may not eradicate the infestation.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: May-Nov

Musk thistle *(Carduus nutans)*
An herbaceous biennial plant that grows to 6 feet tall. It has become a serious invader of open lands throughout the continental United States. It can be recognized by its showy, red-purple flowers and very spiny stem and leaves. The large disk-shaped terminal flower heads droop when mature giving this plant its other common name, nodding thistle. Musk thistle invades a variety of disturbed areas. Pastures are particularly at risk because musk thistle is unpalatable to livestock. Once established it can spread rapidly due to high seed production (as much as 120,000 seed per plant). Musk thistle is native to Western Europe and was accidentally introduced into the United States in the early 1900s.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: June-Sep

Scotch thistle *(Onopordum acanthium)*
This plant can reach a height of 8 feet with large, coarsely lobed, hairy leaves have a velvety-gray appearance. The rosette forms the first year and can have leaves up to 2 feet long and 1 foot wide. The spiny-edged, alternate leaves form leaf wings that extend down onto the stem. This branching plant has reddish-purple to violet flowers and a large, fleshy taproot. It is found primarily along roadsides and railroads, but can become an impassable obstacle to livestock on rangeland and pastures.
Location: Nowater Creek, Mud Creek, South Brokenback
Wyoming Noxious Weed: Yes
Treatment Dates: May-Aug

Plumeless Thistle (*Carduus acanthoides)*
Mature plants are between 1-4 feet tall and have a stout, fleshy taproot. Stems are freely branched above and covered with leaf-like spines that extend up to the flowering heads. Flower heads are solitary at the ends of branches or in clusters of 2-5. Flower bracts are narrowly lance-shaped and appear as sharp spines. Flowers are purplish-pink and clustered in heads that are 1-2 inches in diameter. Plumeless thistle does not typically pose a threat to high quality natural areas, although it has been known to invade native and restored grasslands despite the presence of dense, native prairie vegetation. However, this species is highly aggressive in disturbed areas, and can pose a major problem in buffer and restoration areas Plumeless thistle is one of the most aggressive thistles due to its large seed production
Location: None known
Wyoming Noxious Weed: Yes
Treatment Dates: June-Sep

Canada Thistle (*Cirsium arvense*)
A tall, erect, spiny herbaceous plant that grows to 4 feet tall. It has an extensive creeping rootstock. The leaves are lance-shaped and irregularly lobed with very prickly margins. The stems are ridged and hairy. The flowers are purple to white and can be up to 0.5 inches in diameter. The small seeds, called achenes, are 1 to 1.5 inches long and have a feathery structure attached to the base which lets them float through the air. Numerous species of thistle occur in America, and while some are invasive, many are native. Often the species are difficult to distinguish. Canada thistle can invade a variety of open habitats including prairies, savannas, fields, pastures, wet meadows, and open forests. It forms dense stands which can shade out and displace native vegetation. Once established it spreads rapidly and is difficult to remove. Canada thistle is native to Europe and Asia and was first introduced accidentally during the 1600s.
Location: Throughout the WFO and CYFO

Wyoming Noxious Weed: Yes
Treatment Dates: May-Oct

Field Bindweed *(Convolvulus arvensis)*
A member of the Morning glory family. This creeping perennial was introduced from Europe. It reproduces by seeds and horizontal roots. The stems are smooth, slender, slightly angled, 1 to 4 feet long, and spread thickly over the ground or wind around erect plants or other objects. The leaves are alternate, 1 to 2 inches long, with great variation in shape. They are somewhat arrow-shaped with spreading, pointed, or blunt lobes at the base. The flowers are bell or trumpet-shaped, white, pink, or variegated, and about 3/4 to 1 inch broad. It is one of the most competitive perennial weeds. A two or three-year food supply is stored in the extensive underground root system. This makes it hard to kill by cultivation because roots will live as long as their food reserve lasts. Seeds can also stay viable in the soil for up to 40 years.
Location: Scattered throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: June-Oct

Dyers Woad *(Isatis tinctoria)*
A member of the mustard family. It is a winter annual, biennial or short-lived perennial, 1 to 4 feet tall. The leaves are bluish-green with a whitish vein on the upper surface. The flower has a flat top with yellow petals. The fruit is a purplish-brown pod containing one seed. Dyers woad has a thick tap root that can exceed 5 feet in depth. It is found in disturbed sites and spreads to range and croplands by seed from late spring to mid-summer**.** Dyer's woad is an aggressive weed that infests disturbed and undisturbed sites and then spreads outward into crops and rangeland. There is some evidence that dyer' woad produces allelopathic chemicals.
Location: None known
Wyoming Noxious Weed: Yes
Treatment Dates: May-July

Hoary Cress /Whitetop (*Cardaria draba)*
A perennial forb in the mustard family that can grow up to 2 feet tall. The leaves are soft, gray-green and finely-hairy with heart-shaped bases. The upper leaves clasp to the stem of the plant. The four-petaled flowers are white and the heart-shaped seed pods occur in flattened clusters. Hoary cress invades rangelands, pastures, streambanks, and open forests primarily in the western United States, although it does occur in the East. It can form large infestations that can displace native species and reduce grazing quality. Hoary cress is native to Central Europe and Western Asia and was first introduced into the United States in the early 20th century
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: May-July

Perennial Pepperweed (Lepidium latifolium)
Forms dense colonies by adventitious shoots from roots and deep-seated rhizomes and spreads vigorously. It also produces abundant highly germinable seeds which can survive in the soil for at least 1 year. Fluctuating temperature regimes produce optimum germination. It can grow at altitudes of 4,000 to 8,000 feet. Perennial pepperweed is an aggressive invader of moist to wet ecosystems, even invading ecologically healthy areas. Perennial pepperweed spreads agressively by both seeds and root sprouts. Mechanical removal has been shown to be ineffective because plants form clonal stands and continue to sprout from extremely deep roots, and from root fragments.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: May-Sep

Dalmatian Toadflax (*Linaria dalmatica macedonica)*
A member of the Figwort family. It was introduced as an ornamental from Europe, and is now rapidly invading dry rangeland from 5,000 to 6,500 feet. It is a creeping perennial that closely resembles yellow toadflax. The leaves are waxy, heart-shaped, and clasp the stem. The stems are from 2 to 4 feet tall. The flowers are snapdragon-shaped, bright yellow, sometimes with orange centers. Dalmatian toadflax is especially well adapted to arid sites and can spread rapidly once established. Because of its deep, extensive root system, waxy leaf, and heavy seed production, this plant can be difficult to manage.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: June-Oct

Yellow Toadflax *(Linaria vulgaris)*
Mature yellow toadflax plants are 1-3 feet tall with 1-25 smooth erect floral stems. Flowers are bright yellow and resemble snapdragons. Flowers are arranged in a raceme at the ends of the branches. Leaves are soft, lance-shaped, and pale green. Leaves are mainly alternate but lower leaves appear to be opposite due to crowding. Taproots may be up to a meter in length. Horizontal roots may grow to be several meters long, and can develop adventitious buds that may form independent plants. Yellow toadflax is quick to establish in open sites and is capable of adapting growth to a wide range of environmental conditions. Yellow toadflax aggressively forms colonies through adventitious buds from creeping root systems. These colonies can push out native grasses and other perennials, thereby altering and simplifying the species composition of natural communities and reducing forage production for livestock and wildlife.
*Location***:** Emblem
Wyoming Noxious Weed: Yes
Treatment Dates: July-Sep

Houndstongue *(Cynoglossum officinale)*
Flowers are reddish-purple, with five petals, arranged in panicles in the upper leaf axils. Leaves are alternate, 1-12 inches long, 1-3 inches wide, rough, hairy, and lacking teeth

or lobes. Basal leaves are elliptical to oblanceolate and tapered at the base. Houndstongue produces a single flowering stem. The stem is erect, stout, heavy, 1.5 to 3 feet high and usually branched above. Houndstongue has a thick, black, woody taproot. Houndstongue is poor competitor with native perennials and requires disturbed or bare areas to establish. Once established, houndstongue quickly forms dense monocultures. Houndstongue contains toxic alkaloids that stop liver cells from reproducing. Therefore, houndstongue reduces livestock and wildlife forage and grazing animals should be kept away from houndstongue infested areas.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: May-Oct

Common Burdock *(Arctium minus)*
Mature plants are 3-7 feet tall. The stem is erect, coarse, and much branched. Stem leaves are alternate, broadest at the leaf base and somewhat diminished upward. Leaf margins are toothed or wavy, and the entire leaf is wooly beneath and dark green above. Rosette leaves are large, hairy, and heart-shaped. Common burdock can commonly be found growing along roadsides, ditchbanks, in pastures and waste areas. It generally prefers riparian areas that have moist, fertile soils with high nitrogen contents.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: June-Sep

Oxeye Daisy *(Chrysanthemum leucanthemum)*
Mature plants are 10-24 inches tall with erect, smooth to sparsely hairy stems. Alternately arranged leaves become progressively smaller upward along the stem. Basal and lower stem leaves are 2-5 in long, lance-shaped to narrowly egg-shaped. The upper leaves become stalkless and toothed. Flowering heads are solitary at the ends of branches. Flowerheads have white ray flowers and yellow disk flowers. Oxeye daisy has the potential to invade disturbed areas, form small colonies, and modify existing communities.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: July-Sep

Saltcedar (*Tamarix ramosissima)*
Saltcedar is deciduous shrub that can grow up to 15 feet in height. Leaves are small, scale-like, gray-green in color, and overlap along the stem. The bark is smooth and reddish on younger plants, turning brown and furrowed with age. Several species are considered invasive in the United States and distinguishing the species can often be difficult. Saltcedar invades streambanks, sandbars, lake margins, wetlands, moist rangelands, and saline environments. It can crowd out native riparian species, diminish early successional habitat, and reduce water tables and interferes with hydrologic

process. Saltcedar is native to Eurasia and Africa and was introduced into the western United States as an ornamental in the early 1800s.
Location: Riparian Areas and Reservoirs throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: Yearlong

Downy brome *(Bromus tectorum)*
Cheatgrass is an annual grass that forms tufts up to 2 feet tall. The leaves and sheathes are covered in short, soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. These annual plants will germinate in fall or spring (fall is more common), and senescence usually occurs in summer. Cheatgrass invades rangelands, pastures, prairies, and other open areas. Cheatgrass has the potential to completely alter the ecosystems it invades. It can completely replace native vegetation and change fire regimes. It occurs throughout the United States and Canada, but is most problematic in areas of the western United States with lower precipitation levels. Cheatgrass is native to Europe and parts of Africa and Asia. It was first introduced into the United States accidentally in the mid 1800s.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: No
Treatment Dates: April/May and Aug/Sep

Halogeton *(Halogeton glomeratus)*
A succulent annual forb which can produce 200-400 pounds of seed per acre. It produces two types of seed; brown seed is produced during long-photoperiod seasons and black seed during short-photoperiod seasons. Black seeds are only viable for about 1 year, whereas brown seeds can survive burial for up to 10 years. Seeds may be spread by livestock, wildlife, road grading equipment, and wind.
Location: Throughout the WFO and CYFO
Wyoming Noxious Weed: No
Treatment Dates: May-July

Russian Olive (*Elaeagnus angustifolia* L.)
Russian-olive is classified as either a shrub or small tree. When grown close together, it forms a dense thicket or shrub-hedge. Single plants grow as trees and may reach a height of up to 45 feet. It has silvery leaves and small fruits that are generally silver in color. It has commonly been included in urban landscape plantings to contrast green foliage species. Younger stems have stout spines that make it an ideal plant for use as a barrier hedge. The spines are tough and easily penetrate tires.
Location: Riparian areas throughout the WFO and CYFO
Wyoming Noxious Weed: Yes
Treatment Dates: Yearlong