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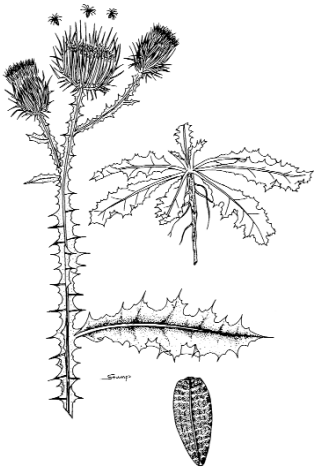
Bureau of Land Management

Colorado State Office

Glenwood Springs Field Office June 2009

Integrated Weed Management Plan and Programmatic Environmental Assessment

DOI-BLM-CO-N040-2009-0078-EA



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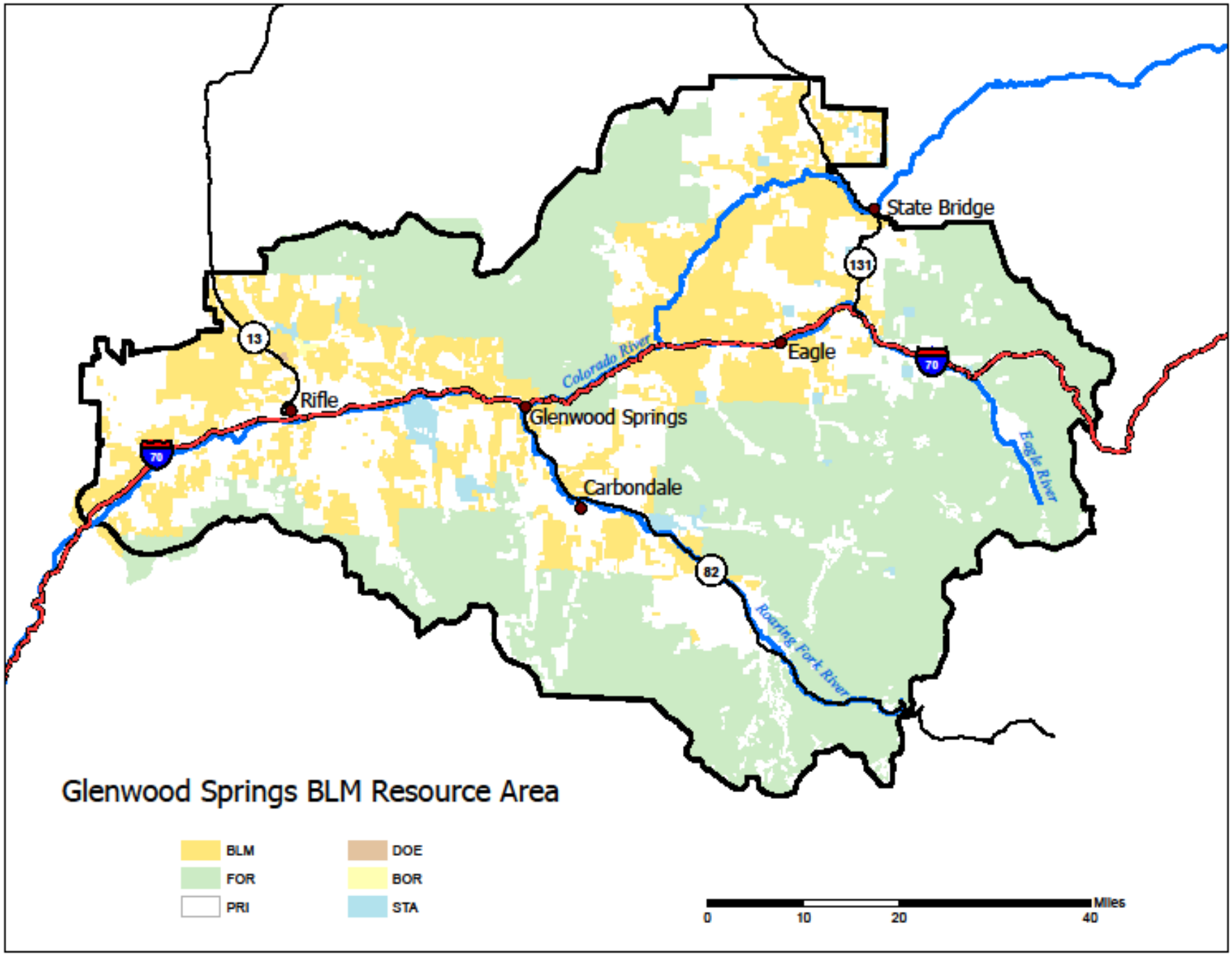
State Bridge
131
13
Colorado River
Eagle
70
Rifle
Glenwood Springs
Eagle River
70
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Glenwood Springs BLM Resource Area
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FONSI
DOI-BLM-CO-N040-2009-0078-EA

The following environmental assessment analyzing the environmental effects of the Proposed Action has been reviewed. The mitigation measures incorporated into the Proposed Action result in a Finding of No Significant Impact (FONSI) on the human environment. Therefore, an environmental impact statement is not necessary to analyze further the environmental effects of the Proposed Action.

DECISION RECORD

DECISION: It is my decision to approve the Integrated Weed Management (IWM) Plan and Programmatic Environmental Assessment (EA). This decision will provide for the orderly, effective, and environmentally sound identification and treatment of infestations of noxious weeds and other invasive non-native plant species on BLM-administered lands within the Glenwood Springs Field Office (GSFO) Area, Colorado.

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is in conformance with the current land use plan under which the GSFO manages BLM lands within its administrative boundaries.
2. Approval of the Proposed Action is in conformance with the 2007 *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Final Programmatic Environmental Impact Statement (PEIS)* to which the current EA is tiered, pursuant to the National Environmental Policy Act (NEPA).
3. Approval of the Proposed Action will facilitate the orderly, efficient, and environmentally sound treatment of infestations of noxious and invasive weeds on BLM lands within the GSFO area.
4. The U.S. Fish and Wildlife Service (USFWS), pursuant to Section 7 of the Endangered Species Act, has concurred with GSFO's determination of "**May Affect, Not Likely to Adversely Affect**" Federally listed or proposed threatened or endangered species as a consequence of implementing the Proposed Action.

MITIGATION MEASURES: The standard operating procedures, mitigation measures, and conservation measures presented in Appendices E, F, and G of this IWM Plan and programmatic EA are included as part of the Proposed Action and shall be applied as Conditions of Approval for any weed treatments or ground-disturbing activities permitted or conducted by the GSFO.

NAME OF PREPARER: Allen B. Crockett, Supervisory Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:

Steven G. Bennett, Field Manager

DATE SIGNED: 6/19/2009

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1. PURPOSE AND NEED FOR THE ACTION

1.1 Introduction

This Environmental Assessment (EA) has been prepared to analyze and disclose the environmental consequences of implementing the programmatic Integrated Weed Management (IWP) Plan proposed by the Glenwood Springs Field Office (GSFO). The EA tiers to the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) (BLM 2007a), which analyzed the impacts of using herbicides (chemical control methods) to treat noxious weeds and other invasive weeds on public lands. In addition, this EA incorporates by reference the *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report* (PER) (BLM 2007b), which evaluated the general effects of non-herbicide treatments (i.e., biological, physical, cultural, and prescribed fire) on public lands. The PEIS identifies impacts to the natural and human environment associated with herbicide use and appropriate best management practices (BMPs), standard operating procedures (SOPs), mitigation measures, and conservation measures for avoiding or minimizing adverse impacts. The PER describes the environmental impacts of using non-chemical vegetation treatments on public lands.

The proposed IWM Plan for the GSFO is needed to reduce the adverse impacts associated with an increase in noxious and invasive weeds on BLM-administered lands within the field office boundary. The proposed IWM Plan also provides a mechanism for evaluating a range of treatment options or combination of options to eradicate or control weed populations. The plan would be implemented in accordance with Federal and State laws, regulations, and policies (Section 1.3) and the GSFO land use plan, as amended (Section 1.4).

This proposed IWM Plan (the "Proposed Action") defines management goals and objectives for GSFO's noxious and invasive weed program and describes the impacts of a variety of treatment methods and options for achieving these goals and objectives. By describing management goals and objectives and analyzing impacts of alternative weed control methods for use on BLM-administered lands, this EA will assist the GSFO in planning future weed treatment projects in compliance with the *National Environmental Policy Act (*NEPA). The assessment of environmental consequences of the Proposed Action and alternatives (Section 3 of this document) is intended to determine whether any "significant" adverse impacts could result from its implementation. NEPA defines "significance" as including both the "context" and "intensity" of an impact (40 CFR 1508.27). If significant adverse impacts are anticipated based on the EA, an EIS would be required to analyze the impacts further. If no significant adverse impacts are anticipated, a *Decision Record* and *Finding of No Significant Impact* (FONSI) would be prepared to document a determination that no significant adverse impacts would result, beyond those already analyzed and disclosed in the GSFO land use plan and the PEIS to which this EA is tiered.

1.2 Background

The GSFO manages approximately 568,000 acres of public lands. In recent years, infestations of noxious and invasive weeds have increased rapidly on these lands due to oil and gas development, livestock grazing, off-highway vehicle (OHV) use, and other types of ground-disturbing activities. "Noxious weeds" are those listed by the State of Colorado (Appendix A) because they constitute a threat to the "continuous economic and environmental value of lands of the state" (CDA 2003). "Invasive weeds" are those that are not listed by the State but considered by BLM as problematic in terms of habitat degradation and interference with reclamation. The recent increase in noxious and invasive weeds has contributed to a downward trend in the health of native plant communities in some parts of the GSFO.

This has reduced the quality and quantity of habitat and forage for wildlife and livestock, altered soil productivity, increased the potential for soil erosion and adverse impacts on water quality, and caused a loss of riparian area function. By evaluating the impacts of weed treatment methods individually or in combination, long-term weed control strategies can be devised to meet different management objectives in different situations.

Currently, the GSFO is in the process of conducting a systematic, landscape-wide inventory for the presence of noxious and invasive plant species. Over the past 20 years, through the collection of weed report forms from GSFO staff, 840 infestations have been recorded in the GSFO area. In 2007, the GSFO began requiring oil and gas operators to conduct weed inventories on all lands disturbed by oil and gas development within the GSFO (BLM 2007c). Approximately 650 acres of weeds were identified and treated by oil and gas operators. In 2008, a total of 70,000 acres of BLM lands were inventoried in the Roaring Fork Valley, resulting in the identification of 1,050 weed infestation points. These mapped and inventoried weed infestations are a fraction of actual noxious and invasive plant species in the GSFO area. The remaining 498,000 acres in the GSFO are planned to be inventoried in the future.

The focus of the past and planned future surveys is on the inventory and mapping of noxious weed species that are considered the most harmful or pose the greatest threat of spreading into new areas. In 2007, approximately 300 infested acres (700 gross acres) of noxious weeds were treated in the GSFO. This total includes treatments by the White River National Forest (WRNF), Eagle and Garfield Counties, and oil and gas operators. Invasive weeds on lands disturbed by oil and gas activities are controlled by the oil and gas operators and other project proponents, and some additional weed treatments may be performed by operators as mitigation for unavoidable adverse impacts to wildlife.

Noxious weeds known to occur in the GSFO area are noted in Table 1, along with their corresponding areas of occurrence. The three categories (A, B, and C) indicated in Table 1 correspond to three lists of species as classified by the State of Colorado. The three lists are based on the following management objectives: List A – designated for statewide eradication; List B – managed for containment; and List C – not designated for control because of wide distribution.

1.3 Conformance with Related Federal and State Laws, Regulations, and Policies

The GSFO has prepared this IWM Plan in compliance with Department of Interior (DOI) and BLM policy and manual direction, including **DOI Manual 517 (*Integrated Pest Management*)** and **BLM Manual Section 9015 (*Integrated Weed Management*)**. The EA associated with this plan has been prepared in compliance with NEPA and in accordance with Council on Environmental Quality (CEQ) format requirements. The EA discloses the direct, indirect, and cumulative impacts of the proposed IWM Plan and a reasonable range of alternatives, including no action (continuation of current management), and determines whether significant environmental impacts necessitating an environmental impact statement (EIS) would result from their implementation.

Several Federal laws, regulations, and policies guide BLM management activities on public lands. The ***Federal Land Policy and Management Act of 1976*** **(FLPMA)** directs the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values." The ***Carlson-Foley Act of 1968*** and the ***Plant Protection Act of 2000*** authorize and direct 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.

Table 1. State-listed Noxious Weeds Known to Occur in the GSFO Area

Species	Category	Primary Occurrence
Absinth Wormwood	List B	Small populations in Mitchell Creek, Glenwood Canyon near No Name , west Eagle county south of Glenwood Canyon, and east Garfield county south of Glenwood Canyon and east of the Roaring Fork River.
Black Henbane	List B	One location in Gibson Gulch, south of Silt.
Bull Thistle	List B	Small populations throughout the GSFO.
Canada Thistle	List B	Large population throughout the GSFO. Occurs primarily in wet areas like springs, reservoirs, and drainages.
Cheatgrass	List C	Dense west of Glenwood Springs; less common east of Glenwood Springs.
Chicory	List C	Scattered populations. Most prevalent near Parachute and Rifle.
Chinese Clematis	List B	Small populations along the Colorado and Roaring Fork Rivers.
Common Burdock	List C	Roadsides in Beaver Creek and Porcupine Creek drainages.
Common Mullein	List C	Scattered throughout oil and gas areas.
Dalmatian Toadflax	List B	Moderate to large populations on Red Mountain and Lookout Mountain; small populations at Crown Mountain and Peach Valley.
Diffuse Knapweed	List B	One location in Spruce Creek drainage.
Field Bindweed	List C	Scattered throughout oil and gas areas.
Halogeton	List C	GSFO lands around Parachute and DeBeque.
Hoary Cress	List B	Garfield Creek Center Mtn. Road, New Castle Colorow Trail, and other small populations throughout the GSFO.
Houndstongue	List B	Scattered throughout the GSFO.
Jointed Goatgrass	List C	West of Jolley Mesa, south of Silt.
Leafy Spurge	List B	Three small populations (only one on BLM) in the Roaring Fork Valley near Woody Creek and Red Canyon.
Mediterranean Sage	List A	Less than 50 plants at the mouth of Horseshoe Bend Recreation Area on BLM land in Glenwood Canyon.
Musk Thistle	List B	Moderate populations scattered throughout the GSFO.
Myrtle Spurge	List A	Less than 25 plants at the mouth of Horseshoe Bend Recreation Area in Glenwood Canyon.
Oxeye Daisy	List B	Small populations along the Colorado and Roaring Fork Rivers and large populations along Boiler Creek in Garfield County.
Perennial Pepperweed	List B	Parachute Creek drainage.
Perennial Sowthistle	List C	Scattered throughout oil and gas areas.
Plumeless Thistle	List B	Large populations in the Roaring Fork Valley; moderate populations throughout the rest of the GSFO.
Poison Hemlock	List C	Small populations on Grass Mesa and Baldy and Garfield Creek.
Redstem Filaree	List B	Common throughout the GSFO.
Russian Knapweed	List B	Large populations around New Castle, Silt, Rifle, and Parachute. Small populations in Eagle County.
Russian-olive	List B	Individual plants along the Colorado and Roaring Fork Rivers and along tributaries.
Salt-cedar (Tamarisk)	List B	Small populations, usually less than 1 acre in size, along riparian corridors.
Scotch Thistle	List B	Small populations scattered throughout the GSFO.
Spotted Knapweed	List B	A few small, isolated populations in Garfield and Eagle Counties.
Yellow Toadflax	List B	Small, scattered populations on Lookout Mountain and Boiler Creek drainage.

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 ***Noxious Weed Control Act of 2004*** established a program to provide assistance through states to eligible weed management entities to control or eradicate harmful and non-native weeds on public and private lands. The ***Public Rangelands Improvement Act of 1978*** requires the BLM to manage, maintain, and improve the condition of the public rangelands so they become as productive as feasible. **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 (BLM 2007a). The President and Congress have directed the DOI and BLM, through implementation of the ***National Fire Plan*** **and** ***Healthy Forests Restoration Act of 2003***, to take more aggressive actions to reduce catastrophic wildfire risk on public lands. Actions should be taken to manage vegetation in a manner that provides for long-term economic sustainability of local communities by improving the health of the nation's forests and the habitat for fish and wildlife (BLM 2007a).

The BLM has also produced national-level strategies for invasive species prevention and management. These include ***Partners Against Weeds*** (BLM 1996a), which outlines the actions BLM will take to develop and implement a comprehensive integrated weed management program; and ***Pulling Together: National Strategy for Invasive Plant Management*** (BLM 1998a), which illustrates the goals and objectives of a National invasive plant management plan (prevention, control and eradication). The Federal Interagency Committee for the Management of Noxious and Exotic Weeds is leading a national effort to develop and implement a ***National Early Detection and Rapid Response System for Invasive Plants in the United States*** (FICMNEW 2003). The primary long-term goals of the proposed system are to detect, report, and identify suspected new species of invasive plants in the United States.

The EPA regulates pesticides (including herbicides) under the ***Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972*** as amended in 1988. This Act establishes procedures for the registration, classification, and regulation of all pesticides. Before any herbicide may be sold legally, it must be registered by the EPA. The EPA may classify a pesticide for general use if it determines that it is not likely to cause unreasonable adverse effects to applicators or the environment. A pesticide that is classified for restricted use must be applied by a certified applicator and in accordance with other restrictions.

Additional direction from the State of Colorado is provided in the ***Colorado Noxious Weed Act*** (C.R.S. Title 35, Article 5.5) of 1996, which declares that certain undesirable plants constitute a threat to the "continuous economic and environmental value of lands of the state" and requires that these "noxious weeds" be managed on private and public lands. The Act further declares that control of noxious weeds should use methods that are least damaging to the environment but also practicable and economically reasonable. In 1999, the Governor of Colorado issued Executive Order D 006 99, directing the development and implementation of noxious weed management programs.

The ***Colorado Pesticide Applicator's Act of 1990*** implements FIFRA, requires certification and training for every commercial supervisor and applicator of a registered pesticide, and requires commercial entities to maintain records of each pesticide application for 3 years. Additional direction comes from the ***Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act (***8 CCR 1206-2***),*** which contain statewide management plans for all List A and List B species (CDA 2003).

1.4 Land Use Plan Conformance Review

As required by U.S. Department of the Interior regulations (43 CFR 1610.5) and ***BLM* Manual Section 1617, *Resource Management Plan Approval, Use, and Modification*** (BLM 1984b), the Proposed Action and analyzed alternatives are subject to, and in conformance with, the current land use plan and amendments.

The current land use plan is the ***Glenwood Springs Resource Management Plan*** (RMP), approved in 1984 (BLM 1984a) and revised in 1988. Amendments to the RMP include the following:

- ***Oil and Gas Plan Amendment to the Glenwood Springs RMP*** (BLM 1991a)
- ***EA for Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado*** (BLM 1996b)
- ***Castle Peak Travel Management Plan*** (1997)
- ***Oil & Gas Leasing & Development, Record of Decision and RMP Amendment*** (BLM 1999a)
- ***Red Hill Plan Amendment*** (1999)
- ***Fire Management Plan for Wildland Fire Management and Prescriptive Vegetation Treatment Guidance*** (2002)
- ***Roan Plateau Planning Area RMP Amendment and Final EIS*** (BLM 2006b).

The RMP revision currently underway in the GSFO is expected to incorporate the IWM Plan.

The Proposed Action is in conformance with the Terrestrial Habitat Management Objective (p.18 of the 1984 RMP) (BLM 1984a), which states as its purpose "…to provide approximately 57,933 animal unit months (AUMs) of big game forage, to improve existing wildlife habitat conditions, and to increase wildlife species diversity."

The GSFO's ***Oil & Gas Leasing & Development Draft Supplemental EIS*** (BLM 1998b) set the following objectives for reclamation success: 1) no noxious weeds are present, and 2) undesirable vegetation composes less than 5 percent of the species composition on sites after three or more growing seasons. The GSFO's ***Roan Plateau Planning Area RMP Amendment and Final EIS*** (BLM 2006b) set the following objective for reclamation success on lands within that planning area: "State of Colorado A, B, or C listed noxious weeds or other undesirable plant species will be absent…."

The GSFO's ***Noxious and Invasive Weed Management Plan for Oil and Gas Operators*** (BLM 2007c) sets strict standards for control of noxious and invasive weeds on all GSFO lands disturbed by oil and gas development. As mandated by the Colorado Noxious Weed Act and the Colorado Oil and Gas Conservation Act, and in conformance with BLM's National Invasive Weed Strategy, oil and gas operators are required to control noxious weeds on lands they disturb during oil and gas exploration and development, including well pads, other surface facilities, pipelines, roads, and any other disturbed areas—whether on BLM lands or on private property used to access Federal mineral leases. Compliance with the requirements of the IWM Plan approved pursuant to this EA will be specified as a Surface Use Condition of Approval (COA) for all future BLM authorizations of oil and gas activities within the GSFO boundaries.

1.5 Special Precautions for Special Status Species and Wilderness Areas

1.5.1 Special Status Species

The ***Endangered Species Act of 1973 (ESA)*** established Federal policies and procedures for protecting Federally listed threatened or endangered plant and animal species, and species proposed for listing. ***Section 7 of the ESA*** specifically requires agencies to work toward the conservation of listed species and to ensure that no agency action is likely to jeopardize a listed species or adversely modify critical habitat.

The BLM consulted with the U.S. Fish and Wildlife Service (USFWS) during development of the PEIS, pursuant to Section 7 of the ESA, and prepared a programmatic biological assessment (PBA) (BLM 2007d) to evaluate likely impacts to Federally listed or proposed threatened or endangered species as a result of weed treatments. In conjunction with the current EA, the GSFO consulted with the USFWS and prepared a BA (BLM 2009) analyzing potential impacts to listed or proposed species in the GSFO area from implementing the Proposed Action and describing conservation measures to avoid or minimize adverse impacts. The USFWS issued its concurrence with the BA on June 19, 2009, including GSFO's determination of potential effects to listed or proposed species and GSFO's proposed conservation measures. The concurrence is provided as Appendix K at the end of this document.

BLM Manual Section 6840*, Special Status Species Management* (BLM 2008), stipulates that "BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats, including ESA proposed critical habitat, to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the ESA." Additionally, "all Federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting shall be conserved as Bureau sensitive species." See Appendix B for a list of special status species known to occur, or with a reasonable potential to occur, in the GSFO area.

1.5.2 Wilderness Study Areas

Control of invasive plants on public lands within Wilderness Study Areas (WSAs) must comply with and be managed consistent with BLM's ***Interim Management Policy Handbook for Lands Under Wilderness Review*** (H-8550-1) (BLM 1995). 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.

1.6 Identification of Issues

During the scoping of the PEIS (BLM 2007a), comments from the public and agencies were used to identify significant issues to be analyzed. The BLM separated the issues into two groups: significant and non-significant. The Council on Environmental Quality (CEQ) regulations states: "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)). CEQ regulations also state 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" (40 CFR 1500.4(g)). Significant issues—which directly influence the initiation, development, and technical design of the proposal—were considered in developing the Proposed Action and the alternatives analyzed in this document.

Issues are considered significant based on (1) the extent of their geographic distribution, (2) the intensity and duration of their effects, or (3) the level of public interest or resource conflict. Non-significant issues

are those that are (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. CEQ regulations at 43 CFR 1501.7 explain this delineation: "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…."

The PEIS (BLM 2007a) identified and analyzed key issues brought up during the scoping process. Those key issues are also applicable to this GSFO-wide analysis and are incorporated either by tiering or by addressing specific issues of concern at the GSFO level.

The following resource issues are key issues for implementation of the IWM Plan in the GSFO, based on a determination by the PEIS (to which this EA is tiered) that use of herbicides for weed treatment could result in adverse impacts (BLM 2007a, pages 4-7 to 4-8):

- Terrestrial and aquatic vegetation
- Terrestrial and aquatic wildlife
- Livestock, wild horses, and burros
- Surface water and groundwater quality
- Cultural resources
- Visual, wilderness, and recreation resources
- Ranching operations
- Human health and safety

The PEIS concluded that risks to these resources and human uses would be minor, given restrictions and other protections incorporated into the use of herbicides on public lands. Greatest risk of adverse impacts would result from spills of herbicides or their inappropriate application. Because of the potential for adverse impacts, this EA addresses these resource issues within the context of resources, landscapes, and land uses in the GSFO area and the treatment types and restrictions incorporated into the IWM Plan.

2. THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes and compares the four alternatives considered for management of noxious and invasive weeds in the GSFO: Alternative A (*Proposed Action*), Alternative B (*No Action)*, Alternative C (*No Herbicide Use*), and Alternative D (*No Aerial Application of Herbicides*). All four alternatives (including no action, or a continuation of current management) would include implementation of an IWM Plan to guide future weed treatments on BLM lands within the GSFO administrative boundaries, since that is current BLM policy. However, the specific IWM Plan would depend on the alternative selected.

2.1 Actions Included in All Alternatives

Regardless of the alternative selected, the IWM Plan implemented by the GSFO pursuant to this EA would include the basic components summarized below, in addition to weed treatments.

2.1.1 Prevention

Prevention is generally recognized as the most effective and economic form of weed management (DiTomoso 2000). To prevent the spread of noxious and invasive weeds, the GSFO would require that a range of BMPs be incorporated in future project proposals, both internal and external. See Appendix C for a list of prevention measures that would be implemented with all alternatives.

2.1.2 Education

The goal of this element of the plan is to generate internal and external support for weed control by increasing awareness of noxious and invasive weeds and their impact on native ecosystems. Following BLM's action plan *Partners Against Weeds* (BLM 1996a), the GSFO would encourage the participation of BLM employees in training that would include identification of weed species, weed biology, environmental effects, the process for reporting infestations, and employee involvement in reducing the spread of weeds.

To increase the general public's awareness of noxious and invasive weeds, a variety of outreach efforts would be considered such as assisting county governments and other organizations in the publication and distribution of brochures and other types of educational media such as videotapes, bumper stickers, posters, and county fair displays.

2.1.3 Coordination and Cooperation

The GSFO plans to continue and enhance cooperation and coordination with other Federal agencies, State and county/local governments, other organizations, and private landowners in an effort to more effectively manage noxious and invasive weeds. Examples include the following:

- Increase efforts to develop assistance or cooperative agreements with local governments to treat infestations that are located near or across jurisdictional boundaries.
- Exchange weed mapping data with other agencies.
- Share information on treatment effectiveness.
- Participate in periodic coordination meetings with local weed management entities.
- Seek opportunities to develop new partnerships.

2.1.4 Inventory and Mapping

Information on the presence, location, and distribution of noxious weeds is fundamental to all subsequent management efforts. Funding constraints to date have precluded a complete inventory of the 568,000 acres administered by the GSFO. Therefore, areas of high human use and high resource value would be selected for inventory priority. These would include, at a minimum:

- Areas proposed for ground-disturbing activities (e.g., oil and gas development, road construction, and range improvements)
- Burned areas
- Areas of Critical Environmental Concern (ACECs)
- Habitat for special status species
- Riparian areas
- Developed recreation sites
- Heavily used roads and trails
- Wildland-Urban Interfaces (WUIs)
- Big game winter range

Once located, noxious weed infestations would be mapped. Mapping a weed infestation provides information about the extent of the infestation, possible modes of spread, potential uninfested areas to be protected and monitored, and the effectiveness of control methods. Over the long term, maps provide historical evidence of the epicenter of an infestation and aid in tracking its spread or decline. A global positioning system (GPS) unit would be used to map center points, lines, or polygons to define the location and limits of the infestation. An ArcGIS shapefile of noxious weeds in the GSFO would be developed and maintained.

2.1.5 Revegetation and/or Temporary Resting from Grazing

Areas disturbed by weeds may be reseeded or planted with desirable vegetation following treatment if the native plant community is considered unlikely to recover on its own. DOI policy states, "Natural recovery by native plant species is preferable to planting or seeding, either of natives or non-natives. However, planting or seeding should be used only if necessary to prevent erosion or resist competition from non-native invasive species" (BLM 2004). Where practicable, seed would be installed by drill-seeding to a maximum depth of 1 inch. Where drill-seeding is impracticable, seed may be installed by broadcast-seeding possibly followed by raking or harrowing. If the site needs to be cultivated (disced) prior to seeding, cultural and biological surveys would be conducted prior to ground disturbance and a site-specific NEPA document would be prepared.

In cases of very large and severe infestations where natural recovery or revegetation are expected to be difficult, the area may be rested from grazing by up to 2 years to hasten the reestablishment of desirable vegetation. Exceptions may include situations in which the treated area represents a small portion of the allotment or where the timing, duration, and intensity of use by livestock would not impede recovery.

2.1.7 Monitoring

Monitoring is an essential component of an IWM Plan. Two types of monitoring would be conducted as part of the IWM Plan: implementation monitoring ("Did we do what we said we would do?") and effectiveness monitoring ("Were weed treatments effective?") (BLM 2007a). Evaluating the effectiveness of control techniques and ensuring that SOPs and mitigation and conservation measures are implemented appropriately and are effective are critical components of the IWM Plan. All weed treatments would be monitored. If all mature plants are eliminated, monitoring would continue in order to detect and eliminate new plants arising from seed, propagule, or root stock for the duration of the seed longevity for that species. The monitoring of infestations associated with the objectives of control or containment would continue at periodic intervals for an indefinite period. Table 2 lists the methods used to evaluate treatment effectiveness are tied to the management objective for a given infestation.

Table 2. Management Objectives, Monitoring Methods, and Measures of Effectiveness

Management Objective	Monitoring Method	Measure of Effectiveness
Eradication	Visually inspect infested area	Absence after a period of time (depends on seed longevity of the weed species)
Control or Suppression	Measure percent cover via quadrats or transects	Reduction in percent cover
Containment	Measure area of infestation by mapping perimeter via GPS or recording length and width of infestation	Reduction in area of infestation

As seen in Table 2, if the management objective for an infestation is eradication, the post-treatment monitoring would emphasize the collection of presence/absence data by visual inspection. In this case, the treatment would be considered successful when the target species is absent from its former location. Typically, this would be evaluated through the period over which the seed bank would remain viable. In comparison, monitoring associated with the objectives of control/suppression or containment would focus on quantitative methods—i.e., the reduction in percent cover or infestation size.

If monitoring demonstrates that a treatment has not been effective in achieving the management goal, corrective actions (e.g., retreatment with the same or different method or combination of methods) would be identified and implemented to enhance the level of success. Data on treatment effectiveness collected during monitoring would be entered into the National Invasive Species Information Management System (when available). In the interim, these data would be entered into a GSFO weed management database.

2.2 Alternative A – Proposed Action

The Proposed Action is to implement the IWM Plan presented in this EA as Alternative A to guide the management of noxious and other invasive weeds on BLM lands administered by the GSFO. The intent of this plan is to provide a comprehensive range of management actions and a decision-making framework to allow resource managers to select actions or combinations of actions to meet the objectives of eradicating, significantly reducing, or containing existing weed infestations and preventing the spread of new infestations. The IWM Plan proposed as Alternative A would differ from Alternative B (No Action) by authorizing the use of four new herbicides approved in the PEIS (BLM 2007a) and the use of helicopters or fixed-wing aircraft to apply herbicides aerially.

The proposed IWM Plan is intended to be broad in scope and to apply to weed control associated with any resource management decisions under GSFO's current or future land use plans and plan amendments. The treatment methods, management objectives, and NEPA process for weed treatments under the Proposed Action are described below. Sections 2.3, 2.4, and 2.5 summarize the other alternatives analyzed in comparison to the Proposed Action.

2.2.1 Treatment Methods

Noxious and invasive weeds would be treated using the best available weed control technique(s) at the appropriate times based on the life history of the target species and cost-effectiveness. Under the Proposed Action, weed treatments could include manual, biological, or chemical controls methods, or combinations thereof. Total area of weed treatments under the Proposed Action would not exceed 5,000 acres per year, of which up to 4,000 acres would be treated aerially. The focus of aerial treatments would be large infestations of cheatgrass and other weeds. Potential treatment methods for use by BLM or project proponents in the GSFO area under this alternative are described in Table 3.

Chemical treatments using selective of non-selective herbicides would comply with the U.S. Environmental Protection Agency (EPA) label directions, follow BLM procedures outlined in Handbook H-9011-1 (*Chemical Pest Control*, BLM 2006a) and BLM Manual Sections 1112 (*Safety*) (BLM 2000) and 9015 (*Integrated Weed Management*) (BLM 1992) and comply with State label standards (BLM 1991b). Herbicide applications would adhere to all State and Federal pesticide laws. All applicators that apply herbicides on lands administered by the GSFO (i.e., certified applicators or those directly supervised by a certified applicator) would comply with the application rates, uses, and handling instructions specified on the herbicide label or, where more restrictive, the rates, uses, and handling instructions developed by BLM for the PEIS.

Table 3. Summary of Potential Treatment Methods under the IWM Plan*

Manual Control
Description: 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 ground level; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; cutting at the ground level or removing competing plants around desired species; or placing mulch around desired vegetation to limit weed germination and growth (BLM 1991b). Hand tools include a handsaw, axe, shovel, rake, machete, grubbing hoe, mattock, Pulaski, brush hook, hand clippers, motorized chainsaw, weed whacker, and power brush saw.
Effectiveness: Manual treatments are most effective when weed infestations are small and complete removal of the roots is possible (Rees et al. 1996). Manual treatments work well for annual or biennial species with tap roots or shallow roots that do not resprout from tissue remaining in the soil. Sandy or gravelly soils allow for easier root removal. Repeated treatments are often necessary due to soil disturbance and residual weed seeds in the seed bank. Manual control can be used with minimal impacts and are useful in sensitive habitats, such as wetlands or riparian areas, or where special status species occur. However, manual treatments are labor intensive compared to other treatment methods such as herbicide and biological control. Typical manual vegetation control costs $70 to $700 per acre (BLM 2007b).
Biological Control
Description: Biological controls involve the intentional use of domestic animals, insects, nematodes, mites, or pathogens (agents such as bacteria or fungi) that weaken or destroy vegetation. The use of domestic livestock to control weeds requires "prescribed grazing" in which the kind of animals, and the amount and duration of grazing are designed to control a particular species while minimizing impacts to perennial native vegetation. In order for prescribed grazing to be effective, the right combination of animals, stocking rates, timing, and rest must be used. Grazing should occur when the target plant is palatable and viable seeds can be reduced.
Effectiveness: Biological control agents are not currently available for many weed species. They are most effective for large populations of weeds, but it is unlikely that they would completely eradicate a weed population, because as populations of the host plant decreases, populations of the agent would also decline. Biological control agents can take many years to get established and bring about the desired level of control, but can be a useful tool in reducing the initial size or density of a weed infestation, making other treatments more feasible. Biological treatments are most effective when followed with other treatments. Biological control using insects, nematodes, mites, or pathogens can range from $80 to $150 per release for ground applications. Treatment of weeds using domestic animals is relatively inexpensive, costing $12 to $15 per acre. Biological control agents such as insects, nematodes, mites, or pathogens that are approved by the BLM have undergone rigorous testing by the USDA Agricultural Research Service to ensure they are host specific and would feed only on the target plants and not on crops, native flora, or endangered or threatened plant species. Before releasing a new agent, an environmental analysis is prepared by APHIS (Agricultural Plant Health Inspection Service). Once approved, a biological control can be released only in states covered by the environmental assessment. The GSFO would use only those biological controls approved by APHIS for release in Colorado. Biological control agents would be used in accordance with BLM Manual Section 9014 (BLM1990). When releasing biological agents on BLM lands, the following process would be followed**:** • A Biological Control Agent Release Proposal (BCARP) is an internal BLM document that includes the type of biological control agent, collection origin, number of specimens planned for release, planned release date, number of releases, target pest species, and estimated treatment acres. A BCARP also includes a discussion of sensitive aspects and precautions and mitigations to minimize impacts to non-target vegetation. A BCARP requires review and approval by the Originator, Field Office Manager, State Office Pest Management Specialist, and Deputy State Director. • A Biological Control Agent Release Record (BCARR) must be completed within 24 hours after release of the biological control. These records must be kept for 10 years. Information on the BCARR includes location of release, actual area (acres) of release, weather conditions, and weed species treated.

Chemical Control
Description: Chemical control involves the use of herbicides to kill or suppress target plants and chemicals applied with the herbicides that improve their efficacy ("adjuvants"). Herbicides can be used selectively to control specific vegetation types or non-selectively to clear all vegetation in a particular area (e.g., bare-ground treatments on oil and gas pads). Manual (i.e., spot) applications are effective for small infestations, areas inaccessible by vehicle, or areas where minimizing potential impacts to non-target plants is desired. Manual applications include spraying from a backpack unit or spray bottle or wiping (wicking) directly onto the foliar tissue. In remote areas and areas where mechanized equipment is not appropriate (e.g., wilderness areas and wilderness study areas), herbicides may be carried and applied using pack animals. Larger weed infestations in highly disturbed areas with good accessibility can be treated by sprayers mounted on ATVs or trucks. Oil and gas pads, pipeline corridors, and roadsides can be effectively treated in this manner. Herbicides could be applied aerially with helicopters or fixed-wing aircraft for large infestations of weeds in areas where it's not economically and/or physically feasible to treat on the ground (e.g., areas burned in wildfires, cheatgrass treatments, wildlife habitat treatments). When applying herbicides on BLM lands, the following process would be followed**:** • Applicator must present current certified pesticide applicator's license. • A Pesticide Use Proposal (PUP) must be approved by the BLM State Office. (A PUP is an internal document that includes the type of herbicide, application rate, application dates, number of applications, and estimated treatment acres. A PUP also includes a discussion of sensitive aspects and precautions and mitigations that will be taken to minimize impacts to non-target vegetation.) A PUP requires review and approval by the Certified Pesticide Applicator, Field Office Weed Coordinator, Field Office Manager, State Office PUP Coordinator, and Deputy State Director. A PUP is valid for 3 years and requires renewal after that time. • The pesticide applicator would fill out a Pesticide Application Record (PAR) within 24 hours of applying herbicides on BLM lands. The pesticide applicator must keep these records for 10 years according to State law. Information on the PAR includes location of application, which and how much herbicide was applied, weather conditions, equipment used, weed species treated, and number of acres treated. Applicators are required to turn in these records to the GSFO at the end of each year. • The GSFO would prepare an annual Pesticide Use Report (PUR) which would be submitted to the BLM State Office. This report includes a total of all pesticides applied on the GSFO.
Effectiveness: The proper use of herbicides at the optimum time can be the most effective method for controlling persistent weeds, including perennial species. Not all herbicides are equally effective on all weeds, nor can every herbicide be used in every situation. Herbicides can damage or kill non-target plants and can be toxic or cause health problems in humans, livestock, and wildlife. Weed populations may develop a resistance to a particular herbicide over time. Herbicide control is less labor intensive than manual methods and is able to more effectively control larger weed infestations. The cost of herbicide application is generally $20 to $250 per acre (BLM 2007b).

** Information taken primarily from BLM 2007b.*

The Proposed Action includes potential use of any of the 18 herbicide active ingredients approved in the PEIS (2,4-D, bromacil, chlorsulfuron, clopyralid, dicamba, diflufenzopyr, diquat, diuron, fluridone, glyphosate, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, tebuthiuron, and triclopyr). Four of these—diquat, diflufenzopyr, fluridone, and imazapic—had not previously been approved for use. The ability to use imazapic as part of the Proposed Action is of particular benefit because it is the only approved herbicide that effectively controls cheatgrass. The herbicide Overdrive® (dicamba + diflufenzopyr) is another important addition to the approved list.

Another of the added compounds, diflufenzopyr, is approved only in a formulation with dicamba, called Overdrive®. This formulation holds promise for controlling both annual and perennial broadleaf weeds. BLM could approve diflufenzopyr as a stand-alone herbicide in the future if registered by the U.S.

Environmental Protection Agency (EPA) under the *Federal Insecticide, Fungicide, and Rodenticide* Act (FIFRA). The other two newly added herbicides (diquat and fluridone) are primarily for use in aquatic sites and therefore not likely to be used in the GSFO, where aquatic weeds are not a significant issue.

In addition to approving four new herbicides, the PEIS also dropped six herbicides previously available under the 1991 Vegetation EIS (2,4-DP, asulam, atrazine, fosamine, mefluidide, and simazine). See Appendix D for a complete listing of herbicides and adjuvants currently approved for use on BLM lands.

The proposed IWM Plan would incorporate the BMPs for preventing weed infestations and the SOPs and conservation measures for implementing weed treatments (see Appendices E, F, and G). These appendices are taken from the PEIS and PER (BLM 2007a, b) and adapted to site-specific conditions in the GSFO area. Analyses of impacts and risks to humans and to non-target plants, fish, terrestrial wildlife, and other resources or resource uses are presented in detail in the PEIS and summarized in the current programmatic EA prepared by the GSFO.

2.2.2 Management Objectives and Treatment Selection Process

Management objectives for noxious weed infestations under the Proposed Action would be established and treatment priorities assigned based on the weed species and the size, density, and location of the infestation. Management objectives would include:

- **Eradication:** Eliminate the weed species, including seeds and fruits.
- **Containment:** Prevent the weed species from spreading beyond the current infestation perimeter.
- **Control or Suppression:** Reduce the extent and density of the weed species.

The selection of a management objective is guided by the requirements of the *Colorado Noxious Weed Act*. As described previously, this Act places Colorado noxious weed species into three categories: List A species are designated for statewide eradication, List B species are managed for containment, and List C species are not designated for control because they are widespread. However, counties typically have their own management objectives for weed species. At a minimum, the GSFO would comply with both State and county management objectives but may establish stricter objectives for eradication or containment in situations where small infestations of a species occurred. Once a management objective is established for a given infestation, its treatment is prioritized in relation to other infestations. The need for prioritization arises from the large number of infestations requiring treatment and limited funding and weed personnel available.

The first (highest) priority would be given to treating infestations of species likely to have the most substantial impact on resources and to treating these infestations while they are small and relatively easy to manage. Thus, as a general rule the highest priority would be to eradicate small infestations of List A and List B species in newly disturbed areas (or areas proposed for disturbance) with high resource values.

The second priority would be to limit the spread of established infestations of List B species. The emphasis would be on control of larger infestations in areas that have a high potential for spread. Examples include roads and trails (including rights-of-way), campgrounds and trailheads, stock tanks and corrals, heavily grazed riparian areas, big game winter concentration areas, and other areas of locally intensive use. In these circumstances, it may not be practical to eradicate the entire infestation, and containment or control may be the most cost-effective management goal.

The third priority would also focus on controlling the spread of List B species but would emphasize less developed recreational facilities, riparian areas that receive relatively light use by livestock, big game

winter range that receives dispersed rather than concentrated use, and areas in the wildland-urban interface that are subject to reinvasion from adjacent private lands and roadways. Small infestations of List C species would also fall into this category. The most cost-effective management goal would largely depend on the size of the infestation and could include eradication, containment, or control.

The fourth priority would emphasize the containment or control of large infestations of List C species. The large areal extent of these infestations would probably preclude eradication and favor suppression and containment as cost-effective management goals.

The purpose of the prioritization process is to ensure that the treatment method selected is appropriate for the situation while minimizing risks to non-target species. Several variables would be considered when determining what treatment or combination of treatments would be used in a specific situation. These include:

- Potential hazards to human health
- Possible damage to non-target plants and animals
- Adverse impacts to the general environment
- Cost effectiveness over the long- and short-term
- Ease of implementation

Table 4a presents preferred methods of treatment under the Proposed Action, given treatment priorities, management goals, and types of infestations. In general, manual treatment are preferred for individual or small isolated populations, while chemical or biological treatments are preferred for larger infestations—depending on the specific weed species and on the presence/absence of special status or other desirable plant species that could be adversely affected by herbicides.

Note in Table 4a that the first, second, and third priority categories, which include eradication, control, and/or containment of List A or List B species, specify use of only manual treatment or direct application (including spot spraying) of herbicides onto target weeds near special status plants rather than broadcast spraying by aerial or ground methods. This is intended to avoid injury to special status species by offsite drift or runoff of herbicides.

Prioritization is less of an issue for project proponents (e.g., oil and gas operators, rights-of-ways holders), who typically are required by BLM to manage weeds on the public lands they impact. For these proponents, priorities would not be established in relation to other infestations across the GSFO. Instead, they would be required to control noxious and invasive weeds as a Condition of Approval applied to drilling permits, right-of-way grants, or other authorizations by BLM of ground-disturbing activities.

2.2.3 NEPA Process

At present, absent an approved programmatic EA at the field office level, compliance with NEPA requires that GSFO prepares a project-specific EA for every new weed treatment activity and location. The Proposed Action would streamline the process for NEPA compliance by allowing GSFO to prepare a Documentation of NEPA Adequacy (DNA) tied to the programmatic EA. The DNA process, while avoiding the need for project-specific EAs, would ensure and document that impacts of weed treatment activities and locations approved as part of an annual plan were fully analyzed and disclosed in the programmatic EA, that conditions relevant to the selection and implementation of treatment methods are essentially unchanged from the EA, that no new information is available that would affect GSFO's selection and implementation of treatments, and that the process conforms to the current land use plan.

2.3 Alternative B – No Action (Continue Present Management)

Under the No Action alternative, the GSFO would continue its current approach to weed management. Specifically, the GSFO would continue to select herbicides from among those previously approved in the 1991 Vegetation EIS, except that the six herbicides dropped in the PEIS would not be used. Not having the newly approved herbicide imazapic available would greatly impair GSFO's ability to effectively treat cheatgrass, which is very aggressive, difficult to control, and widespread in the GSFO area.

Alternative B would also preclude aerial application, which is currently not used on BLM lands in the GSFO area. The continued prohibition of aerial spraying would greatly reduce GSFO's ability to treat very large weed infestations that cannot be adequately or effectively covered using ground methods. Therefore, the current annual treatment rate of less than 1,000 acres per year would continue, compared to as much as 5,000 acres per year under Alternative A. Except for the lack of aerial spraying, the preferred methods of treatment under this alternative (Table 4b) would be the same as under Alternative A. This includes the restriction to use manual methods or spot application of herbicides, rather broadcast spraying by aerial or ground methods, in areas near special status plants to avoid injury from drift or runoff.

Because the most extensive infestations within the GSFO boundaries often consist of cheatgrass, the combination of no aerial spraying and no imazapic under the No Action alternative would likely result in continued expansion of this species.

2.4 Alternative C – No Herbicide Use

This alternative would implement an IWM Plan that would contain the elements of the plan described under the Proposed Action, with the exception that herbicides would not be used. The absence of chemical controls would be offset to some extent by an increase in manual and biological controls. As shown in Table 4c, these would essentially be limited to manual removal of plants in small weed infestations, areas near special status plants, and clumps of tamarisk, or to biological control of specific weeds through targeted grazing.

Because of the limitations of manual and biological methods, the total area treated annually under this alternative would not exceed 1,000 acres per year. While targeted grazing can cover large areas, the effectiveness (percent removal of target species) is much lower than with herbicides. In the future, biological control of larger areas of tamarisk using an introduced Asiatic beetle (see Section 3.4) may be implemented by the GSFO, but this method is not currently in use.

2.5 Alternative D – No Aerial Application of Herbicides

The IWM Plan implemented under this alternative would be similar to Alternative A (Proposed Action) regarding the herbicides approved for use, including the four newly approved herbicides diquat, diflufenzopyr, fluridone, and imazapic, and similar to Alternative B (No Action) regarding the lack of aerial spraying. Because the preferred treatment methods under Alternatives B and D would be the same, they are summarized together on Table 4b. The inability to use aerial applications would preclude treatment of up to 4,000 acres per year of cheatgrass and other extensive weed infestations, as could be done under the Proposed Action. Thus, annual treatments would not exceed 1,000 acres per year.

As with Alternatives A and B, weed treatments near special status plants would be limited to use of manual methods or direct application of herbicides, rather than broadcast spraying, to avoid the potential for drift or runoff into non-target areas.

Table 4a. Preferred Methods of Treatment Given Priorities, Management Goals, and Infestation Type – Alternative A*

Priority	Goal	Infestation	Preferred Method
Highest Priority: ▪ List A species ▪ List B or List C species new to GSFO ▪ Small infestations of List B species in areas of special concern (wilderness, ACECs, habitat for special status plants)	Eradication	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species.	Chemical treatment with selective herbicide.
		Small populations in areas with minimal desirable species.	Chemical treatment with non-selective herbicide, followed by revegetation.
Second Priority: ▪ Large infestations of List B species in areas of special concern ▪ List B species in areas with heavy use or more likely to spread (heavy recreational use, heavy use by livestock, or concentrated use by wintering big game)	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	Chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Aerial or non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
			Biological treatment, possibly with selective herbicides along perimeters.
Third Priority: ▪ List B species in areas with light use or less likely to spread (less recreational use, light or dispersed use by livestock or wintering big game) ▪ List B species in riparian areas, big game winter range, or wildland-urban interfaces ▪ Small infestations of List C species	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	Chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Aerial or non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
			Biological treatment, possibly with selective herbicides along perimeters.
		Infestations of tamarisk and Russian-olive.	Manual treatment, with herbicide applied to stumps, followed by revegetation and control of resprouting.
Lowest Priority: ▪ Large infestations of List C species	Control and Containment	Large infestations of List C species, including weeds dispersed throughout degraded rangeland.	Biological treatment (including prescribed grazing), possibly with selective herbicides along perimeters and localized revegetation or area-wide interseeding to resist reinfestation.

*The table describes preferred methods of treatment given an idealized series of variables. The preferred treatment would vary depending on site-specific conditions.

Table 4b. Preferred Methods of Treatment Given Priorities, Management Goals, and Infestation Type – Alternatives B and D*

Priority	Goal	Infestation	Preferred Method
Highest Priority: ▪ List A species ▪ List B or List C species new to GSFO ▪ Small infestations of List B species in areas of special concern (wilderness, ACECs, habitat for special status plants)	Eradication	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species.	Non-aerial chemical treatment with selective herbicide.
		Small populations in areas with minimal desirable species.	Non-aerial chemical treatment with non-selective herbicide, followed by revegetation.
Second Priority: ▪ Large infestations of List B species in areas of special concern ▪ List B species in areas with heavy use or more likely to spread (heavy recreational use, heavy use by livestock, or concentrated use by wintering big game)	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	Non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
			Biological treatment, possibly with selective herbicides along perimeters.
Third Priority: ▪ List B species in areas with light use or less likely to spread (less recreational use, light or dispersed use by livestock or wintering big game) ▪ List B species in riparian areas, big game winter range, or wildland-urban interfaces ▪ Small infestations of List C species	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment; spot application of herbicide.
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	Non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Non-aerial chemical treatment with selective herbicide, or with non-selective herbicide followed by revegetation.
			Biological treatment, possibly with selective herbicides along perimeters.
		Infestations of tamarisk and Russian-olive.	Manual treatment, with herbicide applied to stumps, followed by revegetation and control of resprouting.
Lowest Priority: ▪ Large infestations of List C species	Control and Containment	Large infestations of List C species, including weeds dispersed throughout degraded rangeland.	Biological treatment (including prescribed grazing), possibly with selective herbicides along perimeters and localized revegetation or area-wide interseeding to resist reinfestation.

*The table describes preferred methods of treatment given an idealized series of variables. The preferred treatment would vary depending on site-specific conditions.

Table 4c. Preferred Methods of Treatment Given Priorities, Management Goals, and Infestation Type – Alternative C*

Priority	Goal	Infestation	Preferred Method
Highest Priority: ▪ List A species ▪ List B or List C species new to GSFO ▪ Small infestations of List B species in areas of special concern (wilderness, ACECs, habitat for special status plants)	Eradication	Individual plants or small groups.	Manual treatment.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species.	
		Small populations in areas with minimal desirable species.	
Second Priority: ▪ Large infestations of List B species in areas of special concern ▪ List B species in areas with heavy use or more likely to spread (heavy recreational use, heavy use by livestock, or concentrated use by wintering big game)	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment.
		Infestations near special status plants.	
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Biological treatment.
Third Priority: ▪ List B species in areas with light use or less likely to spread (less recreational use, light or dispersed use by livestock or wintering big game) ▪ List B species in riparian areas, big game winter range, or wildland-urban interfaces ▪ Small infestations of List C species	Eradication, Control, or Containment	Individual plants or small groups.	Manual treatment.
		Small populations in areas with substantial desirable species or small populations in areas with minimal desirable species.	
		Large infestations in areas with substantial desirable species or large infestations in areas with minimal desirable species.	Biological treatment.
		Infestations of tamarisk and Russian-olive.	Manual treatment, followed by revegetation and control of resprouting.
Lowest Priority: ▪ Large infestations of List C species	Control and Containment	Large infestations of List C species, including weeds dispersed throughout degraded rangeland.	Biological treatment (including prescribed grazing) and localized revegetation or area-wide interseeding to resist reinfestation.

*The table describes preferred methods of treatment given an idealized series of variables. The preferred treatment would vary depending on site-specific conditions.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a description of the human and natural environmental resources that could be affected by the Proposed Action and presents comparative analyses of the direct and indirect consequences on the affected environment stemming from the implementation of the various actions under the Proposed Action and other alternatives analyzed.

A variety of laws, regulations, and policy directives mandate the evaluation of the effects of a Proposed Action and alternative(s) on certain critical environmental elements. Some of the critical elements that require inclusion in this EA are either not present or are present but would not be adversely affected by the Proposed Action or alternatives. Table 5 lists the mandated critical elements as well as other resources of lands uses identified as issues in the PEIS (BLM 2007a) (see Section 1.6 of this EA). Note that the elements analyzed in this document are listed in the table in alphabetical order but discussed in the text in approximate order of decreasing sensitivity to adverse impacts from herbicide use.

Table 5. Critical Elements (Bold) and Resources/Uses Identified as Issues in the PEIS (*Italics*).

Critical Element	Present and Affected		Section Where Addressed	Critical Element	Present and Affected		Section Where Addressed
	Yes	No			Yes	No	
Air Quality		X	--	*Recreation*	X		3.12
ACECs	X		3.13	**Special Status Species***	X		3.3, 3.5, 3.6
Cultural Resources	X		3.10	*Vegetation, Terrestrial and Aquatic*	X		3.2, 3.4
Environmental Justice		X	--	*Visual Resources*	X		3.11
Floodplains	X		3.4, 3.8	**Wastes, Hazardous or Solid**		X	--
Human Health	X		3.14	***Water Quality, Surface and Ground****	X		3.8
Invasive Non-native Species	X		3.1	**Wetlands and Riparian Zones***	X		3.9
Livestock and Ranching Operations	X		3.7	**Wild and Scenic Rivers**	X		3.13
Migratory Birds	X		3.5	*Wild Horses and Burros*		X	--
Native American Religious Concerns	X		3.10	*Wildlife, Terrestrial and Aquatic*	X		3.5, 3.6
Prime or Unique Farmlands		X	--	**Wilderness and WSAs**	X		3.13

*Public Land Health Standard

Analyses of environmental consequences and appropriate mitigation measures under the Proposed Action and alternatives as described below are drawn primarily from BLM's recent non-herbicide treatment PER (BLM 2007b) and herbicide treatment PEIS (BLM 2007a) for the 17 western states, including Colorado. The PEIS and PER present a thorough analysis of effects associated with vegetation treatments proposed for BLM lands. This text and tables below summarize information in the PEIS and PER, with special reference to resources, land uses, and landscape character of the GSFO area.

All of the alternatives analyzed below would incorporate the SOPs, mitigation measures, and conservation measures (for special status species) presented in Appendices E, F, and G of this EA. Additionally, all alternatives would include prevention, education, interagency coordination/cooperation, inventory and mapping, revegetation, and monitoring activities (see Section 2.2). These would have indirect beneficial impacts to the resources and land uses within the GSFO.

3.1 Noxious Weeds and Other Invasive Non-Native Plants

3.1.1 Affected Environment

Noxious weeds known to occur in the GSFO area are noted in Table 1, along with their corresponding areas of occurrence. The three categories (A, B, and C) indicated in Table 1 correspond to three lists of species as classified by the State of Colorado. The three lists are based on the following management objectives: List A – designated for statewide eradication; List B – managed for containment; and List C – not designated for control because of wide distribution.

There are many other invasive, non-native plants known to occur in the GSFO – for example, Russian thistle (*Salsola* spp.), kochia (*Kochia* spp.), and annual mustards. These species are controlled by oil and gas operators and other project proponents in conjunction with their ground-disturbing activities and subsequent reclamation but are not actively controlled outside these situations.

Of the 10 vegetation communities within the GSFO area (see Table 6 on page 23), some are more likely than others to contain infestations of noxious weeds and other invasive plants. Salt-desert shrublands, sagebrush shrublands, and pinyon-juniper woodlands along the I-70 corridor in the western portion of the GSFO have been seriously degraded by widespread infestations of cheatgrass and other non-natives due to historic, and in some cases current livestock grazing (BLM 2005). Smaller infestations of noxious weeds occur throughout the GSFO and are likely caused by oil and gas development, livestock grazing, OHV use, and other types of ground-disturbing activities.

3.1.2 Environmental Consequences

This section discusses the impacts to target plants (i.e., weeds) from the use of herbicides, manual and biological controls and revegetation. Impacts to non-target (desirable) plants from drift, runoff, wind transport, or accidental spills and direct spraying can be found in Section 3.2, Non-Target Terrestrial Vegetation.

3.1.2.1 General Impacts of Weed Treatments on BLM Lands

Direct and Indirect Effects

In general, vegetation treatments have the potential to affect most plant species in much the same way: All are intended to cause mortality or injury to target plants, which may vary in intensity and extent. Herbicides offer an effective and often resource-efficient means of treating and managing undesirable vegetation. Manual methods are often more time and labor intensive, and can create soil disturbance which can lead to additional weed establishment. Biological control provides an affordable method to control larger weed infestations that are not cost-effectively or feasibly controlled by other methods. However, biological control by domestic animals could introduce weed disseminules (seeds or fruits) to a site, attached to an animal's fur or deposited in its feces.

Eradicating and/or controlling weed infestations benefits native plant communities by decreasing the growth, seed production, and vigor of undesirable species, thereby releasing native species from much of

this competition. However, if too little vegetation remains following treatment, other weeds may invade the area. To minimize this potential, areas with a minor component of desirable species or that must be treated with a non-selective herbicide to control the targeted species may be revegetated following treatment. Seeding or interseeding these types of areas can hasten the establishment of desirable native species and help prevent colonization by weeds.

Revegetation can also disturb the soil and create conditions favorable for weeds if the seeded species do not become established. Monitoring of revegetated areas is critical to ensure that the area is recovering as intended or, if not, provide a basis for additional weed control and/or seeding.

Prevention or Mitigation of Adverse Impacts

Under all alternatives, herbicide treatments would comply with the U.S. Environmental Protection Agency label directions and follow BLM procedures outlined in BLM Handbook H-9011-1 (*Chemical Pest Control*) and BLM Manual Sections 1112 (*Safety*), 9011 (*Chemical Pest Control*), and 9015 (*Integrated Weed Management*) and meet or exceed State label standards. Herbicide applications would adhere to all State and Federal pesticide laws. All applicators that apply herbicides on the GSFO (i.e., certified applicators or those directly supervised by a certified applicator) would comply with the application rates, uses and handling instructions on the herbicide label, and where more restrictive, the rates, uses, and handling instructions developed by the BLM.

The GSFO would follow SOPs, mitigation measures, and conservation measures adapted from the PEIS to avoid or minimize adverse impacts to human health and the environment during weed treatments. These measures, presented in Appendices E, F, and G of this document, are included as part of the Proposed Action and would be applied to all weed treatments permitted or conducted by the GSFO. Potential impacts to Federally listed or proposed threatened or endangered species were analyzed in a BA prepared by the GSFO and submitted to USFWS on May 20, 2009. Following review of the BA pursuant to Section 7 of the ESA, the USFWS issued its concurrence with GSFO's determination of "**May Affect, Not Likely to Adversely Affect**" for listed or proposed species and incorporating the proposed conservation measures in Appendix G. The concurrence, dated June 19, 2009, is attached as Appendix K at the end of this document.

3.1.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under the Proposed Action, the GSFO would be able to treat up to 5,000 weed-infested acres per year using manual, chemical (both ground-based and aerial) and biological controls. The GSFO could use four additional herbicide active ingredients approved in the PEIS, as well as continue use of 14 herbicide active ingredients previously approved in the 1991 Vegetation EIS. The newly approved herbicides include imazapic, which is effective on cheatgrass.

Another newly available herbicide (Overdrive®), which contains diflufenzopyr in combination with diquat, appears to have good potential for controlling a variety of broadleaf weeds and annual grasses. The Proposed Action would also include aerial spraying to treat large infestations of cheatgrass or other weed populations that are infeasible or ineffective to treat with ground methods.

The proposed IWM Plan, with its full range of treatment options, will allow for early detection and rapid response to new weed infestations as well as a more proactive, coordinated weed management approach for the GSFO. Of all the alternatives, the Proposed Action would result in the most weeds treated, and the least chance for expansion.

Alternative B – No Action (Current Management)

Under this alternative, the GSFO would not be able to use the four herbicides approved in the PEIS; this includes imazapic, the only herbicide available for effectively controlling cheatgrass. For this reason, combined with BLM's inability to approve aerial spraying to control large infestations, cheatgrass would continue to spread. The lack of aerial spraying would also reduce the total area of treatments possible each year compared to Alternative A, with an upper limit of 1,000 acres rather than 5,000 acres.

Alternative C – No Herbicide Use

This alternative would result in the least acres treated annually of any alternative because of the increased labor, time, and cost associated with manual and biological control options. Noxious weeds would spread at a faster rate than under other alternatives. Many of the noxious weeds in the GSFO, such as cheatgrass, are effectively controlled only with herbicides.

Manual treatments would be practicable only for small weed populations or individual plants due to limited resources. Some perennial weeds such as Russian knapweed and Canada thistle could actually increase following manual treatment due to growth of new plants from rhizomes and root fragments left in the soil. Manual treatment of Russian-olive and tamarisk would also be relatively ineffective without chemical treatment to kill the stump and roots and prevent sprouting.

Biological controls could be used to treat infestations too large for manual control. However, few biocontrols are currently available, and these generally work slowly by weakening the target species, thereby reducing its competitiveness over time rather than eradicating it.

Alternative D – No Aerial Application of Herbicides

Large or inaccessible weed infestations could not be effectively treated under this alternative due to GSFO's inability to approve use aerial spraying. As a result, the total area treated would be no more than 1,000 acres per year, compared to 5,000 acres per year under the Proposed Action. Although Alternative D would include the use of imazapic, and therefore allow more effective control of small stands of cheatgrass than under Alternative B, the inability to treat aerially spray large stands would allow cheatgrass to continue to expand in the GSFO area.

3.1.2.3 Cumulative Impacts

Ground-disturbing activities will continue to increase in the GSFO area as oil and gas companies explore new areas, new ROWs are permitted, and new trails and user areas are developed. Vectors for weed dispersal such as vehicles, recreationists, livestock, and wildlife will continue to be present, spreading weed disseminules to new sites. Alternative A (Proposed Action), with its combination of aerial application and use of a new compound, imazapic, is the only alternative that would allow the GSFO to attack existing large or remote weed infestations—especially of cheatgrass. Weeds would be expected to continue to spread under the remaining alternatives, and especially under Alternative B due to the reliance solely on manual or biological controls.

The repeated use of herbicides in a given area could cause weeds to develop resistance to a particular active ingredient over time. This risk would be greatest under the Proposed Action and would not exist under Alternative C. To reduce this risk, the GSFO would rotate herbicides when treating the same area repeatedly and would use non-chemical control methods when feasible.

3.2 Non-Target Terrestrial Vegetation

3.2.1 Affected Environment

The GSFO contains 10 vegetation communities (Table 6). Pinyon-juniper (*Pinus edulis - Juniperus osteosperma, J. scopulorum*) woodlands are the dominant type, occurring on 37 percent of the GSFO. The understory of the pinyon-juniper commonly includes shrubs such as sagebrush (*Artemisia* spp.), rabbitbrush (*Chrysothamnus* spp.), mountain-mahogany (*Cercocarpus montanus*), and bitterbrush (*Purshia tridentata*). Depending on elevation, substrate, and aspect, associated native grasses perennial commonly include bluebunch wheatgrass (*Pseudoroegneria spicata*), galleta grass (*Pleuraphis jamesii*), Indian ricegrass (*Achnatherum hymenoides*), needle-and-thread (*Hesperostipa comata*), salina wildrye (*Leymus salinus*), and the native bluegrasses *Poa secunda* and *P. fendleriana*.

Sagebrush shrublands make up 16 percent of the GSFO and include basin big sagebrush (*A. tridentata* ssp. *tridentata*), Wyoming sagebrush (*Artemisia t.*ssp. *wyomingensis*), mountain big sagebrush (*A. t.* var. *pauciflora*), or subalpine big sagebrush (*A. t.* var. *vaseyana*), depending on elevation, soil, and aspect. Associated native perennial grasses commonly include galleta grass, Indian ricegrass, and bottlebrush squirreltail (*Elymus elymoides*).

Table 6. Vegetation Community Types within the GSFO Area*

Community Type	Acreage in GSFO	Percentage of GSFO
UPLAND FORESTS AND WOODLANDS		
Pinyon-Juniper Woodlands	198,544	37
Coniferous Forests	47,576	9
Aspen Forests	18,508	5
UPLAND SHRUBLANDS AND GRASSLANDS		
Sagebrush Shrublands	86,851	16
Mixed Mountain Shrublands	66,042	14
Gambel Oak Shrublands	49,124	9
Grasslands	12,207	3
Salt-desert Shrublands	2,428	1
RIPARIAN WOODLANDS AND SHRUBLANDS		
Riparian	4,522	1
BARREN LANDS		
Outcrops, Talus/Scree, and Barren	20,750	5

* Derived from Landsat satellite imagery vegetation mapping data.

Mixed mountain shrublands are a major component of the middle elevations of the GSFO. These shrublands include a mixture of serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos* spp.), Gambel oak (*Quercus gambelii*), chokecherry (*Prunus virginiana*), squawapple (*Peraphyllum ramosissimum*), mountain-mahogany, and antelope bitterbrush. These communities are generally located between the lower elevation pinyon-juniper woodlands and the higher elevation aspen and mixed conifer communities.

Coniferous forests occur at higher elevations in the GSFO. Depending on the slope, aspect, soils, and precipitation, the following species may be found: lodgepole pine (*Pinus contorta*), Douglas-fir

(*Pseudotsuga menziesii*), Engelmann spruce (*Picea engelmanii*), subalpine fir (*Abies lasiocarpa*), and limber pine (*Pinus flexilis*)—the last species only on exposed, windswept ridges. Quaking aspen (*Populus tremuloides*) communities tend to intermix with conifer and sagebrush communities, often along minor drainageways or other sites with slightly elevated moisture. Perennial native grasses commonly include mountain brome (*Bromopsis marginatus*), slender wheatgrass (*Elymus trachycaulus*) and, where aspen is present, blue wildrye (*Elymus glaucus*).

Grasslands consist of perennial grasses often intermixed with native forbs (broadleaf herbs) and low-growing shrubs or subshrubs (species that are woody only at the base). These communities often occur on windswept ridges, south-facing slopes, or deeper soils in valley bottoms. At low to middle elevations, needle-and-thread grass, bluebunch wheatgrass, and western wheatgrass (*Pascopyrum smithii*) are often dominant. At higher elevations, subalpine grasslands are dominated by Thurber's fescue (*Festuca thurberi*), Columbia needlegrass (*Achnatherum nelsonii*), and Letterman's needlegrass (*A. lettermanii*).

Salt-desert shrublands occur in the lower elevations of the western portion of the GSFO, at elevations below 6,000 feet and on saline soils. These areas are dominated by saltbushes such as shadscale (*Atriplex confertifolia*), fourwing saltbush (*A. canescens*), and Gardner's saltbush (*A. gardneri*). Other common shrubs include greasewood (*Sarcobatus vermiculatus*), Wyoming big sagebrush, and rabbitbrush. Prevalent grasses include galleta (*Pleuraphis jamesii*) and bottlebrush squirreltail (*Elymus elymoides*).

Riparian communities occur primarily along rivers and perennial tributaries as well as along some intermittent streams, pond or lake shores, and seeps or springs. Depending on elevation or other ecological situation, dominant riparian species may include narrowleaf cottonwood (*Populus angustifolia*), plains cottonwood (*P. deltoides*), boxelder (*Negundo aceroides*), willows (*Salix* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and a variety of riparian forbs. Associated species commonly include quaking aspen and blue spruce (*Picea pungens*). Shrubs in addition to willow species may include water birch (*Betula occidentalis*), thinleaf alder (*Alnus tenuifolia*), chokecherry, hawthorns (*Crataegus* spp.), redtwig dogwood (*Cornus sericea*), and silver buffaloberry (*Shepherdia argentea*)—again depending on elevation or other ecological situation.

Unvegetated areas of the GSFO include rock outcrops, talus/scree slopes, and other barren lands. Typically, steep slopes and soil conditions (e.g., high content of rock, clay, or gypsum) are the primary factors limiting vegetation growth in these areas.

As mentioned in Section 3.1, some vegetation communities in the GSFO are more likely than others to contain infestations of noxious and invasive weeds. Salt-desert shrublands, sagebrush shrublands, and pinyon-juniper woodlands in the western portion of the GSFO along the I-70 corridor have been seriously degraded by widespread infestations of cheatgrass and other non-native annuals due to historic and, in some cases, current livestock grazing (BLM 2005). However, ground disturbance in any vegetation community is likely to result in invasion by weeds if the revegetation or natural colonization by native species does not occur promptly.

3.2.2 Environmental Consequences

3.2.2.1 General Impacts of Weed Treatments on BLM Lands

Direct Effects

Herbicides could come into contact with and impact non-target plants through drift, runoff, wind transport, or accidental spills and direct spraying. Potential impacts could include one or more of the following: mortality, loss of photosynthetic foliage, reduced vigor, abnormal growth, or reduced

reproductive output. Plants could be crushed by trucks and/or ATVs during ground applications, and injury or mortality to plants could occur. Risks to non-target plants from spray drift are greater with smaller buffer zones between target and non-target vegetation and application from greater heights (i.e., aerial application or ground application with a high boom). Application rate is a major factor in determining risk, with higher application rates associated with greater risk to plants.

Biological control by domestic animals could cause mortality and injury to non-target plants through browse and trampling. Biological control agents such as insects and pathogens do not typically have an effect on non-target plant species or habitats. However, some biological control agents have been known to attack species in addition to the target plant. All biocontrol agents utilized by the GSFO would be tested prior to release to ensure they are host specific.

In general, the effects of manual treatment methods would be minimal, both because of the low level of environmental impact of this method and the limited area in which manual use is feasible. Plants could be directly killed or injured by treatment or trampling by applicator personnel. Subsequent revegetation of treated areas could cause plants to be crushed by tractors or ATVs during drill-seeding, or injured or killed during cultivation or raking. Prior to any proposed cultivation (discing) activities, cultural and biological surveys would be conducted and a site-specific NEPA document would be prepared.

Indirect Effects

All weed treatments would likely affect plant species composition of an area and might affect plant species diversity. Elimination or reduction of non-native species would benefit native plant communities by removing competition from weeds. This would provide more resources (e.g., water and nutrients) to native plants, allowing them to reestablish sites previously dominated by weeds. Because certain herbicides target broadleaf species, non-broadleaf species like grasses may begin to dominate the site, changing the species composition. Use of herbicides that target broadleaf species, particularly with aerial application, could reduce or eliminate native forbs in the treated areas. This could result in a long-term change in the plant community composition. The less a native plant community is disrupted by treatment, the more likely it would be to retain or regain characteristics that could resist weed invasion.

Biological control by domestic animals could lead to soil compaction from soil trampling, increased soil erosion from loss of plant cover, and loss of biological soil crusts which have an important role in hydrology and nutrient cycling. Domestic animals selectively feed on palatable species which would change species composition over time.

Manual methods would likely cause small amounts of soil disturbance which could increase soil erosion. Revegetation could create soil disturbance and lead to additional weed establishment and erosion if seeded (desirable) species did not successfully reoccupy the site. Seed drills could cause soil compaction and damage soil crusts.

Prevention or Mitigation of Adverse Impacts

Under all alternatives, the GSFO would follow SOPs presented in the ROD of the PEIS (Appendix E) to ensure that risks to human health and the environment from weed treatments are kept to a minimum. In addition, the GSFO would implement measures to mitigate potential adverse environmental effects as a result of weed treatments (Appendix F). Adherence to the SOPs and mitigation measures will ensure that all practicable means to avoid or minimize environmental harm have been adopted by the GSFO.

3.2.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under this alternative, the GSFO would treat up to 5,000 acres annually using both ground-based and aerial treatment methods. This alternative would allow all 18 currently approved herbicide active ingredients to be used in the GSFO. This includes a newly approved herbicide (imazapic) that is effective in controlling cheatgrass. The most extensive impacts to vegetation (both negative and positive) would result from this alternative because it includes the greatest treatment acreage among the alternatives.

Because of the larger treatment area, Alternative A would have the greatest risk of accidental exposure of non-target plants. However, impacts from herbicide exposure would not be substantially different than under the other alternatives, since the GSFO would design herbicide treatments to avoid substantial risks to non-target plants through the use of protective SOPs and mitigation measures (Appendices E and F).

Alternative B – No Action (Current Management)

Under this alternative, the GSFO would continue current weed management. Because of the continued inability to use aerial spraying, very large or remote infestations could not be effectively treated. This would limit the total area treated to 1,000 acres per year, compared to 5,000 acres per year under the Proposed Action. Additionally, Alternative B would not allow use of the newly approved herbicide imazapic, which is the only effective treatment currently available for cheatgrass.

Negative impacts to vegetation would be lower than under the Proposed Action because of the fewer acres treated. Conversely, long-term benefits to plant communities would be less under this alternative. Noxious and invasive weeds would continue to spread, increasing damage to native plant communities and inhibiting ecosystem functions.

Alternative C – No Herbicide Use

This alternative would avoid the risks of adverse impacts to non-target plants from herbicide use. Although non-target species could still be affected by manual and biological controls, the negative impacts to non-target plants would likely be less severe and much more limited.

Positive benefits to the ecosystem may be less than under the Proposed Action because herbicide use is the only effective treatment for many noxious weeds in the GSFO and treatment with manual or biological controls may be impracticable due to cost, time, and accessibility. Weeds would increase at a faster rate under this alternative, outcompeting desirable species for resources and degrading native plant communities to a much greater extent than under the other alternatives.

Alternative D – No Aerial Application of Herbicides

Alternative D would include the use of the same herbicides as allowed under the Proposed Action but would not include aerial application. This would limit the GSFO's ability to treat large or remote infestations for which ground application methods are less effective or infeasible. Consequently, the total treatment acreage would not exceed 1,000 acres per year, compared to 5,000 acres for Alternative A.

Because aerial application of herbicides would not occur, the short-term risk of chemical damage to non-target vegetation from offsite drift would be reduced. However, this benefit could be offset by the risk of physical damage by equipment used for ground-based application and, in some situations, by the less effective treatment using ground methods.

Although sharing with Alternative B (current management) the inability to use aerial spraying, Alternative D has an advantage by allowing the use of all 18 currently approved herbicides. These include the newly approved herbicides imazapic, which is effective for cheatgrass, and Overdrive® (dicamba + diflufenzopyr), which is effective on a variety of broadleaf weeds and annual grasses.

3.2.2.3 Cumulative Impacts

Ground disturbance from various activities will continue to increase in the GSFO, creating new weed infestations. If weeds are not effectively controlled, native plant communities will continue to be degraded, decreasing the areal extent of these communities. Alternative A would have the most beneficial effect on native plant communities by reducing the spread of weeds the most through the ability to use aerial spraying of imazapic or other herbicides to treat large or remote infestations of cheatgrass in areas that have burned or been degraded by grazing. Alternative C would have the most negative effect on native plant communities because weeds would spread at the most rapid rate among the alternatives. Alternatives B and D would be similar to each other and intermediate between Alternatives A and C.

3.3 Special Status Plant Species

3.3.1 Affected Environment

Special status species in the GSFO area are listed in Appendix B, along with information on their habitat requirements and probability of occurrence in the GSFO area.

According to the latest species list available online from the USFWS, Mountain-Prairie Region, the following Federally listed, proposed, or candidate plant species may occur within or be affected by actions occurring in the GSFO: Colorado hookless cactus (*Sclerocactus glaucus*), DeBeque phacelia (*Phacelia submutica*), Parachute penstemon (*Penstemon debilis*), Piceance twinpod (*Physaria obcordata*), and Ute ladies'-tresses orchid (*Spiranthes diluvialis*).

BLM sensitive plant species with potential habitat and/or occurrence records in the GSFO include adobe thistle (*Cirsium perplexans),* DeBeque milkvetch (*Astragalus debequaeus),* Harrington's penstemon (*Penstemon harringtonii*), Naturita milkvetch (*Astragalus naturitensis),* Piceance bladderpod (*Lesquerella parviflora*), and Roan Cliffs blazing star (*Mentzelia rhizomata*).

3.3.2 Environmental Consequences

The GSFO consulted with the USFWS during development of this programmatic EA, as required by Section 7 of the ESA, and prepared a BA to evaluate likely impacts to Federally listed or proposed threatened or endangered species (BLM 2009). The BA reached a determination of determination of "**May Affect, Not Likely to Adversely Affect**" for the Colorado hookless cactus, DeBeque phacelia, Parachute penstemon, Piceance twinpod, and Ute ladies'-tresses orchid. That determination was based on BLM's adherence to the SOPs, mitigation measures, and conservation measures (see Appendices E, F, and G) for avoiding or minimizing risks to these species. The USFWS has issued its concurrence with the BA, including the proposed conservation measures (see Appendix K of this document).

For this analysis, effects are considered to be similar for each special status plant species. In general, vegetation treatments have the potential to affect most plant species in much the same way: all are intended to cause mortality or injury to target plants, and may vary in intensity and extent. However, species with the lowest numbers or limited distribution are the most sensitive to impacts.

3.3.2.1 General Impacts of Weed Treatments on BLM Lands

Direct Effects

If herbicide treatments were to occur in special status plant habitat, plants could be crushed by trucks and/or ATVs during ground applications. Ecological Risk Assessments (ERAs) cited in the PEIS predicted the potential for special status plants to suffer negative effects as a result of exposure from BLM-approved herbicides. Modes of exposure include direct spray of plants, accidental spills, offsite drift, surface runoff, and wind transport of soils from treatment sites. Possible negative effects could include one or more of the following: mortality, loss of photosynthetic foliage, reduced vigor, abnormal growth, or reduced reproductive output.

Biological control by domestic animals could cause mortality and injury to special status plants through browse and trampling. Biological control agents such as insects and pathogens do not typically have an effect on non-target plant species or habitats, but some have been known to attack species in addition to the target plant. All biocontrol agents utilized by the GSFO would be tested prior to release to ensure they are host specific. According to the PEIS, "as a general rule, it is assumed that biocontrol agents that attack target species in the same genus as a special status plant would have a negative effect on that special status plant species, unless extensive research has shown otherwise" (BLM 2007a). Since the adobe thistle (BLM sensitive) is known to occur on the north side of I-70 between West Rifle and DeBeque, biocontrol for noxious thistles would not be released in this area to prevent possible negative effects to the adobe thistle.

In general, the effects of manual treatment methods would be minimal because of both the low level of environmental impact of this method and the limited areas for which manual use is feasible. Special status plants could be directly killed or injured if accidentally removed during a treatment or if trampled on by workers treating a site.

Revegetation could include broadcast seeding followed by raking or harrowing or drill seeding, or possibly cultivation (discing) prior to seeding. Plants could be crushed by tractors or ATVs during the drill-seeding, or injured or killed during cultivation or raking. Prior to any proposed cultivation, cultural and biological surveys would be conducted prior to ground disturbance and a site-specific NEPA document would be prepared. Safety buffers around special status plants would prevent direct impacts.

Indirect Effects

Weed treatments could alter species composition. Elimination or reduction of non-native species could create more suitable habitat for special status plant species. Provided herbicides were able to avoid negatively affecting populations of special status plant species on or near the treatment site, long-term benefits to these populations could potentially occur.

Biological control by domestic animals could lead to soil compaction from soil trampling, increased soil erosion from loss of plant cover, and loss of biological soil crusts which have an important role in hydrology and nutrient cycling. Bio-control agents such as insects and pathogens would be expected to have long-term positive effects on special status plant species by controlling undesirable vegetation in occupied or potential habitats. Competition for resources would be reduced and more suitable habitat would be available for special status plant species.

A long-term beneficial effect to special status plant species would be expected from manual treatments. Removal of undesirable, competing vegetation could increase the health or vigor of existing populations,

or increase suitable habitat of unoccupied sites. Soil disturbance and risks of erosion would be minimal with manual methods.

Revegetation could increase desirable vegetation around special status plant species, creating more competition and limiting resources available to special status plants. It could also create a beneficial effect to special status plants by restoring the site with native vegetation that was present before weeds dominated the area.

Prevention or Mitigation of Adverse Impacts

The GSFO would follow the SOPs and mitigation measures presented in Appendices E and F to ensure that adverse impacts to special status plants from weed treatments are avoided or minimized. In addition, the GSFO would implement conservation measures in Appendix G to protect Federally listed, proposed, or candidate threatened or endangered species. The conservation measures include buffer distances based on the information provided in previous ERAs. Adherence to the SOPs and the mitigation and conservation measures will ensure that all practicable means to avoid or minimize harm to special status species have been adopted by the GSFO.

- Herbicide treatments will not be conducted in areas where special status plant species may be subject to direct spray by herbicides during treatments.
- Suitable buffer zones will be established between treatment sites and populations (confirmed or suspected) of special status plant species to avoid negative effects from aerial drift, runoff, or wind erosion during and following treatments.
- Applicators will be required to review, understand, and conform to the "Environmental Hazards" section on herbicide labels (this section warns of known pesticide risks and provides practical ways to avoid harm to organisms or the environment).
- Applicators will be required to follow all instructions and SOPs to avoid spills and direct spraying into aquatic habitats that support special status plant species.
- Applicators will be required to follow all SOPs for avoiding herbicide treatments during weather conditions that could increase the likelihood of aerial drift or surface runoff into non-target areas.

3.3.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under this alternative, up to 5,000 acres of GSFO land could be treated annually. Based solely on acres treated, special status plant species would be more likely to be exposed to herbicides under this alternative than under the other alternatives. This potential risk is further increased by the use of aerial spraying, which has a greater risk of offsite drift than with ground methods. However, the application of SOPs (Appendix E) to ensure that spraying does not occur under conditions favorable to drift and of mitigation measures (Appendix F) to provide an adequate buffer between target and non-target areas is expected to minimize this risk. The conservation measures listed in Appendix G would provide additional protections when treating areas that contain or are located near special status plant species (Appendix G).

Alternative B – No Action (Current Management)

Under the No Action alternative, the GSFO would not use aerial spraying to treat large or remote infestations of cheatgrass and other weeds. For this reason, the total area treated would be no more than 1,000 acres per year, compared to 5,000 acres for the Proposed Action. Because fewer acres would be

treated and aerial spraying not used, this alternative would have less risk of exposure of special status plants to herbicides. However, this benefit is small because the risk of exposure is minimized for all alternatives that include herbicides by the protective measures outlined in Appendices E, F, and G.

Alternative C – No Herbicide Use

Under this alternative, the GSFO would not approve weed treatments using herbicides. Therefore, special status species would not be exposed to these chemicals unless drifting onto BLM lands from treatments by other parties on nearby non-BLM lands. Therefore, the risks from herbicide exposure would be near zero under this alternative. However, measures to protect special status species would be implemented under the other alternatives.

The GSFO would be able to control weeds less effectively under this alternative, allowing them to spread at a faster rate and possibly competing with or threatening special status plant populations. Although manual and biological controls could be used instead of herbicides, not all weeds are effectively treated by these other methods. Even spot treatments with herbicides, which can be effective for infestations in areas that are too sensitive to receive wide-scale treatments, would occur under Alternative C. Therefore, existing populations for special status plants would be at risk of future population decline or extirpation.

Alternative D – No Aerial Application of Herbicides

Under this alternative, no more than 1,000 acres would be treated per year due to GSFO's inability to approve aerial applications. Because fewer acres would be treated, and because aerial spraying would not be used, special status plant species would be less likely to be exposed to herbicides than under the Proposed Action. However, because aerial application under Alternative A would include a variety of measures to reduce offsite drift, difference between Alternatives A and D would be small.

Since Alternative D would include the use of the recently approved herbicide imazapic to control cheatgrass, it would have some advantages over Alternative B. However, the inability to treat the largest cheatgrass infestations—for which only aerial application would be effective—could allow cheatgrass to persist and spread, potentially impacting nearby populations of special status plants.

3.2.2.3 Cumulative Impacts

Ground disturbance from various activities will continue to increase in the GSFO, creating new weed infestations. An inability to control weeds effectively could result in population decline or extirpation of special status plant populations. Cheatgrass is currently degrading the habitat of the Colorado hookless cactus (Federally threatened) in the GSFO, where it has formed a dense cover in both historically and currently occupied areas. Colorado hookless cactus numbers have declined over the last 10 years, probably due in part to the increasing competition with weeds.

Alternative A would have the most beneficial effect for species status plants by reducing the spread of weeds the most. Alternative C would have the most negative effect on special status plants because weeds would spread at a more rapid rate than under other alternatives. With no effective control of cheatgrass under Alternatives B (no use of imazapic) or C (no herbicides), and less effective control under Alternative D (no aerial treatment of large cheatgrass stands), the Colorado hookless cactus would continue to be adversely affected by this noxious weed.

3.4 Non-Target Riparian, Wetland, and Aquatic Vegetation

3.4.1 Affected Environment

The GSFO manages approximately 300 linear miles of perennial and intermittent streams and roughly 300 acres of adjacent riparian vegetation. Much of the riparian habitat occurs in association with wetlands areas, including shallows, marshes, swamps, bogs, pond or lake shores, wet meadows, and seeps/springs. The seven major community types in GSFO riparian and wetland areas are as follows:

- Coniferous riparian forests and woodland – Dominated by blue spruce or one or more of the conifer species dominating adjacent upland habitats.
- Mixed coniferous/deciduous forests and woodlands – Depending on elevation and other ecological situation, may be dominated by boxelder, plains cottonwood, narrowleaf cottonwood, balsam poplar, or quaking aspen, often mixed with blue spruce or another other conifer species.
- Deciduous forests and woodlands – Dominated by the same conifers mentioned above, but without a substantial conifer component. Two woody noxious weed species—salt-cedar (tamarisk) and Russian-olive—are sometimes associated with this community along the Colorado River and tributary streams at lower elevations.
- Tall willow shrublands – Dominated by one or more of several tall willow species, often more than 2 meters high and commonly in association with one or more other riparian shrub species. May contain Russian-olives and salt-cedars along the Colorado River and tributary streams at lower elevations.
- Short willow shrublands – Dominated by one or more species of short willow species, often less than 1 meter high. Short willows do not offer the same structural diversity as tall willows but provide the same general hydrologic functions.
- Non-willow shrublands – Dominated by a variety of non-willow species. Depending on elevation or other ecological situation may include thinleaf alder, western river birch, hawthorn, redtwig dogwood, and silver buffaloberry, often in association with shorter riparian shrubs such as currants (*Ribes* spp.) and roses (*Rosa* spp.).
- Herbaceous vegetation – Typically dominated by several species of riparian forbs, grasses, and grass-like plants (sedges, rushes, etc.).

Riparian communities are particularly vulnerable to colonization and spread of noxious weeds and other invasive species. Riparian areas typically attract a variety of uses such as recreation, wildlife, and livestock grazing. All of these uses can cause disturbance to native vegetation and introduce the seeds of noxious weeds. Once noxious weeds are established in riparian areas, their seeds can be easily transported by water, resulting in spread to new areas. Prevalent riparian weeds in the GSFO area include Russian knapweed, Canada thistle, and houndstongue.

3.4.2 Environmental Consequences

3.4.2.1 General Impacts of Weed Treatments on BLM Lands

Direct Effects

Direct impacts to non-target riparian, wetland, and aquatic vegetation from weed treatments would be basically the same as described in Section 3.2.2 for non-target terrestrial vegetation. Herbicides could

come into contact with and impact non-target plants through drift, runoff, wind transport, or accidental spills and direct spraying. Potential direct impacts to riparian, wetland, and aquatic vegetation could include plant mortality, loss of photosynthetic foliage, reduced vigor, abnormal growth, or reduced reproductive output. Plants could be crushed by trucks and/or ATVs during ground in riparian habitats, resulting in injury or mortality to plants.

Biological control by domestic animals could cause mortality and injury to non-target riparian and wetland plants through browse and trampling and to aquatic plants if the aquatic sites are not normally accessed by domestic grazers.

Manual treatments would generally have minor direct impacts because of the very limited area in which this method would be feasible. Delicate plants could be directly killed or injured by treatment or trampling by applicator personnel. Subsequent revegetation of treated areas riparian areas could cause plants to be crushed by tractors or ATVs during drill-seeding, or injured or killed during cultivation or raking. Prior to any proposed cultivation (discing) activities, cultural and biological surveys would be conducted and a site-specific NEPA document would be prepared.

Offsetting these potential adverse impacts are the considerable benefits of controlling weeds in riparian, wetland, and aquatic sites (at present, no aquatic weeds are an issue in the GSFO area). Invasive plant species are one factor that degrades wetland and riparian function. Weed treatments would remove or suppress competition by the invasive species, improving the growth and reproduction of desirable species.

Indirect Effects

All vegetation removal activities, including weed treatments, can disturb the soil and reduce the amount of plant cover that holds the soil in place and shields it from the erosive forces of wind and runoff. This is turn can increase soil loss, erosion of streambanks, and transport of soil particles into riparian, wetland, and aquatic sites. For aquatic sites in particular, an increased influx of soil particles by erosion from nearby uplands can increase turbidity, which reduces the amount of light penetration needed by submergent aquatic plants, as well as increasing water temperature, encouraging the growth of undesirable algal blooms by increasing the nutrient loading, reducing the dissolved oxygen content, and causing siltation of the coarse substrates (gravels and cobbles) required by some aquatic insect larvae or used for egg-laying sites by some fish species.

Successful revegetation or natural restoration of treated areas would eventually lead to increased diversity, vigor, and reproductive success of desirable species in riparian and wetland habitats. These beneficial changes would reduce erosion, slow the rate of storm-related runoff, improve bank stability, improve hydrologic function, and provide better cover, structural diversity, and food quantity and quality for a variety of wildlife. These benefits to wetland and riparian vegetation through weed treatments would contribute significantly to the ongoing efforts by the GSFO to increase the number of miles of streams and acres of wetlands that are in proper functioning condition.

Prevention or Mitigation of Adverse Impacts

SOPs (Appendix E) and mitigation measures (Appendix F) to minimize impacts to riparian, wetland, and aquatic vegetation include use of appropriate herbicides and treatment methods for a specific situation, establishment of appropriate buffers around treatment areas, and other methods to minimize the potential for accidental direct spray of non-target areas or for offsite transport of spray into non-target areas via runoff or wind drift. As a result, long-term benefits to riparian, wetland, and aquatic vegetation from the control of invasive species would likely outweigh any short-term negative impacts to native plants associated with weed treatment methods. Effects specific to the four alternatives are summarized below.

3.4.2.2 Impacts by Alternative

Alternative A – Proposed Action

The Proposed Action would incorporate manual, biological, and chemical control methods through an integrated approach—including the use of all 18 herbicides currently approved by BLM and the use of aerial spraying of large or remote infestations. By treating up to 5,000 acres per year (versus 1,000 acres or less under the other alternatives), Alternative A is intended to gradually reduce existing infestations as well as more effectively control new infestations that may arise. However, the additional acreage treated aerially would generally not include riparian or wetland areas due to the risk of drift onto non-target tree and shrub canopies or into associated aquatic sites. Treatment methods under the Proposed Action would include the following:

Manual Control – Hand treatments would remove the overstory and would cause little soil disturbance or erosion. In most cases, unwanted vegetation near a wetland or riparian area could be removed without disturbing more desirable species. Manual treatments, which tend to be more selective and involve smaller treatment areas than other methods, would be less likely to affect wetland and riparian areas than the other methods.

Biological Control – The degree of effect to wetlands and riparian areas from treatments using domestic animals would be dependent on the timing, duration, and intensity of grazing. Direct effects could include stream channel/wetland morphology alteration, and loss of native wetland or riparian vegetation. Improper grazing management can have a considerable effect on vegetation vigor and biomass, and species diversity. The potential loss of vegetation as a function of improper grazing management can lead to further loss of aquatic habitat as channels widen and water depths become shallower.

With proper management, grazing can result in desirable plant response from riparian vegetation and result in improved conditions. Good grazing strategies that utilize the right timing and amount of grazing pressure can be useful in controlling invasive plants.

Biological treatments would also involve the release of organisms intended to weaken or kill vegetation. Vegetation would remain in place, resulting in little soil disturbance in the treatment area. If treated successfully, the plant community near or within the wetland or riparian area should improve. Insects have been used effectively for biological control. For example, *Diorhabda elongata deserticola*, a leaf beetle from central Asia, has been used as a biological control agent for salt-cedar. This insect can defoliate large areas of salt-cedar.

Chemical Control – The ability of GSFO to use four new chemicals (fluridone and diquat for aquatic applications, and imazapic and Overdrive® for terrestrial applications) would provide new capabilities for controlling problematic invasive species and would provide benefits to these wetland and riparian areas if invasive species were controlled or eliminated. Risks to wetland and riparian areas from use of these herbicides are similar to or lower than risks associated with currently approved herbicides.

The risks to wetland and riparian plants from accidental spill and drift scenarios would be lower with the proposed herbicides than with currently approved herbicides. In addition, fluridone is specifically indicated for aquatic use; none of the other currently approved herbicides are strictly aquatic herbicides.

Most herbicides approved for use in aquatic sites are non-selective and could cause adverse impacts to non-target wetland and riparian species diversity, competitive interactions, species dominance, and vegetation distribution. Herbicides may directly or indirectly affect the survival, health, or reproduction

of non-target wetland or riparian plants or may affect characteristics of these plant communities and their ecosystem functions.

Non-target wetland and riparian areas could be exposed to herbicides through a variety of routes, including accidental spills or direct spray, local spray drift from adjacent target areas, surface water runoff, and soil erosion. Unintentional applications can have severe negative impacts on wetland and riparian systems. In particular, accidental spills near wetland and riparian areas could be particularly damaging to wetland and riparian vegetation. Spray drift can also degrade water quality in wetland and riparian areas and could damage non-target vegetation. Risks to wetland and riparian non-target species would depend on a number of factors, including the amount, selectivity, and persistence of the herbicide used; the application method used; the timing of the application; and the plant species present. Risks to wetlands and riparian areas from surface runoff would be influenced by precipitation rates, soil types, and proximity to the application area.

Alternative B – No Action (Current Management)

Under the No Action alternative, the IWM Plan implemented by the GSFO would not include aerial spraying, thereby reducing the risk of drift into non-target areas. This would be a potential benefit compared to the Proposed Action. However, the protective measures applied to all alternatives involving use of herbicides (see Appendices E and F) would avoid or minimize that risk.

The No Action alternative would also prohibit the GSFO from approving treatments using the four newly approved herbicides. These include one herbicide (imazapic) that could be used to control cheatgrass and other herbicide (fluridone) that could be used in aquatic sites. No herbicide available to GSFO under current management is effective on cheatgrass or registered for use in aquatic sites.

Alternative C – No Herbicide Use

A benefit of not using herbicides under Alternative C would be the elimination of risks to desirable non-target riparian, wetland, and aquatic plants due to accidental spills, drift, and persistence in the environment. However, this benefit would likely be offset by an increase in weeds that are treated effectively through the use of herbicides. A number of weeds in riparian areas cannot be eradicated manually because they resprout from rhizomes or roots (e.g., Canada thistle, Russian-olive, and tamarisk). Invasive species that are not controlled will outcompete native vegetation and increase the incidence of fire and other conditions that can result in loss of ecosystem function in wetlands and riparian areas.

Alternative D – No Aerial Application of Herbicides

Alternative D is similar to Alternative A in that it would allow use of the four newly approved herbicides, including imazapic for cheatgrass and fluridone for aquatic weeds, but differs by not allowing aerial application. However, most riparian areas would be treated using ground methods under Alternative A to avoid direct spray onto tree and shrub canopies or associated aquatic sites. Although inadvertent drift onto riparian vegetation could occur under Alternative A due to drift from aerial applications in nearby upland areas, the protective SOPs and mitigation measures listed in Appendices E and F would minimize that risk.

GSFO's inability under this alternative to aerially treat infestations that are too large, remote, or rugged for ground methods would increase the potential for continued invasion of riparian corridors by weeds. This could require treatment of riparian areas that previously did not contain significant weeds or retreatment of riparian areas from which weeds had previously been eradicated.

3.4.2.3 Cumulative Impacts

Cumulative impacts to wetland and riparian areas on public lands have occurred from human-caused disturbance factors, including natural resource extraction, recreation, dams and diversions, road construction, agriculture, urbanization, and fire exclusion. Efforts to restore natural disturbance regimes, reduce the potential for large-scale wildland fire, and control noxious weeds and other invasive vegetation should help reduce erosion and sedimentation and restore native plant communities. In addition, the ability of the BLM and other resource-protection entities to use new herbicides, such as fluridone, to control aquatic weeds would benefit lakes and ponds and the aquatic organisms that use these habitats.

Alternative A would have the greatest long-term beneficial effects for riparian, wetland, and aquatic vegetation by reducing the spread of weeds the most (i.e., would treat the most acreage). Short-term adverse effects would also be greatest under Alternative A since it would treat the most acres and include aerial applications, with the greater risk of offsite drift. These effects could accumulate, but if treatments are successful, a countervailing effect of long-term improvement in wetland and riparian area function and productivity should more than offset short-term losses.

Because fewer acres would be treated under Alternative B, it would have a greater negative long-term effect than the Proposed Action because weeds would spread more rapidly. Lack of herbicide treatments under Alternative C would make control of some infestations difficult or ineffective due to the limitations of manual or biological controls. Effects under Alternative D would be similar to those of the Proposed Action, except that the inability to use aerial applications would make it more difficult or impossible to adequately treat some large or remote infestations. Therefore, the risk of loss of riparian habitat function in Alternatives B, C, and D would be greater than under Alternative A.

3.5 Terrestrial Wildlife (Including Migratory Birds and Special Status Species)

3.5.1 Affected Environment

Wildlife populations are found in areas and habitats where their basic needs—food, shelter, water, reproduction, and movement—are met. Many animals have special behaviors and physical traits that allow them to successfully compete with other animals in only one or a few habitats; many threatened and endangered species fall into this category. Less specialized species and can use a wider range of habitats.

An important activity of the BLM is to manage vegetation to improve wildlife habitat. Plants, which are an important component of habitat, provide food and cover. Food is a source of nutrients and energy, while cover reduces the loss of energy by providing shelter from extremes in wind and temperature, and also affords protection from predators.

3.5.1.1 Major Habitat Types and Associated Wildlife

The following subsections describe the important characteristics of terrestrial wildlife and habitats in the GSFO area, focusing primarily on the vegetation component of habitat and how wildlife species use this vegetation. The descriptions emphasize recreationally important big game species, ecologically important avian predators (raptors), upland gamebirds, migratory birds on the USFWS list of Birds of Conservation Concern (BCC) for the region (USFWS 2008), Neotropical migrant birds, and reptiles and amphibians.

Coniferous Forests – The coniferous forest community type provides cover, food, and nesting sites for two BCC species, the flammulated owl (*Otus flammeolus*) and Cassin's finch (*Carpodacus cassinii*). Other species using middle-elevation Douglas-fir forests and higher elevation Engelmann spruce/subalpine fir forests include the northern goshawk (*Accipiter gentilis*), Cooper's and sharp-shinned

hawks (*Accipiter cooperii, A. striatus*), red-tailed hawk (*Buteo jamaicensis*), northern pygmy-owl (*Glaucidium gnoma*), northern saw-whet owl (*Aegolius acadius*), blue grouse (*Dendragapus obscurus*), and a variety of both resident and migrant woodpeckers, flycatchers, and songbirds. Neotropical migrants include Hammond's flycatcher (*Empidonax hammondii*), western tanager (*Piranga ludoviciana*), yellow-rumped warbler (*Dendroica coronata*), chipping sparrow (*Spizella passerina*), and dark-eyed junco (*Junco hyemalis*).

The presence of quaking aspen in some forest stands adds to the richness of the avian community, including Neotropical migrants such as the western wood-pewee (*Contopus sordidulus*), house wren (*Troglodytes aedon*), and warbling vireo (*Vireo gilvus*). The tall and sometimes dense conifers also provide thermal and hiding cover and some food for mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*) during summer. The assemblage of large and small mammals depends on the elevation, composition, and physical structure of the forest and adjacent habitats.

Pinyon-Juniper Woodlands – The pinyon-juniper community type provides cover, food, and nesting habitat for a variety of migratory birds, as well as important hiding and thermal cover and food for deer and elk during winter. Bird species on the BCC list that are present in the GSFO area and mostly associated with pinyon-juniper habitats include the pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), black-throated gray warbler (*Dendroica nigrescens*), and Virginia's warbler (*Vermivora virginiae*). An additional BCC species, the gray vireo (*Vireo vicinior*), is potentially present. Other perching birds include Neotropical migrants such as the plumbeous vireo (*Vireo plumbeus*), mountain bluebird (*Sialia currucoides*), lark sparrow (*Chondestes grammacus*), and black-throated sparrow (*Amphispiza bilineata*)—the last three in more open stands. Raptors nesting in pinyon-juniper habitat include one BBC species, the golden eagle (*Aquila chrysaetos*), as well as the red-tailed hawk, Swainson's hawk (*Buteo swainsoni*), Cooper's and sharp-shinned hawks, and northern pygmy-owl.

Mixed Mountain Shrublands – The vegetation of mixed mountain shrublands varies substantially depending on elevation, slope, aspect, and soil. More mesic (moist) sites such as on north-facing slopes and along minor drainageways are typically dominated by Gambel's oak and serviceberry, while more xeric (dry) sites such as south-facing slopes are typically dominated by mountain-mahogany, bitterbrush, snowberry, and sagebrush. The dense cover, tall height, and abundant acorns and berries of mesic oak-serviceberry stands provide cover, forage, and nesting habitat for one BCC species, Virginia's warbler, as well as Merriam's turkey (*Meleagris gallopavo merriami*). Other species include Neotropical migrants such as the dusky flycatcher (*Empidonax oberholseri*), lazuli bunting (*Passerina amoena*), lesser goldfinch (*Carduelis psaltria*), black-headed grosbeak (*Pheucticus melanocephalus*), and spotted towhee (*Pipilo maculatus*). Dense stands of oak-serviceberry are also important transitional habitat by deer and elk. At lower elevations and on south-facing slopes, xeric shrublands provide critical winter habitat for deer and elk due to the combination of highly palatable browse species (mountain-mahogany and bitterbrush) and the location on relative warm, dry slopes.

Sagebrush Shrublands – The sagebrush shrubland community type, like the mixed mountain shrubland type, varies considerably depending on elevation, slope, aspect, and soil. Extensive stands of Wyoming big sagebrush provide cover, food, and nesting habitat for two species on the BCC list for the GSFO area: the greater sage-grouse (*Centrocercus urophasianus*) and Brewer's sparrow (*Spizella breweri*). Another sagebrush obligate, the sage sparrow (*Amphispiza belli*), is potentially present in this sagebrush subtype. Four other Neotropical migrants, the Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), western meadowlark (*Sturnella neglecta*) and vesper sparrow (*Pooecetes gramineus*), are relatively common in this type and also occur in sparse pinyon-juniper or in grassland types. Three BCC raptor species—the ferruginous hawk (*Buteo regalis*), golden eagle, and prairie falcon (*Falco*

mexicanus)—may hunt in expansive sagebrush stands but nest in nearby trees or tall shrubs. Other raptors that use sagebrush habitats for hunting are the red-tailed hawk and Swainson's hawk.

During winter, deer and elk rely on sagebrush and associated species (commonly including bitterbrush, squawapple, or snowberry) for winter browse, particularly during severe winters when mixed mountain shrublands are not accessible due to deeper and more persistent snow cover. Stands of mountain big sagebrush at higher elevations may support similar types of uses as Wyoming big sagebrush at middle elevations but are generally less extensive. Stands of basin big sagebrush along valley floors are of lower value to most wildlife—due to lower forage quality of this subspecies and commonly associated herbaceous species—and hence receive the same types of use as salt-desert shrublands (see below). The most important use of basin big sagebrush is severe winter range for deer and elk.

Salt-Desert Shrublands – This habitat type provides perching, feeding, and nesting sites for a much less abundant and diverse assemblage of wildlife as the habitats described above due to sparser and lower height of the cover and dominance by woody and herbaceous species that generally are of lower forage quality. Stands dominated by shadscale or fourwing saltbush interspersed with sagebrush receive some winter use by deer and elk, especially during severe winters when higher quality sagebrush shrubland, mixed mountain shrubland, and pinyon-juniper woodland are inaccessible due to deep and persistent snow cover. Other wildlife commonly associated with salt-desert shrublands are similar to those described above for sagebrush shrublands, including a variety of raptors that use the habitat for hunting but nest in nearby trees or on nearby rocky ledges or cliffs.

Grasslands – True grasslands are not abundant in the GSFO area. Where they do occur, they support many of the same uses as the sagebrush and salt-desert shrublands, except for sagebrush obligates such as Brewer's sparrow that require shrubs for nesting. More commonly, areas that appear as grasslands are agricultural lands dominated by one or a few species of non-native pasture grasses, sometimes mixed with alfalfa. These areas, as well as native grasslands, may support seasonal use by deer and elk, particularly during early green-up in spring when other types are still dormant. Raptors also use these areas for hunting, as do coyotes, red foxes (*Vulpes vulpes*) and badgers (*Taxidea taxus*).

Riparian Woodlands and Shrublands – Riparian woodlands (e.g., linear stands of cottonwoods along larger streams and aspen along smaller streams) and shrublands (e.g., tall willows, birch/alder, or silver buffaloberry) typically provide cover, feeding, and nesting habitats for a much greater number of species and individuals than adjacent habitats due to the vertical and horizontal diversity of the community, the proximity to water, and typically the proximity to other habitat types. All riparian woodland and shrubland habitats provide food and cover for deer and elk; the season of use depends largely on the elevation at which a specific community occurs.

Bird species found in cottonwood forests include two BCC species: the bald eagle (*Haliaeetus leucocephalus*), which was recently removed from the Federal list of threatened or endangered species, and Lewis's woodpecker (*Melanerpes lewis*). Neotropical migrants include the cordilleran flycatcher (*Empidonax occidentalis*), Bullock's oriole (*Icterus bullockii*), yellow warbler (*Dendroica petechia*), and American goldfinch (*Carduelis tristis*) in cottonwood woodlands and the willow flycatcher (*Empidonax traillii*), song sparrow (*Melospiza melodia*), and fox sparrow (*Passerella iliaca*) in willow shrublands. Raptors commonly associated with cottonwood woodlands include the red-tailed hawk, Cooper's and sharp-shinned hawks, great horned owl, and long-eared owl (*Asio otus*). A large wading bird, the great blue heron (*Ardea herodias*) nests singly or colonially in mature cottonwoods and may travel several miles to hunt for fish in streams, ponds, and lake margins.

3.5.1.2 Special Status Species

According to the latest information available online from the USFWS, the following Federally listed, proposed, or candidate terrestrial wildlife species may occur or their potential habitat exists in the GSFO area: Canada lynx (*Lynx canadensis*), Mexican spotted owl (*Strix occidentalis*), and western yellow-billed cuckoo *(Coccyzus americanus occidentalis*). As noted above, the bald eagle was recently removed from the Federal list but is being monitored for 5 years before making the delisting permanent.

BLM sensitive terrestrial wildlife species with potential habitat and/or occurrence records in the GSFO area are the Great Basin spadefoot (*Spea intermontana*), northern leopard frog (*Rana pipiens*), milk snake (*Lampropeltis triangulum taylori*), and midget faded rattlesnake (*Crotalus viridis concolor*), in addition to the bald eagle. Another BLM sensitive species, the boreal toad (*Bufo boreas*), is potentially present at the highest elevations of the GSFO area.

See Appendix B for the listing status, habitat requirements, and probability of occurrence on the GSFO for the BLM special status terrestrial wildlife species.

3.5.2 Environmental Consequences

3.5.2.1 General Impacts of Weed Treatments on BLM Lands

Direct Effects

Wildlife may be harmed directly through contamination of food, water sources, habitat alteration, or direct contact. The SOPs, mitigation measures, and conservation measures (Appendices E, F, and G) would be implemented under any alternative. The following is summary of direct impacts of herbicide use to control weeds on BLM lands.

In general, field studies suggest that appropriate herbicide use is not likely to have significant direct toxicological effects on wildlife (e.g., Cole et al. 1997, Sullivan et al. 1998). However, some potential exists to individuals, populations, or species with both proper and improper use of chemical controls (e.g., see USDA Forest Service [USFS] 2005). 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.

The ERA portion of the PEIS (BLM 2007a) evaluated toxicological risks to biological receptors of ten herbicides: bromacil, chlorsulfuron, diflufenzopyr, diquat, diuron, fluridone, imazapic, Overdrive® (dicamba + diflufenzopyr), sulfometuron methyl, and tebuthiuron. Based on the ERA, risks to terrestrial vertebrates from weed treatments using these ten herbicides would be as follows:

- Chlorsulfuron, Diflufenzopyr, Fluridone, Imazapic, and Sulfometuron Methyl – No risk to any wildlife group from direct spray at either the typical or maximum application rate.
- Bromacil and Overdrive® – Low risk to insects and large herbivores from direct spray at the maximum application rate.
- Diquat and Diuron – Low risk to insects, birds, and mammals from direct spray at the maximum application rate and less so at the typical application rate.
- Tebuthiuron – Low risk to large mammalian herbivores and large avian herbivores and high risk to small mammalian herbivores from direct spray at the maximum application rate.

The remaining eight herbicides approved for use by BLM (2,4-D, clopyralid, glyphosate, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, and triclopyr) were not assessed in the ERA but were assessed in PEIS in relation to human health (see Section 3.14, below). Assuming that exposure risks to human receptors also apply to other terrestrial vertebrates, the following potential risks to TEPC species would be expected from use of the eight additional herbicides:

- Imazapic, Imazapyr, and Metsulfuron Methyl – No risk for any exposure scenario analyzed.
- Glyphosate and Picloram – No risk for most exposures; low risk from ingesting water sprayed directly at the maximum application rate or subjected to a spill.
- Triclopyr – Moderate risk from direct spray onto skin at the maximum application rate; low or no risk from other scenarios.
- 2,4-D and Hexazinone – Moderate from ingesting directly sprayed fruit or ingesting fish from a pond contaminated by aerial drift; no or low risk for most exposures.

These results indicate generally no or low risk of toxic effects from herbicides. However, some herbicide/exposure combinations represent moderate to high risks that would be given special consideration when planning herbicide treatments to avoid harm to wildlife (see Appendices E, F, and G).

Indirect Effects

Adverse indirect effects include reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; decrease in wildlife population densities within the first year following application as a result of limited reproduction; habitat and range disruption if treated areas are avoided due to habitat changes; and increase in predation of due to loss of cover (EPA 1998b).

Because of the relatively low risk of toxicological effects to most wildlife even with direct spraying, it can be said that the main risk to wildlife from herbicide use is habitat modification. In forests, for example, herbicide use may result in minor and temporary effects on plant communities and wildlife habitats following single applications to young stands or stands following harvest, including some beneficial effects, but it usually results in a significant drop in forage the season following treatment. However, forage species and wildlife use of treated areas are likely to recover two to several years after treatment (Escholz et al. 1996, McNabb 1997, Miller and Miller 2004).

The extent of direct and indirect impacts to wildlife would vary by the effectiveness of herbicide treatments in controlling target plants and promoting the growth of native vegetation, as well as by the extent and method of treatment (e.g., aerial vs. ground) and chemical used (e.g., toxic vs. non-toxic; selective vs. non-selective), the physical features of the terrain (e.g., soil type, slope), and weather conditions (e.g., wind speed) at the time of application.

The impacts of herbicides on wildlife would depend on the sensitivity of each species to the particular herbicides used, the pathway by which the individual animal was exposed to the herbicide, and indirectly on the degree to which a species or individual was positively or negatively affected by changes in habitat. Species that reside in an area year-round and have a small home range (e.g., insects, small mammals, territorial birds), would have a greater chance of being directly adversely impacted if their home range was partially or completely sprayed because they would have greater exposure to herbicides—either via direct contact upon application or indirect contact as a result of touching or ingesting treated vegetation. In addition, species feeding on animals that have been exposed to high levels of herbicides would be more likely to be impacted, particularly if the herbicide bioaccumulates in their tissues.

Wildlife inhabiting subsurface areas (e.g., insects, burrowing mammals) may also be at higher risk if soils are non-porous and herbicides have high soil-residence times. The degree of interception by vegetation, which depends on site and application characteristics, would also affect direct spray impacts.

The impacts of herbicide use on wildlife would primarily be site- and application-specific, and as such, site assessments would have to be performed at the field level, using available impact information, to determine an herbicide-use strategy that would minimize impacts to wildlife, particularly in habitat that supports special status species.

Prevention or Mitigation of Adverse Impacts

Under all alternatives, the GSFO would follow SOPs presented in the ROD of the PEIS (Appendix E) to ensure that risks to human health and the environment from weed treatments are minimized. In addition, the GSFO would implement measures to mitigate potential adverse environmental effects as a result of weed treatments (Appendix F). If Federally listed, proposed, or candidate threatened or endangered species would potentially be affected by the weed treatments, GSFO would implement the conservation measures listed in Appendix G of this EA and incorporated into the accompanying BA (BLM 2009).

3.5.2.2 Impacts by Alternative

Alternative A – Proposed Action

Implementing the proposed IWM Plan to control noxious and invasive weeds would give GSFO resource managers the best ability to restore native plant communities and their function for the benefit of all wildlife. Overall beneficial effects would be greater under Alternative A than any of the other alternatives because the combination of herbicides and treatment methods available has the best potential to achieve the desired level of positive effect on the habitat. Advantages of the Proposed Action are the ability to use any of the 18 currently approved herbicides (including imazapic, which is the most effective herbicide for cheatgrass control) and to use aerial spraying for large or remote infestation that cannot be efficiently treated with ground methods.

While the more extensive annual treatments possible under this alternative (up to 5,000 acres versus 1,000 acres for the other alternatives) would have somewhat greater risk to wildlife because of more potential for direct and indirect exposure to herbicides, these risks remain low overall. The negative impact of loss of vegetation cover following treatment in areas of dense weeds would be temporary and more than offset by the long-term benefit of enhanced plant species diversity and forage quality.

Weed treatment methods used under Alternative A and associated impacts would include the following:

Manual Control – Manual control techniques could result in short-term displacement of wildlife in the vicinity of the treatments. Manual control could require the presence of many people and/or multiple treatments, possibly within a few months, that could cause repeated displacement of wildlife in the treatment area. This could cause negligible, short-term, site specific, adverse impacts in the form of energy expenditure. The impacts of manual control techniques would be slight and of little significance to wildlife populations.

Biological Control – Introducing biological controls to kill vegetation could have unintentional effects on the wildlife community by establishing a new food source. Depending on what species uses the new food source, the effect could be positive or negative. If generalists respond positively to the new food source it may increase competition to other species causing an overall decline in specialist populations. Some weed species, such as tamarisk, are used as a food source or nesting and foraging habitat. Reducing these

weed species could pose a potential risk to wildlife. However, as invasive species are replaced by native species and the plant communities are reestablished, it is probable that the specialized wildlife would prefer the more native plant communities. Biological treatment impacts to wildlife would be indirectly beneficial, long-term and minor or moderate.

Chemical Control – Alternative A, and any of the alternatives incorporating use of herbicides, would include potential risks to wildlife from both direct and indirect effects of application of chemicals to habitat. These potential impacts are summarized below. Also under all alternatives, the SOPs listed in Appendix E, the mitigation measures in Appendix F, and the conservation measures in Appendix G would be applied as appropriate to minimize potential adverse impacts.

The GSFO consulted with the USFWS during development of this programmatic EA, as required by Section 7 of the ESA, and prepared a BA to evaluate likely impacts to Federally listed or proposed threatened or endangered species (BLM 2009). The USFWS concurred with the determination in the BA prepared by the GSFO (BLM 2009) of "**No Effect**" for the Mexican spotted owl and "**May Affect, Not Likely to Adversely Affect**" for the Canada lynx as a consequence of implementing the Proposed Action. The determinations were based on BLM's adherence to the SOPs, mitigation measures, and conservation measures for avoiding or minimizing risks to these species (see Appendices E, F, and G). The USFWS has issued its concurrence with the BA, including proposed conservation measures (see Appendix K).

Impacts to special status terrestrial wildlife species under any of the alternatives would be similar to those for non-special status species.

Alternative B – No Action (Current Management)

Under Alternative B, the IWM Plan would continue as at present, which does not include the use of imazapic or aerial spraying. Wildlife impacts (positive and negative) would be similar to those that have occurred in previous years. Negative impacts to wildlife could be lower than under the Proposed Action because of the much smaller area treated. These 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 (i.e., improvements in habitat and ecosystem function) would be much less under this alternative than under the other alternatives. 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 associated ecosystem functions.

Alternative C – No Herbicide Use

Because of the lack of herbicide use under Alternative C, wildlife would not be exposed to the toxic effects of some of the active ingredients. 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, since certain invasive species can be effectively treated only with herbicides due to the limitations of manual and biological controls. For example, rugged terrain may prevent treatment by methods requiring terrestrial vehicle and/or foot access, while aerial treatment with herbicides in these areas may be possible. In addition, it often is difficult to eradicate species that resprout from roots or rhizomes left behind by manual treatments. 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.

In the absence of herbicide treatments, invasive plants 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 infeasible or ineffective.

Alternative D – No Aerial Application of Herbicides

Alternative D would allow the use of the same herbicides as under the Proposed Action, including imazapic for treating cheatgrass. However, this alternative would not include the use of aerial application, dramatically reducing ability to treat very large or remote infestations.

Because treatments would cover smaller areas than possible with aerial spraying, fewer individuals and species of wildlife would be exposed to herbicides than under Alternative A. This alternative would also result in fewer impacts to wildlife due to offsite drift. Ground –based methods would also be better able to avoid patches of important wildlife habitat or use areas within the larger treatment area.

Without the option of aerial spraying, the GSFO would be unable to treat large areas of vegetation, which could negatively impact wildlife habitat in these areas over the long term. Under this alternative, long-term negative impacts on wildlife habitat and ecosystems could be greater than any potential short-term negative effects to wildlife that would result from aerial applications under other alternatives.

3.6 Fish and Other Aquatic Organisms (Including Special Status Species)

3.6.1 Affected Environment

3.6.1.1 Special Status Species

The GSFO area includes a number of special status fish species, including Federally listed threatened and endangered species and BLM sensitive species. These are included in Appendix B and discussed below.

Colorado River Fishes – Four big-river fishes that are Federally listed as endangered—the Colorado pikeminnow (*Ptychocheilus lucius*), bonytail (*Gila elegans*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*)—are found in the mainstem Colorado River in Utah and extreme western Colorado. Designated critical habitat for the Colorado pikeminnow and razorback sucker extends within the Colorado River and 100-year floodplain as far upstream as the State Highway 13 bridge at Rifle. This encompasses approximately 35 river miles within the GSFO area, of which only 1.5 miles are in BLM lands. Both of these species require a complexity of river and backwater habitats to support different life stages and seasonal habitat uses. Although neither is known to occur in the GSFO area, they may be present, and recent modifications to the Colorado River in DeBeque Canyon to remove movement barriers have increased the potential for dispersal into the area.

The bonytail and humpback chub have also not been documented within the GSFO area, and designated critical habitat occurs no closer than 50 river miles downstream. These species prefer swift, deep, canyon-bound river reaches.

Greenback Cutthroat Trout – The greenback cutthroat trout (*Oncorhynchus clarki stomias*), Federally listed as threatened, is a small salmonid fish native to the headwaters of the South Platte and Arkansas River drainages and a small segment of the North Platte drainage in Wyoming. It is one of three subspecies of cutthroat trout that currently reside in Colorado. Based on recent genetic work, greenbacks have been documented in certain waters across the west slope of Colorado outside their native (east slope) range.

Greenbacks, like all cutthroat subspecies, inhabit coldwater streams and lakes that provide adequate spring spawning habitat. Spawning generally occurs when water temperatures reach 5ºC to 8ºC. Greenbacks feed on a wide variety of organisms, but their primary food source is aquatic and terrestrial

insects. One population of greenback cutthroat trout has been found within the GSFO area, in Cache Creek on USFS and private lands. The GSFO manages subsurface minerals in the area.

Other Native Suckers and Chubs – Three BLM sensitive species—the bluehead sucker (*Catastomus discobolus*), flannelmouth sucker (*C. latipinnis*), and roundtail chub (*Gila robusta*)—occur within the GSFO area, primarily in the mainstem Colorado River. However, these species also use larger tributary streams for spawning and may reside there year-round. Another native species, the mountain sucker (*C. platyrhynchus*) is known in one stream within the GSFO, Piceance Creek. This species prefers small streams and is found throughout the White and Yampa River drainages of the Piceance Basin.

Colorado River Cutthroat Trout – The Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) is a native trout of the Colorado River Basin. It is one of three subspecies of cutthroats (also including the greenback cutthroat and the Rio Grande cutthroat [*O. c. virginalis*]) that currently occur in Colorado and, like all cutthroat subspecies, inhabits coldwater streams and lakes with adequate spawning habitat present in the spring of the year. Spawning generally occurs when water temperatures reach 5ºC to 8ºC. Colorado River cutthroat trout feed on a wide variety of organisms, but their primary source of food is aquatic and terrestrial insects. Conservation populations of this species (90% genetically pure or greater) are found in at least 15 streams within the GSFO planning area; genetic work is pending on additional streams.

Great Basin Spadefoot, Boreal Toad, and Northern Leopard Frog – Three amphibians in the region—the Great Basin spadefoot (*Spea intermontana*), boreal toad (*Bufo boreas*), and northern leopard frog (*Rana pipiens*)—are BLM sensitive species. Of these, the boreal toad is potentially present at the highest elevations of the GSFO area, while the other two species are known to occur at lower elevations. Larvae (tadpoles) of these species, like those of the non-special status amphibians, breathe through gills and are vulnerable to the same types of environmental physical and chemical stressors as are fish, including chemical contaminants.

3.6.1.2 Other Key Species

Although a number of native and non-native fish species and other aquatic organisms occur in the GSFO area that do not qualify as special status species, some of these are also of special concern with regard to weed treatments under an IWM Plan, and particularly treatments using chemical herbicides. These other key species in the GSFO area are listed in Table 7.

Higher elevation waters (generally above 5,200 feet) of the GSFO area support coldwater sportfishes, consisting primarily of three introduced species—brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*)—and non-native subspecies of cutthroat trout (*Oncorhynchus clarki* ssp.). Native cutthroat trouts are addressed under special status species, below. Other higher elevation species include three additional introduced species—lake trout (*Salvelinus namaycush*), kokanee salmon (*Oncorhynchus nerka*), and mountain whitefish (*Prosopium williamsoni*)—as well as native nongame fishes such as mottled sculpin (*Cottus bairdi*), speckled dace (*Rhinichthys osculus*), white sucker (*Catostomus commersonii*), and long-nose sucker (*Catostomus catostomus*).

Waters generally below 6,500 feet support primarily warmwater fishes, including carp (*Cyprinus carpio*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*), bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), white sucker (*Catostomus commersonii*), long-nose sucker (*Catostomus catostomus*), and others.

In addition to fishes, larval forms of amphibians present in the GSFO area—including the tiger salamander (*Ambystoma tigrinum*), Woodhouse's toad (*Bufo woodhousii*), and western chorus frog

(*Pseudacris triseriata*)—are aquatic and breathe through gills. In some locales, tiger salamanders achieve adult reproductive status while retaining their gills; these neotenic forms remaining fully aquatic throughout their lives. Being aquatic, the larval forms of are vulnerable to the same types of physical and environmental stressors as are fish, including chemical contaminants.

Table 7. Key Non-Special Status Aquatic Vertebrates in the GSFO Area

Grouping		Representative Species	Basis for Designation as Key
Non-Native Sportfishes	Coldwater Species	Lake trout Kokanee salmon Brown trout Rainbow trout Brook trout Cutthroat trout (introduced ssp.) Mountain whitefish Yellow perch	Economic/Recreational Importance
	Warmwater Species	Largemouth bass Smallmouth bass	
Nongame Fishes		Carp White sucker Long-nose sucker	Nuisance
		Mottled sculpin Speckled dace	Native
Amphibians (Larval Forms)		Tiger salamander Woodhouse's toad Western chorus frog	Native; limited habitat

Source: BLM 2008

3.1.6.3 Current Conditions

Aquatic habitats in the GSFO planning area consist of both lentic (pond and lake) and lotic (stream and river) systems. The majority, but not all of the perennial aquatic habitats support fish, and nearly all of the perennial waters support at least some aquatic invertebrates. BLM activities directly and indirectly influence approximately 1,050 miles of fish-bearing streams. Approximately 300 miles of these streams are directly managed by BLM, with the remaining 750 miles managed by private landowners or other Federal and State agencies; these reaches are influenced by BLM management activities upstream or upslope. In addition, approximately 1,971 acres of lakes within the GSFO planning area provide potential habitat for various fish species.

Amphibians may use streams for reproduction but are associated more closely with marshes, seasonal ponds, or permanent ponds. Where they are present in streams, egg masses or larvae of the amphibians present or potentially present in the GSFO area are generally found in waters that do not have strong flows or support predatory fishes—e.g., beaver ponds.

3.6.2 Environmental Consequences

3.6.2.1 General Impacts of Weed Treatments on BLM Lands

Because this programmatic EA tiers to BLM's herbicide treatment PEIS (BLM 2007a), the SOPs, mitigation measures, and conservation measures included in that document would also be applied to protect aquatic organisms in connection with weed treatments within the GSFO area (see Appendices E,

F, and G). Because of these measures, impacts to fish and other aquatic organisms would be substantially reduced if not entirely eliminated.

In general, manual and biological methods for treating noxious weeds and other invasive non-native species as proposed in this EA would have no or minimal adverse impacts on fish or other aquatic vertebrate or invertebrate species, while herbicide treatments would pose some risk from chemical exposures. Conversely, the benefits of weed treatments on aquatic systems—by reducing or removing invasive plants in adjacent habitat and facilitating recovery of a more diverse community—would be greater with the use of herbicides because of the ability to treat larger areas and more aggressive species.

The following summaries of direct and indirect impacts to fish and other aquatic organisms are taken from the PEIS (BLM 2007a). Following the summaries are discussions related to species and habitats that occur in the GSFO area and would be potentially affected by weed treatments.

Direct Effects: General

Direct effects were determined primarily from literature review and the previous ERAs cited in the PEIS to assess the impacts to fish and other aquatic resources from the use of chemical herbicides. Fish and other aquatic organisms are exposed to chemical herbicides in three primary ways:

- Uptake through the skin during swimming in contaminated water
- Uptake through the gills during respiration in contaminated water
- Uptake through the digestive system during ingestion of prey from contaminated water

The major factor influencing the potential for exposure to fish is aerial drift from treated areas into untreated areas and non-target resources (e.g., waterbodies). Other means by which herbicides could reach aquatic habitats is through runoff from treated areas, inadvertent direct spraying, and accidental spills. As discussed previously, the SOPs, mitigation measures, and conservation measures in Appendices E, F, and G of this document would substantially reduce the potential for these exposures.

Species-specific toxicological data do not exist for most ecological receptors, including fish. Thus, the ERAs cited in the PEIS (BLM 2007a) were used for evaluating potential adverse impacts from exposure to herbicides. Surrogate species used were the bluegill or unspecified sunfish (*Lepomis* spp.) to represent warmwater species and the rainbow trout to represent coldwater species.

Based on the ERA portion of the PEIS, the majority of the chemicals evaluated have little or no potential to negatively impact fish or aquatic invertebrates through acute exposures, and only one (diuron) has the potential to bioaccumulate in fish tissue. Acute toxicological effects to fish and aquatic invertebrates of the herbicides evaluated in the ERA from direct or indirect exposure scenarios normally associated with weed treatments may be summarized as follows:

- Chlorsulfuron, Imazapic, Imazapyr, Metsulfuron Methyl, and Sulfometuron Methyl – Potentially high risk to fish due to the toxicity of ALS (acetolactate synthase) inhibitors.
- Bromacil – Low risk from direct spray and spills mixed for the maximum application rate. No risk from offsite drift or runoff.
- Dicamba, Diflufenzopyr, and Overdrive® (Dicamba + Diflufenzopyr) – No risk to fish and aquatic invertebrates from direct spray, spills, offsite drift, or runoff, at either the typical or maximum application rate.

- Diuron –Moderate to high risk to fish and aquatic invertebrates from direct spray or spills. Low risk to fish from runoff into streams, mostly at the maximum application rate. Low risk from aerial drift with proper buffers.
- Diquat and Glyphosate –For diquat, high risk to fish and aquatic invertebrates from spills and to aquatic invertebrates from direct spray; low risk to fish from direct spray. No risk from offsite drift or runoff at either application rate. Risks from use of glyphosate probably similar, except for formulations specifically licensed for use in aquatic sites.
- Fluridone – Moderate to high risk from direct spills; no or low risk from direct spray at the maximum application rate. No risk from offsite drift or runoff.
- Tebuthiuron – No acute risk from direct spray, offsite drift, or runoff. Potential acute risk to fish from spills. Low to moderate chronic risk to fish and invertebrates from direct spray and spills and to invertebrates from runoff.

Since most of the fish species within the GSFO are relatively short-lived (lifespans generally less than 7 years), the potential for chronic toxicity to the fish or to piscivorous predators that feed on them (e.g., bald eagle, double-crested cormorant, great blue heron) is generally minimal. The endangered Colorado River fishes, being long-lived, are at greater risk for chronic effects (see below).

Direct effects on aquatic larvae of non-special status amphibians (tiger salamander, Woodhouse's toad, leopard frog, western chorus frog) are expected to be comparable to those on the fishes described above.

Direct Effects: Special Status Species

Direct impacts to the greenback cutthroat trout (Federally listed threatened species) and the Colorado River cutthroat trout and mountain sucker (BLM sensitive species) would be the same as discussed above for non-special status species.

Direct effects of herbicide treatments on the four Federally listed endangered species (Colorado pikeminnow, bonytail, humpback chub, and razorback sucker) and the three BLM sensitive species (bluehead sucker, flannelmouth sucker, and roundtail chub) would generally be the same as described above for key non-special status species. However, the long lifespans of the big-river fishes (from 30 to 50 years) creates the potential for chronic toxic effects from bioaccumulation (retention in tissues of contaminants taken up from the surrounding environment), bioconcentration (accumulation in tissues of contaminants at high concentrations higher than those found in the surrounding environment), and biomagnification (increase in concentrations as contaminants move through progressively higher trophic levels in the food chain). Colorado pikeminnow, which is both long lived and piscivorous, would presumably be at greater risk of toxic effects than the other big-river species. However, only one of the chemicals evaluated in the PEIS, diuron, has a tendency (low to moderate) to bioaccumulate in the tissue of aquatic organisms (National Library of Medicine 2002).

The GSFO consulted with the USFWS during development of this programmatic EA, as required by Section 7 of the ESA, and prepared a BA to evaluate likely impacts to Federally listed or proposed threatened or endangered species (BLM 2009). The BA reached a determination of "**May Affect, Not Likely to Adversely Affect**" for the greenback cutthroat trout and the four Colorado River fishes based on the SOPs, mitigation measures, and conservation measures (Appendices E, F, and G) for avoiding or minimizing impacts. The USFWS has concurred with the BA and conservation measures (Appendix K).

Direct effects of herbicides on aquatic larvae of special status amphibians (Great Basin spadefoot, boreal toad [if present], and western chorus frog) are expected to be comparable to those on fishes above.

Indirect Effects: General

Since all herbicide treatment methods are similar in that they remove and/or manipulate vegetation, the primary indirect effects that are common to all treatment types are discussed here in order to avoid repetition in the analyses by alternative that follow. In general, the vegetation treatments proposed by the BLM are expected to have short-term negative and long-term beneficial effects on aquatic habitats. Combined with SOPs, mitigation measures, and project design criteria, it is anticipated that negative effects would be minimized. In addition, all site-specific projects would be implemented with the objective of creating long-term beneficial effects on fish species and their habitats.

A general reduction in vegetation cover and biomass in riparian areas, which could occur by any of the treatment methods under any of the alternatives, could have multiple consequences for aquatic organisms, particularly those associated with coldwater streams. These could include an increase in water temperature and sedimentation and a decrease in water storage capacity. Riparian cover provides shade, which cools water temperatures and reduces temperature fluctuations. Riparian vegetation also stabilizes the soil on streambanks, helping to preventing sediment transport and the loss of riparian vegetation by slumping into the stream. Tree and shrub canopies intercept rainfall, helping to reduce the flashiness of overland flow, while the herbaceous layer (grasses and forbs) captures or retards the transport of sediment and pollutants. Last, the diverse structure and composition of most riparian habitats provides a source of terrestrial insect prey. See Platts (1991).

Increased sedimentation entering aquatic habitats as a result of destabilized streambanks and increased erosion can cover spawning and rearing areas, thereby reducing the survival of fish embryos and juveniles. Excessive sedimentation can also fill in important pool habitats, making them unusable by fish and other aquatic organisms. Pool habitats are important as thermal refugia for fish during the temperature extremes of summer and winter seasons. Excessive sediment can fill in the interstitial spaces between stream substrates that are important for aquatic invertebrate productivity. A number of sublethal effects to aquatic species may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long-term, increased sediment loads reduce primary production in streams. Reduced instream plant growth, combined with the reductions in riparian vegetation, can limit populations of terrestrial and aquatic insects, which also serve as food sources for many fish as well as bat and bird species.

Within the GSFO area, impacts associated with potential increases in sediment would be to species most sensitive to increases in sediment—primarily members of the order Salmoniformes. These species in the GSFO area include rainbow, brown, brook, and cutthroat trout and mountain whitefish. The mottled sculpin in the order Scorpaeniformes is also sensitive to sediment increases and occurs in the area. Depending on the size and timing of treatment and the lag time for target species die-off and reestablishment of desired native riparian species, impacts could be more prolonged and greater in intensity and scope. Trout within the GSFO area generally reside in small mountain streams that are sensitive to changes in sediment input.

Brown trout, brook trout, and mountain whitefish are fall spawning fish that lay eggs in or over appropriate stream and river substrates generally from late September-November depending on elevation. Excessive inputs of sediment in the fall could be detrimental to these fish as during the fall, streams and rivers are generally at or near base (low) flow conditions. These reduced flows would minimize the ability of streams to efficiently move increased sediments through the system. Rainbow and cutthroat trout and mottled sculpin are spring spawning fish that generally produce eggs from March-June depending on elevation. These fish generally spawn during increased spring flows associated with

snowmelt which helps to scour and maintain channels and more efficiently move increased sediments through the system. Thus impacts to spawning members of these species would be reduced.

Removal of large amounts of riparian vegetation can alter the nutrient dynamics of the aquatic habitat. In areas where riparian vegetation has been lost, a shift in energy inputs from riparian organic matter to primary production by algae and vascular plants have been predicted (Minshall et al. 1989) and observed (Spencer et al. 2003). The increased solar radiation that results from the loss of streamside (or poolside, etc.) vegetation causes temperatures, light levels, and autotrophic production (i.e., plants and algae) to increase. This change in the food web of an aquatic habitat could alter the composition of food and thus energy sources that are available to fish and aquatic invertebrates. In addition, increased stream temperatures could affect some species.

Impacts associated with potential increases in stream temperature would be to species most sensitive to changes in stream temperature—primarily the same species as addressed above for sediment. Trout generally occupy small mountain streams within the area. Small streams can be sensitive to changes is water temperature, which could impact fish by slowing their growth rate and increasing their susceptibility to disease. All fish species could be negatively impacted by shifts in composition of food resources, which could also reduce growth and survival.

By exposing more surface area of soil directly to rainfall, and increasing the overland flow of water into the aquatic habitat, removal of vegetation could result in decreased water storage capacity of the soil. Over the long-term, overland flow can erode the topsoil and cut rills and gullies or deepen existing gullies, concentrating runoff. As a result, sediment production is increased. Reduced infiltration and increased runoff may decrease the recharge of the saturated zone and increase peak flow discharge. Thus, the amount of water retained in the watershed to sustain base flows is reduced.

Increases in stream flow can lead to alterations in channel morphology. Doubling the speed of streamflow increases its erosive power by four times and its bedload and sediment carrying power by 64 times. Accelerated runoff can thus cause unstable stream channels to downcut or erode laterally, accelerating erosion and sediment production. Lateral erosion results in progressively wider and shallower stream channels, which can negatively affect fish populations by reducing the amount of important summer and winter thermal refugia pool habitats. Pool/riffle and width/depth ratios, which are important habitat components for many fish species, may also be altered.

Impacts associated with potential increased peak flows and reduced base flows could impact all species of fish. Lowered base flows could result in increased stream temperatures and lowered pool depths, and loss or reduced use of important micro-habitats important to many fish including backwaters, spawning areas, and undercut banks. Increased peak flows as discussed could result in stream habitat impacts as streams are widened and width to depth ratios become out of balance. This can reduce important pool habitat needed for over summer and over winter survival, and result in increased stream velocities with little holding habitat (runs and pools). This would be more pronounced on small mountain trout streams but could also affect habitat complexity in larger river habitats within the area.

The severity of the effects would vary by treatment method, location, the amount of plant material removed, and the distance from the aquatic habitat. Most of the effects would also be increased in severity if vegetation were removed prior to a period of heavy precipitation. Therefore, timing of the treatments is another important factor. The effects of vegetation removal would persist until riparian areas were adequately revegetated with desired native vegetation with root masses capable of providing good streambank stability.

In the GSFO area, large scale treatments of woody noxious weeds (tamarisk, Russian-olive) are not anticipated given the very limited amount of tamarisk and Russian-olive found on public lands. Where these treatments could occur would be along the major waterways such as the Colorado and Eagle Rivers. In riparian areas with extensive houndstongue and Canada thistle, it is anticipated that existing sedges and rushes and other riparian grasses would quickly revegetate the sites. Overall, the indirect impacts addressed above would be very site specific and minor in scale within the GSFO.

Over the long-term, all treatment methods that remove non-native and competing vegetation are likely to have a beneficial effect on the habitat of aquatic species, provided that native or other desirable plant species are returned to those habitats after the treatments. Noxious weeds can have substantial negative effects on stream/riparian areas by outcompeting more desirable riparian vegetation, reducing biodiversity, altering aquatic habitats (e.g., reducing streambank protection, undercut bank cover, overhanging vegetation cover, pool depth and volume, and detrital and nutrient inputs; and increasing erosion and fine sediment deposition, stream width, and thermal relationships), and altering natural ecosystem processes (National Fire Plan Technical Team 2002). Vegetation treatments that target plant communities adjacent to aquatic habitats should result in conditions that would be more suitable for supporting native aquatic species. Therefore, vegetation treatments would eventually increase the amount of suitable habitat, potentially leading to an increase in desired species populations.

Another long-term benefit of the removal of non-native fuels from riparian habitats is the decrease in the risk of a future high severity wildfire. Diverse, vigorous, and dense stands of native riparian vegetation are less susceptible to wildfire and help to protect streams from the direct and indirect effects of wildfires by buffering streams from the effects of temperature increases and filtering ash and debris flows. These benefits are less in small mountain streams or high-gradient canyon reaches with narrow riparian zones.

Indirect Effects: Special Status Species

Indirect impacts for the greenback and Colorado cutthroat trouts and the mountain sucker would be the same as discussed above for non-special status species and could include both increased sediment loads and exposure to chemicals due to runoff from treated areas into streams. The greenback, a Federally listed threatened species, is known from only one stream within the GSFO area (Cache Creek). The BLM does not own any surface portions of the creek but does administer subsurface Federal mineral estate within portions of the watershed. Based on limited data, riparian vegetation is in good condition, and tamarisk and other noxious weeds are not present along or near this stream.

For the big-river fishes, including the Colorado pikeminnow, bonytail, humpback chub, and razorback sucker (Federally listed as endangered) and the three BLM sensitive species (bluehead sucker, flannelmouth sucker, and roundtail chub), increased sediment loads due to short-term losses of streamside vegetation would not be represent the same type of adverse impact. All of these species are well adapted to high sediments loads in the Colorado River and its major tributaries. In general, periodic to frequent influxes of sediment are important in the creation and maintenance of important microhabitats for these species.

Movement and redistribution of sediments helps to create and maintain backwater habitats important to many life stages of these fish. Periodic inundation of floodplain areas with water/sediment provides optimal seedbed areas for native cottonwood regeneration to occur. Any increased sediment loading resulting from proposed treatments would be site specific and short-term in duration (until such time as native or other desirable vegetation reestablishes at the site) and should have no negative impact to any of these species or their habitats.

Based on the fact that, under all alternatives, proper implementation of SOPs, mitigation measures, and conservation measures would be implemented, it is unlikely that negative indirect impacts would occur to these fishes or their habitat.

Prevention or Mitigation of Adverse Impacts

Under all alternatives, the GSFO would follow SOPs presented in the ROD of the PEIS (Appendix E) to ensure that risks to human health and the environment from weed treatments are minimized. In addition, the GSFO would implement measures to mitigate potential adverse environmental effects as a result of weed treatments (Appendix F). If Federally listed, proposed, or candidate threatened or endangered species would potentially be affected by the weed treatments, GSFO would implement the conservation measures listed in Appendix G of this EA and incorporated into the accompanying BA (BLM 2009).

In addition to the measures identified in Appendices E, F, and G of the PEIS and this EA, two additional measures to protect special status fish species would be implemented as part of the IWM Plan for the GSFO area:

- To protect the Colorado River and greenback cutthroat trouts, no weed treatments during March – June within 0.25 miles of occupied habitat. This measure is intended to minimize the potential for transport of sediments and chemicals into the streams by avoiding the period of highest runoff.

- No use of the herbicide diuron within 0.5 mile of the Eagle, Roaring Fork, and Colorado Rivers. This measure is intended to minimize exposure of the endangered Colorado River fishes to this compound, which is the only BLM-approved herbicide with a tendency (characterized as low to moderate) (National Library of Medicine 2002) to bioaccumulate in fish tissue. This concern is specific to long-lived species such as the Colorado pikeminnow, bonytail, humpback chub, and razorback sucker.

3.6.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under this alternative, up to 5,000 acres per year could be treated for weeds, including 4,000 acres per year by aerial spraying. Based solely on acres treated, aquatic organisms would be at a higher risk of exposure to herbicides under this alternative than under any other alternative. Impacts from herbicide exposure should not be substantially different than under the other alternatives, since the GSFO would design herbicide treatments to avoid risks to fish-bearing waters through the use of the SOPs, mitigation measures, and conservation measures identified in Appendices E, F, and G.

Because this alternative would allow for the greatest area of weed treatment, the potential would be greatest for indirect effects to the greenback and Colorado River cutthroat trouts due to increased sediment transport from treated areas. Weed infestations in areas where these species occur are generally minor and could be treated using spot application of herbicides or manual removal. Thus, large-scale losses of riparian vegetation would not be expected, and increases in sedimentation would be minimal.

An advantage of this alternative compared to the other alternatives is the ability to use all of the currently approved herbicides. These include two newly approved compounds: imazapic for cheatgrass control and fluridone for control of aquatic broadleaf weeds.

Based on the above, the Proposed Action would provide the most long-term benefits to riparian habitats that support key and special status fish, amphibians, and other aquatic organisms by improving the naturalness and diversity of vegetation adjacent to streams and other aquatic sites. This major benefit would more than offset the minor short-term impacts described above.

Alternative B – No Action (Current Management)

Under this alternative, the GSFO would not utilize aerial spraying to treat large infestations of cheatgrass or other weeds. The GSFO would therefore treat fewer acres of weeds on an annual basis (1,000 acres per year compared to 5,000 acres for Alternative A). Because fewer acres would be treated and aerial application would not be allowed, resident fish species would have a lower risk of toxic effects from exposure to herbicides than with the Proposed Action.

The lesser area of weed treatment annually would also reduce the potential for indirect effects from the transport of sediments off large areas treated aerially. However, this temporary benefit would be more than offset by the reduced ability to treat cheatgrass. Infestations of this species, which cover hundreds of acres within the GSFO area, would likely expand because of the inability to use aerial spraying. Additionally, this alternative would not include the use of the newly approved herbicide imazapic, which is the most effective treatment for cheatgrass. This would further increase the likelihood for expansion of cheatgrass. The presence of cheatgrass, which can form a dense canopy of standing biomass that is brown throughout the growing season, increases the risk for larger fires on a more frequent basis. This in turn increases the potential for adverse impacts on resident fishes from sediment transport and debris flows into aquatic habitats. This would be a greater risk for Colorado River and greenback cutthroat trout than for the big river nongame fishes, which are well adapted to high sediment loads.

The long-term benefits to fisheries and aquatic habitats—and to special status species and their habitats—associated with weed treatment would be less under this alternative than under the Proposed Action. The continued proliferation of weeds throughout the GSFO area would continue to degrade upland and riparian habitats important to the long-term sustainability and functionality of fisheries.

Alternative C – No Herbicide Use

Under this alternative, herbicides would not be used to treat noxious and invasive weeds. Therefore, fish and other aquatic organisms would not be exposed to these chemicals, and none of the potential impacts identified above would result. The total area of annual weed treatments would be much less due to the limitations of manual and biological controls.

The lesser area of annual weed treatment would reduce the potential for indirect effects from the transport of sediments off large areas treated aerially. However, this temporary benefit would be more than offset by the reduced ability to treat cheatgrass. This species, which is widespread and covers hundreds of acres in the GSFO area, would proliferate because chemical treatment is the only effective means of controlling this noxious weed. The presence of cheatgrass increases the risk for larger fires on a more frequent basis, which in turn would increase the potential for adverse impacts from sediment transport and debris flows into aquatic habitats.

The long-term benefits associated with weed treatment to fisheries and aquatic habitats—and to special status species and their habitats—would be substantially less under this alternative. Limiting treatment methods to biological and manual would increase the risk of continued proliferation of weeds throughout the GSFO area. This would continue to degrade upland and riparian habitats important to the long-term sustainability and functionality of stream habitats and fisheries.

Alternative D – No Aerial Application of Herbicides

This alternative is similar to Alternative B in that no aerial application of herbicides would be allowed but different in that the four newly approved herbicides could be used. One of these, imazapic, is the most effective treatment available for cheatgrass. Due to the lack of aerial spraying, the GSFO would treat no more than 1,000 acres per year, compared to 5,000 acres under the Proposed Action. The smaller area of treatments would result in less risk of toxic effects from exposure to herbicides and less potential for indirect effects from the transport of sediments from dense infestations treated aerially.

The short-term benefits to key and special status aquatic species due to the lack of aerial spraying would be more than offset by the reduced ability to treat cheatgrass, which often occurs as large infestations. Cheatgrass, which is widespread and covers hundreds of acres, would likely continue to expand. The presence of cheatgrass increases the risk for larger fires on a more frequent basis, which in turn increases the potential for adverse impacts from sediment transport and debris flows into aquatic habitats. This is more of a concern for Colorado River and greenback cutthroat trout than for the big river nongame fishes, which are well adapted to high sediment loads.

Based on the above, the long-term benefits to fisheries and aquatic habitats associated with weed treatment would be substantially less under this alternative than the Proposed Action due to the inability to use aerial spraying on large or remote infestations. The continued proliferation of weeds (particularly cheatgrass) throughout the GSFO area would degrade upland and riparian habitats important to the long-term sustainability and functionality of stream habitats and fisheries.

3.6.2.3 Cumulative Impacts

A variety of past, ongoing, and future activities have, are, or will occur on public lands within the GSFO area. Ground disturbance from various activities including rights-of-ways, natural gas development, livestock grazing, recreation and travel management, mining, fire and fuels management, forestry, and others will continue to occur in the GSFO. All of these activities have contributed to the current weed infestations that exist. All ground disturbing activities have the potential to open niches for weeds to move in and increase. If weed management is not emphasized, stream and riparian habitat degradation will likely increase over time, resulting in reduced habitat quality for fish and other aquatic species. Conversely, aggressive weed management would help eliminate, control, and reduce the acres of noxious and invasive weeds within the GSFO and help maintain and improve stream and riparian habitats important to fish, amphibians, and other aquatic organisms.

3.7 Livestock and Ranching Operations

3.7.1 Affected Environment

Approximately 489,566 acres of public lands are open to livestock grazing within the GSFO's administrative boundaries. The area open to livestock grazing is divided into 241 livestock grazing allotments, of which 179 are currently permitted for use and 59 are vacant. The livestock that graze on GSFO decision area lands are primarily cattle but also include sheep and some domestic horses. The majority of livestock grazing operations occur between the months of April to October with a few exceptions near the towns of De Beque and Parachute. Appendix H identifies the currently permitted allotments with the authorized livestock numbers, season of use, percent public lands, and animal unit months (AUMs).

3.7.2 Environmental Consequences

3.7.2.1 General Effects of Weed Treatments on BLM Lands

Beneficial Effects

All treatments that successfully reduce the cover of noxious weeds on rangelands would benefit livestock by increasing the number of acres suitable for grazing and the quality of forage. Noxious weed infestations can greatly reduce the land's carrying capacity for domestic livestock, which tend to avoid most weeds (Olson 1999). Cattle, in particular, preferentially graze native plant species over weeds, which often have low palatability as a result of toxins, spines, and/or distasteful compounds (Young 1992, Beck 1999, Olson 1999). Although goats and sheep are more likely to consume alien weeds than cattle, they also tend to select native or introduced forage species over weeds (Walker et al. 1994, Olson and Wallander 1998, Olson 1999). In addition, some noxious weeds (e.g., common tansy, houndstongue, Russian knapweed, and St. Johnswort) are poisonous to livestock. The success of weed removal would determine the level of benefit of the treatments over the long term.

Treatments that reduce the risk of future catastrophic wildfire throu

using non-herbicide vegetation treatment methods on public lands. The PEIS, titled *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b), identifies impacts to the natural and human environment associated with herbicide use. The PER and PEIS provide broad descriptions of resources, analyses of environmental impacts, and BLM-wide decisions on herbicide use and other tools for the management of noxious and invasive weeds. They also provide a source of information to which local-scale analyses can be tiered—including the programmatic IWM Plan prepared by the BLM GSFO to guide weed treatment planning and implementation at the field office level (BLM 2009a).

A final BA was prepared for the proposed use of herbicides to treat vegetation on BLM lands in 17 western states (BLM 2007c) and the BLM requested concurrence that this action is not likely to adversely affect proposed or listed endangered or threatened species or proposed or designated critical habitat. The U.S. Fish and Wildlife Service (Service) responded with a memorandum containing section 7 consultation guidance and concurrence that the proposed action, along with all of its conservation measures, is not likely to adversely affect any threatened or endangered species under its jurisdiction (USFWS 2006). The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NFMS) responded separately with a letter of non-concurrence for the species that may be affected under its jurisdiction.

The proposed GSFO IWM Plan includes the basic components of prevention, education, coordination and cooperation, inventory and mapping, revegetation, and monitoring in addition to weed treatments. Weed treatments would consist of manual, biological, and/or chemical control techniques. The total area of weed treatment under the proposed action would not exceed 5,000 acres per year. Up to 4,000 of those acres may be treated aerially with herbicides. The focus for aerial treatments would be large infestations of cheatgrass and other weeds following fire.

Manual control involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Biological control involves the intentional use of domestic animals, insects, nematodes, mites, or pathogens (agents such as bacteria or fungi) that weaken or destroy vegetation. The use of domestic livestock to control weeds requires "prescribed grazing" in which the kind of animals, and the amount and duration of grazing are designed to control a particular weed species while minimizing impacts to perennial native vegetation.

Chemical control involves the use of herbicides to kill or suppress target plants and chemicals applied with the herbicides that improve their efficacy ("adjuvants"). Herbicides may be sprayed manually for small infestations by spraying from a backpack unit or spray bottle or wiping (wicking) the herbicide directly onto a plant's foliar tissue. This is most effective for small infestations, areas inaccessible by vehicle, or areas where minimizing potential impacts to non-target plants is desired. Larger weed infestations with good accessibility can be treated by sprayers mounted on ATVs or trucks. Oil and gas pads, pipeline corridors, and roadsides can be effectively treated in this manner. Herbicides could also be applied aerially with helicopters or fixed-wing aircraft for large infestations of weeds in areas where it's not economically and/or physically feasible to treat on the ground (e.g., areas burned in wildfires, cheatgrass treatments, wildlife habitat treatments).

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gh fuels reduction would also benefit livestock. Uncontrolled, high intensity wildfires can damage large

tracts of rangeland, reducing its suitability for livestock grazing. Wildfires occur most often during drought conditions, when vegetation is already stressed by the low soil moisture and high evaporative loss. As a result, wildfires can magnify the stress on rangeland forage species and hampers their recovery. Treatments that restore and maintain fire-adapted ecosystems would decrease the effects from wildfire to rangeland plant communities and improve ecosystem resilience and sustainability.

Treatments that control populations of non-native species on public lands would be expected to benefit native plant communities by reducing the importance of non-native species and aiding in the reestablishment of native species through natural recovery or post-treatment revegetation. The use of herbicides or other treatment methods to simply kill vegetation is often inadequate, especially for large infestations. Introducing and establishing competitive plants is also needed for successful management of weed infestations and the restoration of desirable plant communities (Jacobs et al. 1999). The degree of benefit would depend on the success of these treatments over both the short and long term. Some treatments are very successful at removing weeds over the short term, but are not successful at promoting the establishment of native species in their place. In such cases, seeding of native plant species would be beneficial. Weeds may resprout or reseed quickly, outcompeting native species, and in some cases increasing in vigor as a result of treatments. The success of treatments would depend on numerous factors, and could require the use of a combination of methods discussed below to combat undesirable species.

Adverse Effects

The proposed vegetation treatments would cause disturbances to rangeland plant communities by killing both target and non-target plants. In areas that have been highly degraded, merely restoring disturbance to the ecosystem could adversely affect native plant communities by encouraging the spread of weeds or the persistence of an altered vegetation structure and species composition. Treatments could require temporary rest from livestock grazing, forcing livestock operators to graze animals elsewhere. Herbicide treatments have the potential to affect the health of livestock.

The abundance of downy brome has caused some livestock producers to rely on it as a source of early spring forage. The disadvantage for livestock producers is the narrow window of grazing opportunity and the wide variation of total forage production from year to year.

Prevention or Mitigation of Adverse Impacts

The SOPs and mitigation measures designed to minimize impacts to livestock and ranching operations in the PER/ PEIS (BLM 2007a, b) have been adapted and included in Appendices E and F of this programmatic EA. No additional mitigation is suggested.

3.7.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under this alternative, the IWM Plan implemented for the treatment of weeds within the GSFO would include use of all 18 herbicides currently approved by BLM, compared to 14 herbicides approved under current management, and would employ aerial herbicide applications. The four newly approved herbicides include imazapic, which is effective on cheatgrass, and Overdrive® (dicamba + diflufenzopyr), which is effective on a variety of broadleaf weeds and annual grasses. The ability to use aerial spraying under this alternative is of particular benefit for treating large or remote infestations—often consisting of cheatgrass—that cannot be treated effectively with ground-application methods. Because of the ability to

use aerial spraying, Alternative A could include up to 5,000 acres of weed treatment annually, compared to 1,000 acres per year under Alternatives B and D, and a much smaller area than under Alternative C.

Positive and negative impacts to livestock and ranching operations under the Proposed Action from the use of manual, biological, and chemical controls are summarized in the following paragraphs.

Manual Control – Manual treatments would have minimal effects on livestock and their forage. Manual treatments would target the removal of undesirable species but would not affect desirable species. Therefore, any effects on livestock forage would be beneficial. The duration of these benefits would depend on the species' ability to resprout, which could be controlled using a combination of treatments (e.g., manual treatment plus herbicides).

Biological Control – Use of domestic animals to manage undesirable vegetation could affect the livestock that regularly graze on public lands under a grazing permit or lease. When managed improperly, these animals could compete for the same forage resources as domestic livestock. Under proper conditions, it has been demonstrated that the use of sheep and goats to manage leafy spurge through prescribed grazing has improved the conditions of the range, opening up infested sites for grass regrowth, and thus providing additional forage for authorized livestock grazing.

Insects and pathogens released to manage noxious weeds on rangelands would not be likely to affect livestock. These agents target undesirable species and could result in a long-term increase in the quality of forage on a treatment site. However, it is possible that in some situations use of these agents could prohibit animals from using a pasture for short periods of time.

Chemical Control – Use of herbicides to weeds would have a number of both adverse impacts and benefits compared to the manual and biological controls. Adverse impacts from herbicides in areas used for grazing of domestic livestock include the following:

- The extent of direct and indirect effects to livestock from herbicide treatments are evaluated in the PEIS (BLM 2007a). Several factors influence the effectiveness of the herbicide application, including timing and method of application, herbicide used, application site characteristics, and environmental conditions. The direct effects of herbicide use on livestock depend on the sensitivity of each species to the particular herbicide used. Indirect effects include the degree to which a species or individual is positively or negatively affected by changes in rangeland conditions.
- Livestock would have a greater chance of being adversely affected by herbicide use if their entire range or areas where they concentrate are treated. However, livestock could be specifically removed from an area during vegetation treatment, as directed on the herbicide label, or treatments could be scheduled to occur when livestock were not present, adhering to the reentry interval specified on the herbicide label. If livestock were removed from the area specifically to facilitate the vegetation treatment, the grazing permittee would be adversely affected as a result of the area being unavailable for grazing. The permittee would need to either find alternative grazing areas, or modify ranching operations to account for the unavailable forage. Even though large treatments would usually occur when livestock were not in the treated area, some risk of indirect contact and consumption of contaminated vegetation over a large area would still exist. The use of spot treatment applications, in accordance to label directions, would reduce the potential effect on livestock. The effects of herbicide use on livestock would be site and application specific, and as such, site assessments would have to be performed, using available information, to determine an herbicide-use strategy that would minimize effects to livestock.

- The BLM and USFS risk assessments suggest several possible common effects of herbicides to livestock (SERA 2001, ENSR 2005a-j). Livestock that consume large quantities of grass have greater risk for harm than livestock or wildlife that feed on other herbaceous vegetation or seeds and fruits, because herbicide residue is higher on grass than it is on other plants (Fletcher et al. 1994, Pfleeger et al. 1996). However, exposure to harmful doses of herbicide would be unlikely, since animals would be removed from the area if there was a chance they could be harmed by an herbicide, as required by the label instructions.
- In conjunction with the identified grazing restrictions listed on herbicide labels, additional restrictions may be identified that require the livestock owner to remove the livestock from the treated area for a specified period of time prior to slaughter. In reviewing the grazing and slaughter restrictions listed on herbicide labels, it is important to recognize that additional grazing restrictions may apply to grazing lactating dairy animals. As described for other vegetation treatment methods, some herbicide treatments may require additional rest from livestock to ensure that more desirable vegetation has the opportunity to increase and reestablish on those sites from which undesirable vegetation has been removed.

Beneficial effects from use of herbicides would offset some of the negative effects listed above. Anticipated benefits are summarized below:

- In cases where herbicide treatments are able to reduce the cover of noxious and unpalatable weeds on grazed lands, there would be short- and long-term benefits to livestock as a result of increased quality of forage. In some cases, herbicides are the most effective means of controlling or eradicating invasive plant species.
- The extent of positive and negative effects to livestock would depend on the relative amount of each herbicide used, whether herbicides would be applied in rangeland environments, and the method of application. The risk of negative effects would be greatest if diuron, diquat, bromacil and/or 2,4-D are used extensively. However, diquat would be used by BLM exclusively as an aquatic herbicide, and the non-selective herbicides bromacil and diuron are not likely to be used extensively in rangelands. If these herbicides are used in restricted scenarios, as is proposed, and other herbicides are used effectively to increase the abundance of native forage relative to unpalatable weeds, positive effects to livestock could outweigh negative effects.
- The ability to use the four new herbicides proposed for use (diquat, fluridone, imazapic, and Overdrive®), as well as future herbicides that become registered with the EPA, would give BLM more options in choosing herbicides that best match treatment goals and application conditions and are less toxic. As a result, there could be an increase in benefits and a reduction in overall risks to livestock (three of the four new herbicides present little to no risk to livestock) and an increase in habitat and ecosystem benefits from treatment.

Alternative B – No Action (Current Management)

Under the No Action alternative, current weed management would continue, which does not include the four new herbicides newly approved in the PEIS or the use of aerial herbicide applications. Among these is imazapic, which is the most effective treatment for cheatgrass available to BLM. Not having this herbicide available makes it likely that cheatgrass infestations would continue to expand, reducing the quality and quantity of forage in the affected rangeland. Additionally, the four new herbicides represent a low risk to livestock from toxic effects. Not having these compounds available could increase risks to livestock if more injurious herbicides (e.g., 2,4-D, bromacil, diuron, tebuthiuron, and triclopyr) are used.

Because of the lack of aerial spraying, fewer acres would be treated under this alternative than Alternative A (1,000 versus 5,000 acres per year). Aerial treatments of very large or inaccessible weed infestations would not be practicable due to the limitations of ground methods.

Positive and negative impacts to livestock would be similar to those that have occurred in the GSFO in the past. Negative impacts may be lower than under the other herbicide-use alternatives because fewer total acres would be treated. However, long-term positive impacts on livestock communities (i.e., improvements in rangeland forage) could be lower under this alternative. Invasive plant populations would likely continue to expand at the current rate or more quickly, potentially increasing damage to desirable native forage, and the abundance of unpalatable or toxic plants.

Alternative C – No Herbicide Use

Under Alternative C, livestock would not be affected by herbicide use. Primary impacts would stem from manual and biological control techniques. Positive benefits to rangelands as a result of vegetation management could be reduced under this alternative, as certain species are only effectively controlled by herbicides, and in some situations other methods are impractical due to cost, time, or public concerns.

Under this alternative, without the use of herbicides, invasive plant populations would likely continue to spread, possibly at increasing rates. The spread of invasive plant populations would cause further damage to susceptible native plant communities, including rangeland communities that provide forage for livestock, particularly in situations where other treatment methods would not be effective or feasible. The spread of invasive plant populations would likely have deleterious effects on livestock. In addition, acres infested by noxious weeds that are toxic to livestock, including common tansy, leafy spurge, Russian knapweed, common St. Johnswort, tansymustard, and yellow starthistle, would increase; in contrast, these species would be targeted by the BLM for herbicide treatments under the other alternatives.

Alternative D – No Aerial Application of Herbicides

Alternative D would be similar to the Proposed Action by including use of the four new herbicides approved in the PEIS—including imazapic for cheatgrass and Overdrive® for a variety of weedy forbs and annual grasses—but different by not including aerial spraying of herbicides. As with Alternative B, the lack of aerial spraying would limit the total area of weed treatments to 1,000 acres per year, compared to 5,000 acres for Alternative A. The smaller area of herbicide use would substantially reduce the potential impacts to livestock from offsite drift into non-target areas. Conversely, without the option to spray herbicides aerially, large areas of rangeland may remain untreated under Alternative D, which could negatively impact livestock habitat and forage in these areas over the long term.

Long-term negative impacts to rangeland could be greater than any potential short-term negative effects to livestock that would result from aerial applications, particularly given that livestock would be removed from rangeland application areas before aerial spraying.

3.8 Soils

3.8.1 Affected Environment

Soils of the GSFO have been mapped in four soil surveys: *Soil Survey of Rifle Area, Colorado, Parts of Garfield and Mesa Counties* (NRCS 1985); *Soil Survey of Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties* (NRCS 1992); *Soil Survey of the Douglas-Plateau Area, Colorado, Parts of Garfield and Mesa Counties* (NRCS 2001); and *Soil Survey of the Routt County Area, Colorado, Parts of Rio Blanco and Routt Counties* (NRCS 2007).

The BLM parcels within the GSFO range from bottomlands and terraces to mountain slopes and ridge tops. Much of the area is rugged, forested, mountainous, or hilly, with comparatively narrow valleys. Soils across the area vary with local geology, topographic relief, and climate. Soils on floodplains and terraces are more than 60 inches deep and are formed in loamy material deposited by water or glacial drift. All other soils vary in depth from less than 20 inches to more than 60 inches.

The erodibility of a soil is affected by its inherent tendency for soil particles to become detached and made available for transport, which is related to physical characteristics such as texture and percent organic matter. It is also affected by other site characteristics such as soil type, aspect, slope length and steepness, vegetation cover, and the magnitude and duration of rainfall and snowmelt events.

Approximately 50 percent of the GSFO soils have severe to very severe erosion hazard. Undisturbed soils with severe erosion hazard lose an average 5 to 12 tons/acre/year of soil, while undisturbed soils with very severe erosion hazard experience 12 to 30 tons/acre/year of soil loss. Soils with severe to very severe erosion hazard and occurring on slopes in excess of 30 percent are considered "fragile soils." Such soils generally require oil and gas operators to follow special operating constraints in order to maintain soil productivity, prevent accelerated soil erosion, and protect water quality and quantity.

3.8.2 Environmental Consequences

3.8.2.1 General Impacts of Weed Treatments on BLM Lands

Direct and Indirect Effects

All four alternatives would involve removal of noxious weeds from areas where newly bare slopes could experience increased erosion until vegetation regrows to the point where it can once again hold the soil in place and shield it from rain splash. Soil compaction associated with ungulate biocontrol and use of motorized equipment for other treatment methods—particularly ground broadcasting of herbicides—could also reduce water infiltration and soil productivity by eliminating pore spaces used for water storage and air exchange. These effects would typically last until a vegetation layer is restored at a treatment site. As stated earlier, prompt revegetation using native species can reduce the erosion hazard, but can also create additional temporary soil disturbance.

Weed removal in infested areas can reduce soil fertility, at least temporarily, through various processes. These include reductions in the supply of carbon and other nutrients, the soil's moisture-holding capacity, and the evapotranspiration rate, all of which combine to cause loss of soluble nutrients by leaching. Soil fertility can also be affected by soil erosion, which causes loss of organic matter and adsorbed nutrients through offsite transport by wind or water (Bonneville Power Administration 2000). Soils with low initial organic matter content are most susceptible to reductions in soil fertility through these processes.

All alternatives involve some manual treatments, which would have less direct impact on soils than other proposed treatments. Workers and vehicles accessing the site could disturb topsoil and/or surface organic matter, increasing the opportunity for re-invasion by weedy species; however, the extent of this disturbance would be limited. Coarse-textured soils and steep slopes would be the most fragile. Some potential exists for contamination of the soil from petroleum products used in hand-held power equipment, but these effects would be extremely localized.

Where domestic animals are used for biological weed control, their hooves can cause shearing and compaction of soil; this in turn may increase the soil's susceptibility to both water and wind erosion and reduce the availability of water and air to plant roots. These effects can be severe in heavily grazed areas (Trimble and Mendel 1995). Domestic animals could additionally alter nutrient cycling processes in soils

by depositing organic nitrogen in urine and feces. In some instances, the formation of soil nitrogen hotspots could increase localized productivity to such a degree that weeds would be favored over native plants adapted to low nitrogen conditions (Evans and Ehleringer 1993).

Manual, hand-spraying, and ungulate biocontrol weed treatments could further result in localized disturbance to biological (cryptogamic) soil crusts, which could reduce soil quality and ecosystem productivity, increase susceptibility to erosion, encourage weed establishment, and reduce water infiltration (Belnap et al. 2001). The duration of these effects would vary, but soil crust recovery rates typically are much slower than the recovery of vascular plants (BLM 2007b).

Prevention or Mitigation of Adverse Impacts

The PEIS and PER describe measures to protect soils during weed treatments (see Appendices E, F, and G). For all alternatives, these measures would include the following:

- Where feasible, access work site only on existing roads, and limit all travel on roads when damage to the road surface will result or is occurring.
- Where listed or proposed aquatic species occur, consider ground-disturbing activities on a case by case basis, and implement SOPs to ensure minimal erosion or impact to the riparian habitat.
- Within riparian areas, do not use vehicle equipment off established roads.
- Outside riparian areas, allow soil-disturbing treatments and driving off established roads only on slopes of 20% or less.
- Do not conduct biomass removal activities that will alter the timing, magnitude, duration, and spatial distribution of peak, high, and low flows outside the range of natural variability.
- Avoid hydromulching within buffer zones established at the local level.
- Establish appropriate buffer zones to downstream water bodies, habitats, or species/populations of interest.
- Leave suitable quantities of excess vegetation and slash onsite.
- Employ appropriate livestock dispersion techniques, including judicious placement of salt blocks, troughs, and fencing to prevent damage to riparian areas but increase weed control.
- Do not conduct weed treatments involving use of domestic grazers in riparian areas affecting listed, proposed, or candidate threatened or endangered species, except where it is determined that these treatments will not damage the riparian system, or will provide long-term benefits to riparian and adjacent aquatic habitats.

Over the long term, all treatments that remove invasive vegetation and restore native plants should enhance soil quality on public lands (BLM 2007a). For example, sites dominated by spotted knapweed display substantially higher surface runoff and stream sediment yield than sites dominated by native perennial grasses (Lacey et al. 1989). Cheatgrass dominance and associated fires also reduce biological soil crusts, which affect soil erosion, water infiltration, and nutrient cycling (Belnap et al. 2001).

All weed treatment alternatives would further benefit soil quality by reducing the risk of wildfire. Wildfires cause a loss of soil nutrients and the consumption of soil organic matter. Given the ability of severe wildfires to cover large areas, their impacts on soil quality could potentially be quite high.

3.8.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under the Proposed Action, the GSFO would be able to treat up to 5,000 acres of weeds per year, of which 4,000 acres would be by aerial application. This alternative would also allow GSFO to use four herbicides newly approved by the PEIS, including one (imazapic) of particular benefit in controlling cheatgrass. Therefore, the IWM Plan implemented by Alternative A would result in the most weeds treated—especially the large expanses of cheatgrass that are particularly problematic in the GSFO area—and the least chance of expansion.

Because the Proposed Action alternative would increase the range of herbicides available to BLM managers, it would allow more options in choosing herbicides to match treatment goals and application conditions. This should beneficially affect soil resources since potential negative impacts to non-target vegetation (and the underlying soil) would be minimized; riparian vegetation buffers would be maintained; and native vegetation ground cover would increase, holding soil in place better than most invasive species (e.g., non-native grasses).

The Proposed Action could also affect soil physical, chemical, and/or biological properties. These changes could include changes in soil structure (e.g., decreased percentage of fines), porosity, salinity, cation exchange capacity, microfaunal diversity, or organic matter content. Whether such changes are beneficial or harmful would depend on the method of treatment, the soil type, and in some cases (e.g., tamarisk) the weed species being treated. For example, some herbicides are toxic to various soil organisms (BLM 2007b). However, the large majority of soil impacts resulting from the Proposed Action are expected to be positive; these would include the return of more stable soils, attenuated nutrient cycling, and a return to normal fire cycles (BLM 2007a).

Herbicide applications may result in contact with soils, either intentionally for systemic treatments, or unintentionally as spills, overspray, spray drift, or windblown dust. Contact may also occur as a result of herbicide transport through plants to their roots where herbicide may be released into soil (BLM 2007a). Soil disturbance associated with manual treatments is likely to be minimal, and would not require rehabilitation efforts due to the small area affected.

The treatment method with the greatest potential for adverse short-term effects on soils is herbicide use on dense monotypic stands leading to substantial loss of vegetation cover. Application of the SOPs and mitigation measures in Appendices E and F would minimize soil disturbance and prohibit potentially erosive actions in areas identified by field office resource specialists as containing highly erodible soils.

Alternative B – No Action (Current Management)

Under this alternative, the GSFO would not be able to use the four additional herbicide active ingredients approved in the PEIS. Because of the inability to use imazapic, which is the most effective cheatgrass control, this invasive annual grass would continue to spread. Aerial application of herbicides would also not occur, limiting the total area treated to less than 1,000 acres per year, compared to 5,000 acres for the Proposed Action. As a result, positive impacts to soils from weed treatments would be fewer and less extensive than in Alternative A.

While short-term impacts from erosion would be less due to the smaller area treated, long-term impacts would be greater from the increased fire hazard and from the decreased ability of plant roots to hold soil in place associated with areas dominated by annual grasses and annual/biennial forbs than with areas dominated by perennial native grasses. In particular, soil properties affected by cheatgrass would be

negatively impacted by this alternative. These properties include soil texture and fertility (primarily in response to fire occurrence), and the presence of biological soil crusts.

Alternative C – No Herbicide Use

This alternative would result in the smallest area of weed treatment annually because of the limited effectiveness and increased labor, time, and cost associated with manual and biological controls. Noxious weeds would spread at a faster rate than under other alternatives. Many of the noxious weeds in the GSFO are perennials that are most effectively controlled with herbicides. For example, Russian knapweed and Canada thistle would likely increase from manual treatments because root and rhizome fragments left in the soil would create new plants. Cheatgrass would not be treated because herbicides provide the only feasible form of control for this species. Russian-olive and tamarisk would probably not be treated because without the use of herbicides to kill the stump and roots, manual control could create new plants by sprouting. Small, isolated weed infestations would be the focus for manual control.

Biological controls could be used on the few species for which biocontrols exist. However, biocontrol agents are only available for a few weed species, and even for these such controls work slowly and do not typically eradicate weed populations but work to weaken the individual plants and reduce their competitiveness over time. As a result, positive impacts to soils from weed treatments would be fewer and less extensive than in any of the other alternatives.

While some short-term reduction in potential erosion of treated areas would accompany the smaller amount of weed treatments, over the long term soils would suffer due to increased fire hazard and the decreased soil quality and decreased ability of plant roots to hold soil in place in areas dominated by annual grasses and annual or biennial forbs. To an even greater degree than in Alternative B, the widespread occurrence of cheatgrass under Alternative C would adversely affect soils. In addition, the likelihood of greater dependence on ungulate biocontrol for certain weed species would increase soil compaction and erosion, particularly in areas adjacent to streams, stock ponds, and salt blocks.

Alternative D – No Aerial Application of Herbicides

This alternative is similar to Alternative B by not including aerial application of herbicides. As a result, no more than 1,000 acres would be treated annually, compared to 5,000 acres under the Proposed Action. However, Alternative D allows the use of four newly approved herbicides—including imazapic, which is of particular benefit for controlling cheatgrass. More weeds would be treated than under Alternative C, which would not include the use of herbicides.

Because this alternative would not include aerial treatments, it is possible that some areas may be treated using ground methods that would otherwise have been treated aerially. In such areas, biological soil crusts would be at greater risk from damage by motorized equipment and personnel. On the other hand, dependence on hand spraying would decrease somewhat the probability of wind drift, with its potential for damage to non-target plants and resultant increase in soil loss.

3.9 Surface Water and Groundwater

3.9.1 Affected Environment

3.9.1.1 Surface Water

The topography of the GSFO varies from rugged mountains in the east to high plateaus bordered by steep slopes in the west, and the climate also ranges from alpine conditions to semi-arid/arid conditions (USGS

2000). Precipitation ranges from greater than 30 inches annually in the higher mountain areas to ten inches annually in the lower areas along the Colorado River and in the rain shadow around Dotsero.

The GSFO lies within the upper Colorado River Basin, which encompasses an area of approximately 17,800 square miles and includes the Eagle and Roaring Fork River basins. The Colorado River originates in the mountains of central Colorado and flows southwesterly through the center of the GSFO. The Eagle River flows west into the Colorado River in the eastern part of the GSFO. The Roaring Fork River flows northwest, is joined by the Crystal River, and flows into the Colorado River in the center of the GSFO. Minor rivers that flow into the Colorado River or its tributaries in the GSFO are the Blue, Piney, and Fryingpan. Perennial streams that flow into the Colorado River or its tributaries in the GSFO include Fourmile, Thompson, Divide, Mamm, Beaver, Battlement, Rifle, and Parachute Creeks.

Tributaries to the Colorado River within the GSFO typically have low to moderate relief, with channels ranging from straight to sinuous. Floodplain widths are narrow due to steep stream gradients, typically 3 to 7 percent. Gulches, the large majority of which are ephemeral or intermittent, typically have steep headwaters that flatten and broaden at lower elevations. Peak flow usually occurs in May on the rivers and streams in the GSFO. Peak flows, especially on intermittent and ephemeral streams, may also result from summer thunderstorms.

In general, surface water in the GSFO is of good quality. However, natural water quality in streams varies depending on annual precipitation patterns, vegetation cover, and geology. Sediment and, at lower elevations, salinity derived from shale and evaporite formations are the primary pollutants. At lower elevations, increased sulfate and magnesium levels also contribute to decreased water quality.

During snowmelt runoff and especially during intense thunderstorm activity, sediment and salinity yields are likely to be higher than during low-flow periods. Vegetation cover also affects the sediment and salinity yield from watersheds, with sparsely vegetated areas tending to yield higher amounts of sediment and salinity during runoff events than areas with more vegetation cover. During periods of low flow, salinity concentrations are highest in surface waters even though the quantity of salt delivered to streams is lowest during these periods.

Water quality in the GSFO also varies somewhat with the extent of human influence. For example, human activities contribute about half of the salinity in the Lower Colorado River Basin (USGS 1996a). Generally, human impacts stem from non-point sources including agricultural runoff, upstream timber harvesting, streambank modification, roads, and reservoir evaporation. Two important factors affecting the amount of sediment and salinity in surface water are the proximity of any disturbance to a stream, and how well the vegetation cover between the disturbance and the stream is maintained. Riparian vegetation functions to armor stream banks and acts as a filter to remove sediment before it enters the stream.

Invasive plants can create conditions that modify water quantity and quality. Directly or indirectly, invasive plants can affect streambank stability and sediment input and the turbidity, temperature, dissolved oxygen, and pH of the stream. Water uptake by some invasive plants (e.g., tamarisk) can also reduce water quantity (USFS 2005), and tumbleweeds such as knapweed can contribute to blockage of culverts and irrigation water intakes.

The Colorado Department of Public Health and Environment (CDPHE) has established classifications and water quality standards for streams based on existing or potential water uses, pursuant to Section 305(b) of the Clean Water Act. Table 8 lists stream segments that appear on the 303(d) list or on the Monitoring and Evaluation List, which consists of segments suspected of having water quality problems but where data are inadequate. A table listing Federal and State surface and groundwater quality standards and

selected additional information for BLM-approved herbicides considered in this document is presented in Appendix I.

Table 8. Water Bodies in the GSFO Planning Area on the 2006 Section 303(d) List or the 2006 Monitoring and Evaluation List

List	Segment Description	Portion	Impairment
303(d)	Tributaries to Colorado River, Roaring Fork to Parachute Creek, excluding specific segments	All	Selenium
303(d)	Clear Creek to the Colorado River	Dry Fork	Selenium
Monitoring and Evaluation	Colorado River, Roaring Fork to Parachute Creek	All	Sediment
Monitoring and Evaluation	Colorado River, Parachute Creek to Gunnison River	All	Sediment
Monitoring and Evaluation	Tributaries to Colorado River, Roaring Fork to Parachute Creek, excluding specific segments	Mamm Creek, South Canyon Creek	Iron (total recoverable concentrations)
Monitoring and Evaluation	Tributaries from County Road 251 to Colorado River	All	Selenium

Source: CDPHE 2008a, 2008b

Many of the streams are identified on the CDHPE 303(d) list or in its 305(b) report to the EPA identifying streams that do not meet water quality standards for their designated uses; but in all cases, these are for naturally occurring elements or for sediment, existing concentrations of which are only partly due to human activity. For example, selenium primarily leaches from shale; where this source of impairment is found to be natural, an ambient quality-based, site-specific standard may be considered. If a stream segment is listed on the 303(d) list, any point-source discharge permit would have to use total maximum daily loads instead of technology-based standards, although this could potentially be waived if the affected stream segment is found to have naturally occurring levels qualifying it for an ambient quality-based standard that effectively removes it from the list.

Surface water in the Planning Area is currently being managed under guidance from the 1984 RMP (BLM 1984a) and BLM's Land Health Standard 5. The planning objectives for surface water are to maintain or improve existing water quality in the resource area where possible, and to comply with applicable State and Federal water quality standards. The RMP designates watersheds that have characteristics requiring special management considerations to protect water quality. Primary among these RMP designations in the GSFO is a portion of the Rifle Municipal Watershed, along a portion of lower Beaver Creek; the BLM manages its land within this watershed by prohibiting surface disturbance unless the City of Rifle grants a permit. Land Health Standard 5 calls for the water quality of all water bodies located on or influenced by BLM lands to meet or exceed CDPHE standards (BLM 2007e).

3.9.1.2 Groundwater

The primary groundwater sources in the GSFO are the shallow alluvial aquifers beneath floodplains and river terraces, or isolated lenses of Wasatch Formation sandstone immediately below this alluvium; the deepest water supply wells are about 600 feet deep, and most are shallower than 200 feet. Deep, poor-quality aquifers such as the Mesaverde Group are accessed only by oil and gas operators for natural gas

extraction and—in a few locations—produced water injection; these range from 1,200 to more than 10,000 feet below ground surface, with screening averaging 6,000 to 8,000 feet deep (URS 2006). The Roan Plateau Planning Area has a geologically distinct groundwater system; this consists of four separate bedrock aquifers, with a combined thickness of 430 feet (BLM 2006b).

Good quality groundwater is in ample supply in the GSFO area, but there is little reliance on it by outlying ranches because surface water is sufficient to meet the relatively low water demand. Although nearly all current freshwater wells in the GSFO are on private land, the BLM has taken on the role of managing watersheds for the protection of both surface water and groundwater resources.

Groundwater in the GSFO is currently being managed primarily under guidance from CDPHE's Water Quality Control Regulations 41 and 42. Numerical standards are shown in Appendix I.

3.9.2 Environmental Consequences

3.9.2.1 General Impacts of Weed Treatments on BLM Lands

The removal of vegetation via any of the proposed alternatives could cause short-term increases in surface runoff via reduced infiltration and evapotranspiration rates. This could in turn contribute to increased erosion (particularly on steep slopes with fragile soils), decreased surface water quality, and even altered stream channel morphology. Furthermore, reduced infiltration could impact groundwater recharge, leading to decreases in groundwater supply and the magnitude of base flows.

All weed treatments could temporarily affect water quality by reducing nutrient uptake by plants, resulting in a pulse of nutrients to nearby water bodies, even in semiarid environments (Binkley and Brown 1993). Soluble nutrients such as nitrogen would likely enter streams or other water bodies via groundwater, while nutrients adsorbed to soil particles (e.g., phosphorous) could be carried to surface water in runoff. Nutrient enrichment of aquatic systems can lead to algal blooms and hypoxia (oxygen depletion) (Getsinger 2004). Loss of vegetation and erosion in areas with extensive natural sources of salt in the soil can additionally lead to higher levels of salinity in nearby water bodies.

The loss of stream shade due to removal of streamside vegetation could increase water temperatures. In coldwater systems, temperature increases could contribute to water quality degradation and potentially impact recreational fisheries until native vegetation is reestablished (Clark 2001). However, the removal of hazardous fuels from public lands would provide long-term benefits to water quality by reducing the risk of severe wildfire in treated areas. Wildfires that consume all vegetation and plant litter can cause subsequent increases in stream sedimentation and discharge (DeBano et al. 1998). In addition, fire retardants used on wildfires could affect water quality; the retardants used most extensively on wildfires contain nitrogen and phosphorus that could cause nutrient enrichment of surface water and groundwater. In highly alkaline waters, toxic concentrations of ammonia can be produced. When mixed with water and exposed to ultraviolet radiation, fire retardants also break down into hydrogen cyanide, an extremely toxic substance (Fresques et al. 2002). Finally, the use of water from nearby sources to extinguish wildfires could reduce the quantity of surface water resources, particularly in arid climates or during dry seasons.

All proposed alternatives include some level of biological control, including grazing by goats and other ungulates. Hooved animals can increase surface runoff by reducing vegetation cover through herbivory and trampling and by compacting the soil and disturbing the soil surface.

3.9.2.2 Impacts by Alternative

Alternative A – Proposed Action

Under the Proposed Action, the GSFO would be able to treat up to 5,000 weed-infested acres per year using manual, chemical (both ground-based and aerial) and biological controls. The GSFO could use four additional herbicide active ingredients (diflufenzopyr, diquat, fluridone, and imazapic) approved in the PEIS (BLM 2007a), as well as continue the use of 14 herbicide active ingredients previously approved (BLM 1991b). The GSFO would be able to utilize aerial spraying to treat large infestations of cheatgrass or other weed populations that were inaccessible or unable to be treated with ground equipment.

An IWM Plan with a full range of treatment options will allow for early detection and rapid response to new weed infestations as well as a more proactive, coordinated, and site-specific weed management approach for the GSFO. Of the alternatives, the Proposed Action would result in the most weeds being treated and the least chance of expansion.

Weed treatments have the potential to affect both surface water and groundwater quality and quantity. Vegetation removal could affect surface water by increasing surface runoff, promoting erosion and sedimentation, reducing shading and increasing water temperature, and limiting the amount of organic debris entering water bodies. In addition, even some handheld equipment used in invasive plant treatment has the potential to disturb or displace soil, making the soil more vulnerable to erosion. However, impacts to water quality from manual and biological (insect or pathogen) treatments would be minor and short-term, as soil disturbance would be minimal from manual treatments such as pulling and weed whacking due to the small size of treatment areas, and insects or pathogens do not generally kill host species rapidly enough to lead to extensive loss of vegetation cover. Biological treatments utilizing domestic livestock for selective grazing would follow measures outlined in Appendices E, F, and G in order to protect riparian and surface water resources.

Chemical use in aquatic riparian areas has the potential to negatively affect both surface water and groundwater quality, particularly if applied at concentrations that exceed label requirements. Herbicides can reach surface water bodies through drift, the airborne movement of herbicides beyond the treatment area. Three factors contribute to drift: application technique, weather conditions (wind speed and air temperature), and applicator error. Herbicides registered for use in terrestrial habitats may also affect surface water and alluvial groundwater, primarily as a result of unintentional spills or movement of herbicides from the upland sites into aquatic systems, as well as through additional sedimentation stemming from loss of vegetation cover (see Appendix I). Some herbicides have the additional potential to infiltrate into groundwater, where attenuation and breakdown of the chemical may be slow.

If well-vegetated buffers between treated areas and water bodies are left untreated, they can intercept herbicides and mobilized sediment, reducing the potential for these contaminants to reach surface water. The potential for water body contamination would be minimized by strict application of the riparian buffers listed in Appendices E, F, and G. Additional minimum buffer requirements would apply for the Proposed Action, as well as for Alternatives B and D, for areas covered by the Roan Plateau RMPA/EIS (BLM 2006b); these buffers are 10 feet for hand applications and 25 feet for vehicle applications.

Treatment with chemicals would follow a number of other SOPs and mitigation/conservation measures outlined in Appendices E, F, and G. These measures would minimize the possibility of accidental contamination of water bodies and groundwater by herbicides due to runoff, drift, misapplication/spills, and leaching. The aquatic labeled herbicides would not impact water quality if used according to label rates of application. Additionally, the wider range of available pesticides increases the opportunity for spot and localized applications of specific weed patches; these applications are less likely to result in drift because they are targeted to specific plants and less herbicide is applied.

Of the four new herbicides that could be applied in this alternative, diquat carries the greatest risk to native fish and plants, and is a known groundwater contaminant (BLM 2007a); while effective in aquatic and riparian weed control, its use should be limited only to areas where vegetation control is the overriding concern and risks to fish and water quality can be adequately mitigated. Imazapic, which would be used primarily to treat cheatgrass, is not known to contaminate surface water or groundwater. Except for fluridone (which has a high potential for surface water runoff) and diflufenzopyr (which is highly mobile in soils), the proposed herbicides have low potential to flow to aquatic bodies in stormwater runoff or base flow following application in upland areas. Diflufenzopyr is also not known to contaminate groundwater. Since the risk of surface runoff contaminating water bodies and drinking water is moderate to high for treatments using 12 of the 18 currently permitted herbicides (2,4-D, bromacil, clopyralid, diuron, glyphosate, hexazinone, imazapyr, picloram, sulfometuron methyl, tebuthiuron, and triclopyr), the new herbicides could replace these for various treatments and thus reduce risks to water quality (BLM 2007a). In general, strict application of the SOPs and mitigation measures in Appendices E, F, and G would minimize the water quality impacts of this alternative.

If any riparian areas do become denuded as an inadvertent result of nearby weed treatment, these sites would be potential candidates for restoration. Any additional disturbance related to restoration would be minor compared with the benefits of a more rapid reestablishment of vegetation cover.

In summary, reducing the number of acres degraded by weed infestations throughout the GSFO via this alternative would reduce sedimentation in water bodies, improve nutrient cycling, and help return the landscape to normal fire cycles (BLM 2007a). If properly applied, the herbicide treatments in the Proposed Action—particularly in riparian areas of 303(d) listed watersheds—would improve water quality and quantity, thus enhancing fish and wildlife habitat and recreational opportunities in the long term. These benefits may prove to be greater than those resulting from the other three alternatives.

Alternative B – No Action (Current Management)

Under this alternative, the GSFO would not be able to use the four additional herbicide active ingredients approved in the PEIS (BLM 2007a) but would continue to use the 14 herbicide active ingredients previously approved for use in the 1991 Vegetation EIS (BLM 1991b). Because the GSFO would not be able to use the herbicide active ingredient imazapic, which is the most effective cheatgrass control, this noxious weed would continue to spread.

Because of the inability to use aerial herbicide application, Alternative B would allow no more than 1,000 acres per year, compared to 5,000 acres under Alternative A. Consequently, the potential for negative impacts to—or lack of improvement in—surface water and alluvial groundwater from weed treatments would be greater than in Alternative A. For example, the smaller range of available pesticides would decrease the opportunity for spot and localized applications of specific weed patches; more widespread application of a single herbicide may be more likely to result in drift and movement of herbicide from upland sites into water bodies and alluvial groundwater. Additionally, the area dominated by cheatgrass would continue to expand, and the low ability of this weed to hold soil in place would lead to a larger volume of sediment reaching downslope water bodies. On the other hand, a smaller number of herbicides used to treat a specific area may lead to a slightly decreased likelihood of spills during the reloading of spray applicators.

Alternative C – No Herbicide Use

This alternative would result in the least acres treated annually because of the increased labor, time, and cost associated with manual and biological control options. Consequently, noxious and other invasive weeds would spread at a faster rate than under other alternatives. Many of the noxious weeds in the

GSFO are perennials that are most effectively controlled with herbicides. For example, Russian knapweed and Canada thistle would probably increase from manual treatments because rhizomes and root fragments left behind would create numerous new plants. Cheatgrass would not be treated because herbicides provide the only feasible form of control for this species. Russian-olive and tamarisk would probably not be treated, because without the use of herbicides to kill the stump and roots, new plants would sprout. Small, isolated weed infestations would be the focus for manual control.

Biological controls could still be used to control weeds for which biocontrols are available. However, biocontrol agents only exist for a few GSFO weed species. Even for these, such agents work slowly and do not typically eradicate weed populations but work to weaken the vigor of individual plants, gradually reducing their competitiveness. Increased use of manual methods, and possibly domestic ungulates, in riparian areas could lead to increases in sedimentation and nutrient loads of adjacent water bodies. As a result, benefits to surface water from weed treatments in the form of sediment control would be fewer and less extensive than in any of the other alternatives.

While some short-term reduction in water body sedimentation would result from reduced weed treatment, in the long term water bodies would receive more sediment as a result of increased fire hazard, decreased ability of plant roots to hold soil in place, and the likely increase in ground disturbance due to increased use of goats or other ungulates for biocontrol. To an even greater degree than in Alternative B, the widespread occurrence of cheatgrass would adversely affect surface water quality under this alternative. On the other hand, eliminating herbicide use would also eliminate the possibility of herbicide drift and runoff into water bodies, and herbicide infiltration into alluvial aquifers. Additionally, manual treatment seldom results in large areas of exposed soil; at least some weed material (e.g., tree stumps) would remain in the treatment areas, reducing somewhat the risks of sedimentation and alteration to stream flow.

The use of herbicide-related mitigation measures in the three other alternatives would minimize the risks associated with herbicides, reducing the potential benefits of reliance on manual and biological controls as proposed in this alternative.

Alternative D – No Aerial Application of Herbicides

This alternative would not include aerial applications. Therefore, large and inaccessible weed infestations would not be treated in situations where ground-based treatments would be infeasible or ineffective. Not being able to use aerial spraying would limit the total treatment area to 1,000 acres per year, compared to 5,000 acres per year under the Proposed Action. However, the GSFO would be able to use all 18 chemicals currently approved for use on BLM lands. This includes imazapic, which is the most effective herbicide currently available to BLM for control of cheatgrass.

The impact of this alternative on surface water and groundwater would be intermediate between those of Alternative A (which includes both aerial spraying and the four new herbicides) and Alternative B (which includes neither aerial spraying nor the new herbicides). The lack of aerial applications would primarily impact cheatgrass and a few other widespread weeds, but this would be ameliorated somewhat by the use of imazapic. Localized dependence on manual and ungulate (selective grazing) biocontrol methods could lead to increased soil detachment and sedimentation in downslope water bodies. On the other hand, because aerial spraying has a higher probability of wind drift than hand spraying, its lack of use would reduce to some degree the removal of non-target plants and sedimentation of water bodies adjacent to treated areas, compared to the Proposed Action.

This alternative would have mixed impacts regarding the migration of herbicides into water bodies and infiltration of herbicides into alluvial aquifers. While any reduction in wind drift in riparian areas would

also reduce herbicide concentrations in adjacent water bodies, the increased use of ground methods could increase the possibility of spills, which could migrate into water bodies or soak into the ground.

3.10 Cultural Resources and Native American Religious Concerns

3.10.1 Affected Environment

3.10.1.1 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470) and its implementing regulations found at 36 CFR Part 800 require Federal agencies to take into account the effects their actions will have on cultural resources for any endeavor that involves Federal monies, Federal permitting or certification, or Federal lands.

The GSFO is located within a larger area identified by the Ute Tribes as part of their ancestral homeland. Contemporary Native American groups such as the Ute Tribes of the Uinta and Ouray Bands (Northern Ute), Southern Ute, and Ute Mountain Ute Tribes maintain cultural ties to the land and resources within the GSFO area. Cultural resources are locations of past or current human activity, occupation, or use and include prehistoric or historic archaeological sites, buildings, structures, objects, districts, or other places. Cultural resources can also be natural features including native plants localities that are considered to be important to a culture, subculture, or community. Traditional Cultural Properties (TCPs), located throughout the GSFO area, are places associated with the traditional lifeways, cultural practices, or beliefs of a living community. These sites are rooted in the community's history and are important in maintaining cultural identity. Locations of TCPs, such as traditional plant gathering areas, are often not known to the BLM, but may still be present in the planning area.

There is a potential for proposed vegetation treatments to cause impacts to cultural resources and to native plants utilized by the Ute tribes. Specific vegetation treatment proposals would follow standard procedures for identifying cultural resources, in compliance with Section 106 of the NHPA, as implemented through the Colorado State protocol. The process includes necessary consultations with the Colorado State Historic Preservation Office (SHPO) and interested tribes.

The effect of herbicide treatments on cultural resources depends on the method of herbicide application and the herbicide type used. Some chemicals can cause soil acidity to increase, which would result in deterioration of artifacts. Application of chemical treatments can also result in impacts such as altering or obscuring the surfaces of standing wall masonry structures, rock art panels, and organic materials.

Long-term effects to Tribal cultural uses could be associated with enhancing culturally significant plant and animal habitat as well as improving vegetation cover on eroding archaeological sites. Long-term impacts could also result from ground disturbance associated with the effects of the chemicals or physical damage from vehicles taken off-road to apply the chemicals. Short-term impacts could result from loss of access during treatment.

Depending on the selected application method for herbicide treatment plans, the BLM might be unable to avoid plants identified by local tribes as being important in traditional subsistence, religious, or other cultural practices. Consultation would be undertaken with tribes and groups to locate any areas with plants that are of importance to the tribe and that might be affected by chemical treatments. Certain herbicides could also pose a possible health risk through residues left on plants used as traditional foods or for ceremonial purposes or as a result of contaminating other food sources or drinking water.

3.10.1.2 Native American Religious Concerns

The Ute Indian Tribes claim the GSFO area as part of their ancestral homeland, including known areas of Native American religious concern and potentially other areas not identified to the BLM. The Ute Tribes of the Uinta and Ouray Bands (Northern Ute), Southern Ute, and Ute Mountain Ute Tribes were notified of the proposed IWM Plan on April 1, 2009. No responses, questions, or requests for additional information were received by May 5, 2009.

3.10.2 Environmental Consequences

3.10.2.1 Cultural Resources

Alternative A – Proposed Action

The Proposed Action, like all alternatives, would implement an IWM Plan to guide the management of noxious and invasive weeds on public lands administered by the GSFO. The intent of the plan is to provide a comprehensive range of management actions and a decision-making framework that would allow resource managers to select actions or combinations of actions to meet the objectives of eradicating, significantly reducing, containing, or preventing new infestations of noxious and invasive weed species. The plan is intended to be broad in scope and would be applicable to weed management activities associated with the implementation of any resource management decisions described in current and future RMPs and RMP Amendments.

Also as under all alternatives, the Proposed Action would allow the GSFO to treat noxious and invasive weeds using a combination of the best available weed control technique(s) at the appropriate times based on the life history of the target species and on cost-effectiveness. Manual, biological, and chemical control techniques, and combinations thereof, would be considered. However, the Proposed Action would differ from the other alternatives in two important areas: (1) aerial application of herbicides would be used where appropriate, and (2) GSFO would be able to use the four newly approved herbicides addressed by the PEIS (BLM 2007a).

The availability of aerial spraying for control of large or remote infestations would allow BLM to treat up to 4,000 acres per year using this method, for a total of 5,000 acres per year. The availability of imazapic—one of the four newly approved herbicides—would increase BLM's ability to treat cheatgrass, which often occurs in very large stands following fires in areas degraded by grazing. The combination of aerial spraying and use of imazapic under the Proposed Action would result in much more effective treatment of this highly aggressive, widespread, and difficult weed.

Any proposed noxious and invasive weed control action has some potential to affect cultural resources in the GSFO area. For archaeological sites, direct impacts result primarily from disturbance of surface and subsurface sediments. For historic properties with protohistoric or historic structural remains, direct impacts result from damage to or destruction of these structures. Direct impacts to cultural resources can happen any time the ground is subject to alteration. The best method to reduce or eliminate direct impacts will be designing the Proposed Action to avoid these known resources.

Proximity of a weed management project to a cultural resource may in fact adversely impact the significance of a cultural resource by changing the setting, location, association, and feeling particularly for culturally sensitive Native American sites and/or areas of concern.

Alternative B – No Action (Current Management)

Under the No Action alternative, the IWM Plan implemented for lands administered by the GSFO would not include aerial application of herbicides or the use of imazapic or other newly approved active

ingredients. Control of noxious and invasive weeds would be conducted as under current management and would be limited to no more than 1,000 acres per year, versus 5,000 acres for the Proposed Action.

This alternative would not change the current management of cultural resources. Specific vegetation treatment proposals would continue to follow standard procedures for identifying cultural resources, in compliance with Section 106 of the NHPA, as implemented through the Colorado State protocol. In addition, this alternative would reduce the chance of non-target species/native plant communities and cultural sites being affected by drift of herbicides from areas of aerial application.

Alternative C – No Herbicide Use

This alternative would implement an IWM Plan that includes the manual and biological control elements of the Proposed Action but does not include the use of herbicides. In the absence of chemical controls, there would be an increase in the use of manual and biological control techniques, but the total area treated annually would be much less than under the other alternatives due to the limitations and inefficiencies of these other methods.

While native plants identified as being important in traditional subsistence, religious, or other cultural practices could benefit from manual and biological control techniques and the non-use of chemicals, the spread of invasive species may or may not increase erosion on cultural sites depending upon the nature of the invasive species. If weed encroachment causes soil erosion, artifacts may be exposed and collected or displaced; losing their context. The direct loss of cultural resources due to erosion and exposure as well as replacement of native species would occur over the long term. As weeds spread, native plants available for use by Native American groups would be reduced.

Alternative D – No Aerial Application of Herbicides

This alternative is similar to Alternative A (Proposed Action) in that it would utilize an IWM Plan for weed control. Under Alternative D, however, only ground-based techniques would be used to apply herbicides, which would reduce the risk of drift onto non-target areas. Consequently, this alternative would reduce the exposure risk to non-target species, native plant communities, and cultural sites.

3.10.2.2 Native American Religious Concerns

Alternative A – Proposed Action

Any proposed control of noxious and other invasive weed species has some potential to affect areas of Native American religious concern in the GSFO area. The best method to reduce or eliminate direct negative impacts would by designing the Proposed Action to avoid these areas. Even the proximity of a weed control action to native plant communities, cultural sites, or areas of Native American religious concern may in fact adversely impact the significance of the area by changing the setting, location, association, and feeling.

Alternative B – No Action (Current Management)

This alternative would not change the current management of weeds as it affects areas of Native American religious concern. Specific treatment proposals would continue to follow standard procedures for identifying cultural resources. In addition, Alternative B would reduce the chance of native plant communities, cultural sites, or areas of Native American religious concern being affected by drift of herbicides from treated areas into non-target areas.

Alternative C – No Herbicide Use

While areas of Native American religious concern would benefit from no use of chemicals, the spread of invasive species may or may not increase erosion on these sites, depending upon the nature of the invasive species. If weed encroachment causes soil erosion, artifacts may be exposed and collected or displaced, losing their context. As weeds spread and replace native populations, plants available for use by Native American groups would be reduced.

Alternative D – No Aerial Application of Herbicides

Because this alternative would not use aerial herbicide application, it reduces the risk to native plant communities, cultural sites, and areas of Native American religious concern from drift of herbicides into non-target areas.

3.11 Visual Resources

3.11.1 Affected Environment

The BLM identifies and evaluates visual resource values through the VRM (Visual Resource Management) inventory system (Handbook H-8410-1; BLM 1986a). The VRM system is a policy used by the BLM to inventory and manage visual resources on public land based on the aforementioned VRM classes describing scenic quality, sensitivity level, and distance zone criteria. Visual resource management objectives are established in resource management plans in conformity with land use allocations (see BLM 1984b). These area-specific objectives provide the standards for planning, designing, and evaluating future management projects. A Contrast Rating System (Handbook H- 8431-1; BLM 1986b) provides a systematic means to evaluate the approved VRM objectives and to identify mitigation measures to minimize adverse visual impacts. BLM's VRM classes and associated objectives are summarized in Table 9.

Table 9. BLM Visual Resource Management Class Descriptions

VRM Class	Class Objective
I	Preserve landscape character. This class provides for natural ecological changes but does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	Retain existing landscape character. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract a casual observer's attention. Any changes must repeat the basic elements of line, form, color, and texture found in the predominant natural features of the characteristic landscape.
III	Partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	Provide for management activities that require major modification of the landscape character. The level of change to the characteristic landscape can be high. 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 repetition of the basic

	landscape elements.
Rehabilitation Areas	Areas in need of rehabilitation should be flagged during the inventory process. The level of rehabilitation is determined through the RMP process by assigning the VRM Class approved for that particular area.

Source: BLM 1986a

The landscape within the GSFO area is diverse and consists of foothills, mountains, plateaus, mesas, canyons, and both broad and narrow river valleys. Vegetation types vary from grassland, saltbush, and sagebrush at lower elevations to mountain brush and pinyon-juniper at middle elevations and coniferous and aspen forests at higher elevations. Some of the streams and rivers flowing though and adjacent to the GSFO area include the Colorado, Eagle, and Roaring Fork Rivers, and Deep, Thompson, Sweetwater, Elk, Rock, Egeria, and Abrams Creeks. Prominent landscape features in the GSFO area include Anvil Points, the Grand Hogback, Castle Peak, Deep Creek Canyon, Bull Gulch, Thompson Creek, and the East Fork of Parachute Creek. While most of the valley bottoms are private and within the foreground of viewsheds, adjacent public lands serve as important scenic backdrops and visual open space.

The GSFO encompasses 10 communities (Parachute, Rifle, Silt, New Castle, Glenwood Springs, Dotsero, Gypsum, Eagle, Carbondale, and El Jebel/Basalt) and is bisected by some of Colorado's busiest highway corridors (Interstate 70 and State Highways 13, 82, and 131). Visual quality is a concern to most residents in the GSFO area. The proximity of BLM lands to communities and key transportation corridors in addition to the combined effects of scenic quality, the high degree of sensitivity, and visual accessibility have resulted in large portions of the GSFO being managed as VRM Class II.

While many of GSFO lands are highly visible and have a high degree of sensitivity, the diverse topography and vegetation allow these lands to have a high degree of visual absorption capability. The VRM Classes under the current RMP (BLM 1984) and the potentially new VRM Classes resulting from the current RMP revision in the GSFO were chosen to emphasize scenic quality along I-70; State Highways 82, 13, and 131; the Colorado River Road; and other high-sensitivity transportation corridors. The Deep Creek, Thompson Creek, East Fork of Parachute Creek Canyon, and Bull Gulch ACECs and all of the WSAs in the GSFO have been proposed for special management (VRM Class I) to protect their outstanding scenic qualities and to preserve their naturalness.

3.11.2 Environmental Consequences

3.11.2. 1 General Impacts of Weed Treatments on BLM Lands

Direct and Indirect Effects

Under Alternatives A, B, and D—all of which involve the use of herbicides to treat infestations of noxious weeds and other invasive plant species—impacts to visual resources would be evaluated by comparing the existing characteristic landscape with the anticipated changes in the basic design elements of form, line, color, and texture likely to result from use of herbicides. Any of the alternatives involving use of herbicides to control weeds would create the potential for short-term and long-term changes to existing landscapes that contain substantial amounts of weeds.

In general, herbicide treatments would have short-term negative effects and long-term positive effects on visual resources. The effects of treatments over a large portion of the landscape are more likely to be observed by people than the effects of small-scale treatments. Impacts to visual resources from herbicide treatments would begin to disappear within one or two growing seasons in most landscapes. The

regrowth of native vegetation on the site would eliminate much of the stark contrasts and visual impacts within a cleared area.

The removal of vegetation could have short-terms effects to the visual qualities of treatment sites by creating openings and obvious changes in color or texture due to direct mortality of the weeds and some non-target plant species that provide a noticeable visual contrast to the surrounding areas of green vegetation. The degree of these effects would depend on the amount of area treated, the appearance of the background vegetation and the vegetation being removed, the type of treatment, the season of treatment, and the sensitivity of the viewshed.

Over the long term, vegetation treatments would likely improve visual resources on public lands. Treatments that aim to rehabilitate degraded ecosystems, if successful, would result in plant communities that are dominated by native species, which is considered to be positive and would significantly outweigh any short-term negative impacts.

For small treatment areas, negative impacts from the presence of dead or dying plants, an overall decrease in plant cover, and an increase in bare soil would generally be less severe due to the smaller scale of the treatment. Although the small scale would be less effective at reducing the conspicuousness of the treatment if located adjacent to an area of human use—e.g., at a trailhead or along a trail—the close viewing distance should make it apparent that the area has been treated for weeds.

For large treatment areas, and especially for those with a high initial cover by target species, herbicide treatments may cause the landscape to have less green color and/or less total plant cover, with a greater amount of bare soil. This could be particularly negative for large treated areas that are visible but not in the immediate foreground of identified sensitive viewsheds, which include key transportation corridors and communities. For treated areas that are visible but located in the immediate foreground (e.g., adjacent to a transportation corridor or on a BLM parcel adjacent to a rural residential or small urban area), this is less of a concern because it should be more apparent that the changes are temporary and due to weed treatments and hence beneficial.

Prevention or Mitigation of Adverse Impacts

Under any of the alternatives involving use of herbicides, the SOPs and mitigation measures described in Appendices E and F would be implemented to reduce adverse impacts to the environment. In general, many of these measures would also benefit the protection of visual quality by minimizing mortality of non-target plant species and ensuring prompt reclamation of areas not expected to recover naturally within a reasonable timeframe. In addition, the following mitigation measures specific to visual resources would be applied:

- For very large and dense weed infestations in VRM Class I or Class II areas that have a high degree of sensitivity, consider treating the infestations in multiple applications at different times so that changes in landscape character are staggered. This measure would not be used if it would compromise the effectiveness of the treatment (e.g., by allowing weeds to invade treated areas from untreated areas).

- For very large and dense weed infestations in VRM Class I and II areas that are highly visible or have high sensitivity, consider reseeding to hasten recovery rather than relying on natural processes, even if natural processes are anticipated to be effective eventually.

The following subsections summarize impacts to visual resources under the four alternatives analyzed in this programmatic EA.

3.11.2.2 Impacts by Alternative

Alternative A – Proposed Action

The Proposed Action would have the greatest potential for both adverse short-term impacts and beneficial long-term impacts from use of herbicides to treat noxious and other invasive weeds. This conclusion is based on the fact that Alternative A is the only alternative that would include the use of helicopters or fixed-wing aircraft to apply herbicides to large or remote infestations that may be difficult or inefficient to treat with other methods. No large-scale weed control would be expected in VRM Class I areas (WSAs and the Deep Creek, Thompson Creek, Bull Gulch, and East Fork of Parachute Creek ACECs) due to the largely undisturbed and natural appearance of the existing landscape, and few large scale projects would be expected in VRM Class II areas. Large-scale treatments within VRM Class II areas may require special project requirements to reduce long term contrasts that may attract attention of casual observers.

Alternative B – No Action (Current Management)

Continuation of current management under Alternative B would have both fewer short-term adverse impacts and fewer long-term benefits than the Proposed Action due to the lack of aerial spraying and resultant smaller area treated annually (up to 1,000 acres per year versus 5,000 acres for the Proposed Action). Weed control efforts would generally be concentrated in small areas of disturbance and along travel corridors where a disturbance is already present. No large-scale weed control would be expected in VRM Class I areas due to the largely undisturbed and natural appearance of the existing landscape, and few large scale projects would be expected in VRM Class II areas. Large-scale treatment within VRM Class II areas may require special project requirements to reduce long term contrasts that may attract attention of casual observers.

Alternative C – No Herbicide Use

Because no herbicide treatments would take place under Alternative C, visual resources would not be adversely affected by changes in vegetation related to the presence of dead or dying plants. Conversely, visual quality aspects adversely affected by a dominance of weeds would not improve over time and instead would become further degraded as invasive plants continue to spread. Many types of weed infestations (e.g., knapweeds, non-native thistle, etc.) cannot be effectively controlled by manual or biological treatments, particularly if the infestations are large. Therefore, efforts would generally be limited to small areas that can be treated manually. Even small stands may not be effectively controlled manually because new plants may arise from roots and rhizomes that remain in the ground.

Alternative D – No Aerial Application of Herbicides

Impacts to visual resources under Alternative D would be less than under the Proposed Action because the lack of aerial herbicide applications may make some remote locations difficult or impossible to treat effectively. In addition, because large-scale treatments are less feasible without aerial spraying, fewer large areas of vegetation are likely to be treated, further reducing both the short-term negative and long-term positive visual impacts. Over the long term, this alternative would leave more large tracts of land untreated than the Proposed Action (Alternative A). Weed control efforts would generally be concentrated along travel corridors where a disturbance is already present.

3.12 Recreation

3.12.1 Affected Environment

3.12.1.1 Recreation Activities

Recreation has become the predominant use of local BLM and National Forest System lands. Most estimates of recreational use on public lands depend entirely on field observations and professional judgment of the recreation staff and hence are not scientifically based. The 568,000 acres in the GSFO area receive more than 800,000 visits per year. Outdoor recreation opportunities on these lands include land-based, water-based, and snow-based sports. Typical activities include camping, hiking, horseback riding, mountain biking, OHV riding/driving, and cross-country skiing/snowshoeing. Migratory and resident wildlife provide plentiful opportunities for hunting, photography, and wildlife observation. Renowned local rivers (Eagle, Colorado, and Roaring Fork), smaller streams, and lakes offer boating and coldwater fishing opportunities.

The nation's largest herd of elk attracts large numbers of hunters during the big game hunting season, which begins in late August and extends into December. Because Colorado offers unlimited over-the-counter elk hunting licenses, big game hunting alone accounts for more than 200,000 participants and 600,000 visitor days within the GSFO area.

3.12.1.2 Community Growth Areas

A considerable and growing recreation demand is found on BLM lands around and between communities in wildland-urban interface areas with trail/road networks and aesthetic amenities. Community growth issues abound since 80 percent of the BLM lands are within one-mile of private lands. The towns of Eagle, Gypsum, Glenwood Springs, Carbondale, Basalt, New Castle, Parachute, Silt, and Rifle have bordering BLM lands that are valued as "backyard" recreation areas by local residents.

3.12.1.3 Recreation Management Areas

BLM's *Land Use Planning Handbook* (H-1601-1) requires that BLM identify land as either Special Recreation Management Areas (SRMA) or Extensive Recreation Management Areas (ERMA). Both classifications offer quality and highly valued recreation or tourism opportunities which are paramount to recreation participants, recreation-tourism partners, recreation service providers, and communities.

Special Recreation Management Areas – SRMAs previously were identified on BLM lands that were experiencing heavy use or where BLM planned on making large investments in staff, funding, facilities, or time. SRMAs now are identified to address areas where recreation is the management focus. The GSFO currently manages eight SRMAs (Table 10).

Table 10. Special Recreation Management Areas in the GSFO

SRMA Name (acres)	Targeted Activity Opportunity	Management Summary
Bocco Mountain (1,388)	Motorcycling	Identified as an SRMA in the 1997 Castle Peak Travel Management Plan. Designated and maintained single-track trails with highest use in the spring. Administered by BLM predominantly through travel route designations and implementation plan.
Bull Gulch (8,252)	Hiking, Hunting	Low use until fall hunting seasons. No developed facilities

Table 10. Special Recreation Management Areas in the GSFO

SRMA Name (acres)	Targeted Activity Opportunity	Management Summary
		or maintained trails. SRMA overlaps with ACEC and WSA designations.
Carbondale Red Hill (3,092)	Hiking/Running/Mountain Biking	Identified as an SRMA in the 1999 Red Hill SRMA RMP amendment. Administrative partnership with the Red Hill Council. Implementation plan completed in 2000. Designated and maintained single-track trails. Only SRMA in GSFO integrating BBM concepts. Primary market strategy is the residents of the Roaring Fork Valley. High use in spring, summer, and fall.
Deep Creek (2,406)	Hiking	SRMA overlaps with ACEC designation. Eligible/suitable Wild and Scenic River section. Trailhead and primitive trail along Deep Creek. High use in summer and fall.
Gypsum Hills (16,931)	OHV driving and riding	Identified as an SRMA in the 1997 Castle Peak Travel Management Plan. Minimal public interest and the GSFO staff never completed an implementation plan. Administered by BLM via travel route designations. High use in summer and fall.
Hack Lake (3,337)	Hiking, Horseback Riding, Hunting	Low use until late summer and during the fall hunting season. SRMA overlaps with small WSA. Adjacent to Flat Tops Wilderness Area. Trailhead and a few primitive trails.
Thompson Creek (4,270)	Hiking, Climbing	SRMA overlaps with ACEC designation. Eligible/suitable Wild and Scenic River section. Trailhead and one maintained trail. High use in late spring, summer, and fall.
Upper Colorado River (20,600)	Fishing, Floatboating, Swimming	High visitation. Marketed as a destination for visitors to resorts for fishing and boating and popular with Colorado residents. Eligible/suitable Wild and Scenic River section. Numerous facility developments and access points. High use in summer and fall.

Extensive Recreation Management Areas – BLM lands not delineated as an SRMA are identified as an ERMA. Several ERMAs may be identified to address the wide variety of recreation-related tourism issues, activities, or circumstances (e.g., use and user conflicts, visitor safety, resource protection) within one decision area. ERMAs make up 88 percent of BLM lands within the GSFO.

ERMAs provide unspecified recreation settings that facilitate the visitors' freedom to pursue a variety of recreation opportunities and outcomes. Recreation users value the freedom of choice, remoteness, and naturalness associated with dispersed recreation use. Regardless of the activity, the opportunity to get away from day-to-day stresses, and to be with friends and family in a natural setting, are the primary benefits that motivate dispersed recreation visitors.

Within ERMAs, management, administration, marketing/information/education and monitoring support actions are aligned to maintain participation in a variety of recreation activities as well as addressing use/user conflicts, visitor safety, and/or resource protection. Visitors usually find basic visitor services and few developed recreational facilities.

3.12.1.4 Developed Recreation Facilities

Developed recreation sites and facilities have been constructed to enhance recreation opportunities, protect resources, manage activities, or reduce recreation use conflicts Developments range from campgrounds to trailheads with simple bulletin boards to developed river access. Recreation management has traditionally focused on managing BLM lands and developed recreation sites along the Colorado, Eagle, and Roaring Fork Rivers except during the fall big game seasons when the focus shifts to upland areas. The developed sites adjacent to growing communities and I-70 are used by residents as community/urban parks for day-use activities.

The GSFO manages 19 day-use sites, all of which provide river access and 10 of which provide boat launches. The GSFO also manages 15 trailheads, in addition to 5 developed campgrounds that contain a total of 36 campsites. Most of the developed campgrounds have basic infrastructure, few campsites, and receive seasonal use. One exception, the Gypsum campground, is often used for activities, such as permanent residency and late-night parties due to its proximity to I-70. Two of the developed campgrounds collect fees, together totaling $4,000 to $5,000 and 1,000 to 1,300 visitor days per year. These sites are maintained by BLM seasonal staff.

3.12.1.5 Marketing and Tourism

The State of Colorado attracts visitors who embrace its image as a place for adventure and recreation. Outdoor recreation is a big business and accounts for approximately 31 percent of all travel into Colorado (including business travel and skiing). A variety of attractions and activities, during all seasons, provide a stable tourism industry that is important to the regional economy, as well as to the fiscal well-being of the sales tax dependent local governments. Tourism and out-of-area incomes are often the primary economic engines of an economy which boasts renowned recreation opportunities.

The GSFO is in Colorado's northwestern tourism region. BLM marketing has generally focused on hunting and motorized sports on the White River National Forest and other opportunities elsewhere in the region. BLM lands tend to be marketed indirectly or lumped in with opportunities on the White River National Forest. The most commonly cited economic benefit derived from BLM lands is contributions to the local economy made from hunting and wildlife-related tourism. Some communities say that revenues from hunting season are so important that they sustain many businesses throughout the rest of the year.

3.12.2 Environmental Consequences

3.12.2.1 General Impacts of Weed Treatments on BLM Lands

Direct Effects

Weed treatments using manual, biological, or chemical controls as allowable and appropriate under each alternative would have some short-term negative but more substantial long-term positive impacts. In general, direct impacts to recreational users and opportunities would result primarily from temporary closures of areas being treated. These closures would be related to protection of human health and safety and would be based on the specific treatment method. Temporary closures of treated areas could adversely affect visitors who are unaware of the closure and travel to the area, only to find that they cannot use it at that time or on that day.

Manual controls, to be used for small populations of weeds, may not require any closures other than setbacks from areas of active weed-whacking or other methods that could represent a safety hazard in the immediate vicinity during the period of active treatment. Biological controls, such as releasing an insect or pathogen known to injure or kill a certain weed species or using livestock to reduce weed vigor by removing above-ground biomass and/or seed heads, could also require temporary closures to prevent conflicts with recreational users.

Chemical controls would have a much greater potential for direct adverse impacts due to the toxicity of some compounds to human receptors (see Section 3.14). This risk of toxic exposures could result from accidental direct spray, contact with freshly sprayed foliage by walking through a treatment area, inhalation or incidental ingestion of aerial drift outside a sprayed area, and ingestion of berries and other fruits that have been sprayed directly or subject to deposition from aerial drift (see Section 3.14).

Indirect Effects

Visitors may be impacted by the inconvenience associated with temporary closure of treated areas, especially if they made plans and traveled to a site expecting that it would be open. Visitors may also acknowledge indirect, short-term, site-specific negative effects associated with dead or dying vegetation following herbicide applications. Human-caused landscape alterations can negatively impact the physical (including visual) and social qualities of the recreation setting in areas perceived to be relatively "natural" and dominated by natural ecological processes (e.g., the Hack Lake, Castle Peak, Bull Gulch, and Thompson Creek areas). Considering details such as timing of the treatment (e.g., spraying in late summer and early fall when other vegetation is also cured and brown) can reduce indirect impacts to recreation setting character quality resulting in less impact to the visitors' recreation experience.

Prevention or Mitigation of Adverse Impacts

The following are measures to avoid or minimize adverse impacts of herbicides to recreation uses. Also see Appendices E and F for SOPs and mitigation measures presented in the PEIS (BLM 2007a).

All Treatments

- Address site-specific recreation use (e.g., SRMAs, peak use periods, visitor health and safety issues, and commercial use) in annual operational plans or proposed aerial application projects.
- Avoid treatments near concentrated recreational areas during on weekends and during holiday periods.

Aerial Treatments

- Avoid aerial applications of bromacil, diuron, and tebuthiuron in areas likely to receive high recreation use during or within 1 week after spraying.
- Avoid aerial applications of herbicides in low-elevation areas along the I-70 corridor west of Glenwood Springs where big game hunting use is high during big game rifle seasons.
- Sign main access routes into the aerial application area with notices explaining when the aerial application of herbicides is going to be performed and the associated precautions.

Other Treatments

- Post signs to temporarily close treatment areas during herbicide application or manual treatment. The scale and duration of the closure will be based on the type of treatment. In the case of herbicide use, the closures may extend for considerable distances from the treated area and may last for up to 1 week, depending on the specific chemical and application method. An explanation for the closure and the associated precautions should be included on the signage.

- Mix a degradable dye with the herbicide to help visitors see the treated areas near developed recreation sites and high use trails.

Mitigation for impacts on recreational uses of wilderness and other special areas (e.g., streams eligible for listing as Wild and Scenic Rivers) is addressed in Section 3.13.

3.12.2.2 Impacts by Alternative

Alternative A – Proposed Action

Because Alternative A would include aerial applications—allowable only under this alternative—it would represent an additional risk to recreational users due to the greater area to be treated annually (up to 5,000 acres per year, compared to 1,000 acres under the other alternatives) and the greater risk from drift of herbicides into non-target areas. However, health risks to recreational users are low for most of the herbicides approved for use on BLM lands, including inadvertent exposure to an herbicide mist or contact with freshly sprayed vegetation (see Section 3.14). Exceptions are bromacil, diuron, and tebuthiuron, all of which represent some risk to public receptors from these exposure scenarios.

The risk of incidental exposure from aerial applications would probably be greatest for visitors who are traveling cross-country through dense vegetation into remote areas where the use of aerial applications is more likely to be the preferred treatment method. This risk would be greatest during the fall big game hunting season when dispersed use is high and when visitors camp and hunt in remote areas.

Alternative B – No Action (Current Management)

Under the No Action alternative, weed treatments would continue as at present. Therefore, aerial application would not be allowed. As a result, although this alternative would represent some of the direct and indirect impacts to visitors described above, these would generally be less than under the Proposed Action. This applies to the long-term positive impacts of weed control as well as the short-term negative impacts of conflicts with recreation resulting from temporary closures and a temporary decrease in visual quality of treated vegetation at trailheads, boat put-ins and take-outs, and other areas of concentrated human use.

Alternative C – No Herbicide Use

Relying solely on manual and biological controls for noxious weeds and other invasive non-native species would avoid the short-term conflicts with visitors resulting from temporary closures of sprayed areas and from a decrease in visual quality from dead or dying vegetation in areas being used for recreation use. Over the long term, weed infestations could result in a decline in the quality of the recreation opportunity, especially for those activities dependent on healthy native plant and animal populations, such as wildlife viewing and hunting.

Alternative D – No Aerial Application of Herbicides

Short-term adverse and long-term beneficial impacts of chemical control of weeds on BLM lands under this alternative would be similar to those with current management (Alternative B) and with aspects of the Proposed Action (Alternative A) not associated with aerial herbicide applications. The principal difference between this alternative and the Proposed Action would be a reduced risk to dispersed recreation visitors from exposure to herbicide drift, direct spray, or contact with recently sprayed vegetation. These lower risks are due to both the smaller area treated annually (no more than 1,000 acres versus 5,000 acres under the Proposed Alternative) and the lack of aerial application.

3.13 Wilderness and Other Special Areas

3.13.1 Affected Environment

The BLM manages certain lands under its jurisdiction that possess unique and important ecologic, biologic, geologic, paleontologic, historic, and social values. Most special areas are either designated by an Act of Congress or Presidential Proclamation, or are created under BLM administrative procedures. The National Landscape Conservation System (NLCS) is the primary management framework for lands designated by Congress.

The GSFO currently manages two types of lands under the NLCS: Wilderness Study Areas (WSAs) and Wild and Scenic Rivers (WSRs). The GSFO does not manage any designated Wilderness, National Monuments, National Conservation Areas, National Scenic and Historic Trails, or Recreational Rivers. The remaining special areas are analyzed and designated during the land use planning process and are managed under administrative procedures. At the time of this assessment, GSFO administrative designations include Areas of Critical Environmental Concern (ACECs) and SRMAs. All "Special Areas" covered in this section have unique authorities, policies, and administrative directions that guide special management actions with the common goal and overall intent to evaluate, preserve, and protect those significant components of our national heritage.

The BLM conducted a 15-year wilderness study process on all public lands for wilderness characteristics during the 1980s. Four areas consisting of 27,724 acres (Castle Peak, Bull Gulch, Flat Tops Addition-Hack Lake, and Maroon Bells Addition-Eagle Mountain) within the GSFO were found to contain wilderness characteristics, were designated as WSAs, and subsequently were included as part of the *BLM Colorado State Office Final Wilderness Study Report* (BLM 1991) that was submitted to Congress in 1991. Until Congress either designates these WSAs as Wilderness or releases them for other uses, the BLM will continue to manage them under BLM's *Interim Management Policy (IMP) Handbook for Lands under Wilderness Review* (H-8550-1) (BLM 1995).

The objective of the Integrated Management Policy is that WSAs be managed to prevent unnecessary or undue degradation so as not to impair their suitability for designation as "Wilderness." [As used in this programmatic EA, "Wilderness" means designated as such by Congress, while "wilderness" means any

area having wilderness characteristics.] To this end, all permitted activities must be temporary and create no new surface disturbance nor involve permanent structures. All management actions must preserve and protect wilderness characteristics, which include naturalness, outstanding opportunities for solitude and unconfined types of recreation, and supplemental values. In accordance with BLM's Integrated Management Policy, manipulation of vegetation by chemical or biological means [or mechanical means, which are not included in the proposed IWM Plan] will not be permitted except for the "control of noxious weeds and individual exotic plants such as tamarisk when there is no effective alternative and when control of the noxious weed or exotic plant is necessary to maintain the natural ecological balance within a WSA or portion of the WSA." All WSAs within the GSFO are closed to motorized and mechanized vehicles.

At the time of preparation of the current EA, the GSFO contains no designated WSRs. However, in preparation for an RMP revision, WSR eligibility studies were conducted by the GSFO in 1995 for Deep Creek, in 2002 for streams within the Roan Plateau planning area, and in 2007 for the remaining public lands and related waters. These studies were conducted in accordance with section 5(d) (1) of the WSR Act of 1968. All eligible segments are assigned a tentative classification to ensure appropriate protections for lands adjacent to those stream corridors. Classifications are based on the type and degree of human development and access associated with the river and adjacent lands at the time of the eligibility determination. A total of 26 "eligible" segments are currently being managed administratively by the GSFO through stipulations, allowable uses, and/or management actions that protect the identified Outstanding Remarkable Values (ORVs).

All eligible streams will be managed to protect their free-flowing nature, the identified ORVs, and the segments preliminary classifications until a suitability study is completed. Only Congress can designate a river/stream for inclusion into the WSR preservation system. A WSR suitability study is currently being conducted as part of the current RMP revision being undertaken by the GSFO. The ORVs identified to date in the WSR study process include fish, botanic, ecologic, geologic, and recreation (float boating, fishing).

The GSFO also currently manages approximately 27,000 acres within six ACECs. The current RMP revision may result in identification of additional ACECs. ACECs are defined in FLPMA as "areas within the public lands where special management attention is required to protect and prevent irreparable damage to important and unique historic, cultural, botanic, and scenic values, fish and wildlife resources, other natural systems or processes (rare or exemplary), or to protect life and safety from natural hazards." Administrative protections established through stipulations, withdrawals, avoidance, and/or allowable uses are uniquely prescribed by each individual area. The objective is to provide special management for natural area requiring such and to protect and preserve the relevant and important values. ACECs currently designated in the GSFO area contain the following relevant and important values: scenic, geologic, cultural, botanic, fish, and one debris flow.

SRMAs are addressed in the Section 3.12, Recreation.

3.13.2 Environmental Consequences

3.12.2.1 General Impacts of Weed Treatments on BLM Lands

Because of their special status WSAs, WSRs, and ACECs have strict guidelines for vegetation treatments. These guidelines prohibit activities that degrade the quality, character, and integrity of the protected lands. Vegetation treatments used in WSAs, or in designated Wilderness, must follow guidance contained in 43 CFR 6300 (*Wilderness Management*), Handbooks H-8560-1 (*Management of Designated Wilderness Areas*) (BLM 1988e) and H-8550-1 (*Interim Management Policy for Lands under Wilderness*

Review) (BLM 1995), and BLM Manual Section 8560 (*Management of Designated Wilderness Areas*) (BLM 1993). Management in areas containing wilderness characteristics is directed at retaining the natural character of the environment.

No standard set of restrictions applies to vegetation treatments in other types of special areas. However, the unique values of these areas must be considered when preparing plans for treatment activities. Activities proposed within ACECs must consider and protect the identified relevant and important values, while those within eligible or suitable WSR corridors (0.25 mile either side of the river) must consider and protect the identified ORVs, free-flowing nature, and tentative classifications.

The PEIS and PER (BLM 2007b, c) present thorough analyses of the effects associated with vegetation treatments proposed for BLM lands. The environmental effects to wilderness and other special areas in the GSFO would be the same as or similar to those identified in the above documents. This section summarizes impacts discussed in the PEIS and PER as pertains to resources and land uses in the GSFO.

In WSAs, ACECs, stream segments eligible as WSRs, and other special areas, only treatments that protect and/or improve the natural condition of the identified values for which the area was recognized would be allowed under any alternative. During GSFO's annual weed treatment planning process under the IWM Plan, all proposals for weed treatments would incorporate, analyze, and document applicable management objectives for each special area and its related values; the allowable uses, stipulations, and travel management restrictions; and any subsequent special project requirements or restrictions.

Visitors may be impacted by the inconvenience associated with temporary closure of treated areas, especially if they made plans and traveled to a site expecting that it would be open. Visitors may also acknowledge indirect, short-term, site-specific negative effects associated with dead or dying vegetation following herbicide applications. Human-caused landscape alterations can negatively impact the physical (including visual) and social qualities of the recreation setting in areas perceived to be relatively "natural" and dominated by natural ecological processes (e.g., the Hack Lake, Castle Peak, Bull Gulch, and Thompson Creek areas).

Mitigation for the potential adverse impacts to uses of WSAs, ACECs, eligible WSRs, and other special areas consists of giving consideration to details such as timing of the treatment to avoid the period of greatest use of the area or spraying in late summer/early fall when other vegetation is cured and brown.

3.13.2.2 Impacts by Alternative

Alternative A – Proposed Action

The ability to use four new chemicals under this alternative would provide additional capabilities for controlling problematic invasive species and would provide long-term benefits to wilderness characteristics and other special area values through the control or elimination of these species. Because this alternative involves potentially the most treatment acres (up to 5,000 acres per year, compared to 1,000 acres or less for other alternatives), it could also have the greatest short-term adverse impact on these special areas. Short-term impacts could result from temporary closures and impacts to the natural-appearing landscape and non-target native vegetation of these areas. Although a small portion of treated acres may be in special areas, more total acres would be treated under this alternative than any other alternative. Therefore, more acres of sensitive areas may be treated than under the other alternatives.

While this alternative could have the greatest beneficial impact on wilderness and other special areas by reducing the risk of loss of those values and potentially improving the natural ecosystem processes, many of the sensitive areas would be unlikely to be treated aerially. This conclusion is based on deep canyon

terrain (the Deep Creek, Thompson Creek, and East Fork of Parachute Creek ACECs and the Bull Gulch WSA), relatively small size (the Flat Tops Addition and Eagle Mountain WSAs), and the high public use (WSR-eligible segments of the Colorado River) of these areas.

Among non-chemical control methods, grazing is generally compatible with the designated uses of these areas, and selective grazing for weed management could be less intrusive than other treatments. In areas that historically did not support livestock and where grazing does not currently occur, the introduction of domestic grazers or a switch to a different species of grazer could adversely affect some relevant and important or outstanding remarkable values. Examples include naturalness and special status species.

Alternative B – No Action (Current Management)

Impacts to wilderness characteristics and other special area values under the No Action alternative as a result of herbicide treatments would be similar to those that are currently occurring. Wilderness and special areas that are dominated by invasive species are usually less visually aesthetic and deemed to be impacted by humans and hence not "natural." Under this alternative, the BLM would treat fewer acres than under the Proposed Action (up to 1,000 acres per year versus 5,000 acres) —and hence fewer acres with wilderness characteristics or other special values. Therefore, Alternative B would have both fewer positive benefits and fewer negative impacts associated with use of herbicides to treat noxious weeds and other invasive plants. In addition, the vegetation treatments would probably not be as effective in restoring wilderness and other special areas due to the inability to use aerial applications for very large or remote infestations or to use the four additional herbicides approved in the PEIS (BLM 2007a).

Alternative C – No Herbicide Use

Alternative C would avoid potential negative impacts on wilderness characteristics and other special area values from accidental exposure to herbicides. However, relying on non-chemical treatment methods for even the most invasive species would greatly reduce GSFO's ability to control or eradicate large or particularly difficult infestations—including both reducing existing weed populations and responding to new infestations that may arise. This includes some weed species that are a nuisance or could be injurious to humans, livestock, and wildlife or that may disrupt natural ecological process.

Reliance on manual or biological treatment methods in lieu of herbicides would have a greater impact on wilderness and other special areas in situations where the presence of weeds is in conflict with the associated values. Manual methods can be used with minimal impacts in sensitive habitats, but they are more costly and labor intensive. Options for biological controls are limited for most weed species and could have unexpected consequences from the introduction of non-native biologic agents and/or grazers.

Alternative D – No Aerial Application of Herbicides

This alternative would be similar to current management (Alternative B) in that it would include herbicides as one of the treatment options but not use aerial applications for large or remote weed infestations. However, because many of the WSAs, ACECs, and WSR-eligible streams would probably not be treated aerially anyway (see discussion under Alternative A, above), its unavailability under Alternative D is less of an issue for wilderness and other special areas. Weed control efforts would generally be by horseback, from a boat, or on foot within WSAs and in special areas concentrated along travel corridors. While this alternative would limit the benefits of large-scale treatments in wilderness and other special areas, the negative aspects of this limitation would be negligible. An exception would be the inability to control weeds in some large-scale revegetation efforts following a fire.

3.14 Human Health and Safety

3.14.1 Affected Environment

People living in or visiting the GSFO area are routinely exposed to a variety of health and safety risks. The four most common causes of death in the U.S., as well as Colorado, are heart disease/stroke, chronic respiratory disease, cancer, and accidents (Minino et al. 2002). In Colorado, mortality rates from these causes in 2002-2003 differed from the national rates as follows (number per 100,000 population; Colorado rates presented first): heart disease/stroke – 231.4 vs. 295.5; chronic respiratory disease – 53.0 vs. 43.4; cancer – 169.5 vs. 193.0; and accidents – 42.0 vs. 36.6. Nationally, mortality rates for males are nearly 1.5 times those for females, and mortality rates for African Americans are nearly 1.5 times those for Caucasians (NCHS 2007, cited in BLM 2007a).

Risks from disease in addition to heart attack/stroke and chronic respiratory disease include a variety of other illnesses, both infectious and non-infectious. Non-infectious diseases include those related to occupational exposures, including respiratory, neurological, and dermatological disorders associated with occupational exposures to pesticides and other chemicals.

Risks from cancer are such that approximately one in four people will be diagnosed with a cancer during their lifetime (Calabrese and Dorsey 1984). Causes of cancer include incidental exposure to carcinogens in the environment, food, and tobacco, and occupational exposure to carcinogens in the workplace. In the U.S., one-third of all cancers are attributed to tobacco smoking. Work-related cancers are estimated to account for 4 to 20 percent of all malignancies. The NIOSH has reported that approximately 20,000 cancer deaths and 40,000 new cancer cases each year in the U.S. are attributable to occupational hazards.

Risks from accidents include acute trauma from occupational injury in addition to those associated with motor vehicle accidents, falls, drowning, lightning, poisoning, and other causes.

Risks from use of herbicides on public lands appear to be negligible. For example, only one minor injury associated with the application of herbicides was reported in 2005 (BLM 2007a). No data are available on the incidence of cancer or non-infectious diseases attributable to exposure of herbicide applicators to chemicals in the course of treating weeds on public land.

3.14.2 Environmental Consequences

3.14.2.1 General Impacts of Weed Treatments on BLM Lands

The following subsections address the differences in potential exposure risks to public and occupational receptors among the four alternatives.

Manual Control – Treating weeds by pulling, digging with a shovel, or cutting off the flowering heads of biennials prior to seed dispersal would not affect human health or safety.

Biological Control – Use of insects, pathogens, or domestic grazing animals to manage weed infestations would not affect human health or safety.

Chemical Control – Use of herbicides for control of noxious weeds and other invasive plant species poses some potential risk of adverse impacts on human health and safety. Therefore, the PEIS (BLM 2007a) included a Human Health Risk Assessment (HHRA) to evaluate herbicide use on public lands. The HHRA addressed occupational receptors (who mix, load, transport, and apply herbicides) and public receptors (hikers, hunters, and anglers; swimmers, berry pickers; Native Americans; and residents).

Occupational Receptors

Exposure risks to occupational receptors consist primarily of direct exposure (whether through the skin, inhalation, or incidental ingestion) by workers who mix, transport, or apply the herbicides. Greatest exposure doses are likely to be associated with mixing herbicides, pouring the contents into containers for use in application, and cleaning up any residue or minor spillage. An additional risk to applicators results from exposure via dermal contact, inhalation, or incidental ingestion while walking or riding/driving through an herbicide mist. Most occupational exposures result in temporary skin or eye irritation or in other short-term effects such as nausea, dizziness, or reversible nervous system abnormalities. Long-term effects are much less common but can include damage to organs, the nervous system, or the immune system and potentially inheritable mutations that can be passed on to offspring.

Both the short-term and long-term effects to occupational receptors can be greatly reduced by adherence to operational safety guidelines, use of protective clothing, equipment checks, and personal hygiene. BLM has attempted to minimize risks to applicators involved with herbicide treatments on public lands in the GSFO by specifying that their use be limited to certified herbicide applicators, except in a few special circumstances (e.g., spot applications to one or a few plants by trained BLM personnel using pre-mixed, consumer-grade herbicides). Professionals who are trained, experienced in handling chemicals, and use suitable personal protective equipment are much less likely to be exposed at potentially toxic levels than are those who use herbicides infrequently and may be unaware of the risks and how to minimize them.

Public Receptors

Public receptors within the GSFO area consist mostly of residents and outdoor recreationists (hikers, hunters, anglers). These receptors would be exposed less frequently and at much lower doses than would occupational workers who deal with herbicides regularly and at higher concentrations.

Rural residential areas and some small urban areas are distributed throughout the GSFO along highways and county roads. These are not the areas which BLM anticipates will receive the bulk of herbicide treatments. Instead, most herbicide applications are expected to be along BLM roads that provide access to recreational, grazing, and oil and gas uses and in specific areas disturbed by these activities. Therefore, the potential for public exposure to herbicides is mostly limited to infrequent and short-duration use of the public lands and by inadvertent dispersal of airborne or waterborne herbicides from treated areas toward rural residential or agricultural lands.

Much of the BLM land within the GSFO area is heavily used—although only seasonally—by hunters. Hikers and anglers use the area less intensively but in a more protracted (year-round) pattern, with greatest use from spring through fall. Boating (including rafting, kayaking, and canoeing) is another seasonally important public use on the Colorado, Roaring Fork, and Eagle Rivers. In terms of exposure risk, boaters are more similar to anglers than to swimmers in terms of the frequency and duration of potential exposure to waterborne chemicals. Waterbodies used for swimming are very limited in the area; only two lakes (Harvey Gap and Rifle Gap reservoirs) receive regular use and are located near BLM lands. Other waterbodies are generally either unsuitable for regular use by swimmers or not located near BLM lands subject to herbicide treatments. No agricultural uses exist that are comparable to berry pickers in terms of protracted handling of treated plant material. Use of the area by Native Americans, including traditional uses of plant foods and fibers, is also minor (see Section 3.10).

Herbicide Toxicity and Exposure

The HHRA portion of the PEIS addressed a total 24 herbicide active ingredients, of which 18 are currently approved by BLM and proposed for use in the GSFO (Table 11) (Appendix D). The 18

approved compounds include six evaluated by BLM for the PEIS, nine evaluated by the USFS, and three of nine additional compounds evaluated by BLM in EISs from the period 1988 to 1999 (the remaining additional compounds evaluated in the earlier EISs are no longer approved).

Risks to humans were evaluated in relation to both occupational and public receptors, based on the toxicity of each compound and the assumed exposure dose under three assumed scenarios: routine exposure at typical application rates, routine exposure at maximum application rates, and accidental exposure. Routine exposure of workers consists of dermal contact, inhalation, and incidental ingestion while mixing or applying an herbicide. Accidental exposure of workers results from a spill or direct spray onto the skin. For public receptors, routine exposures result from typical uses of public lands that have been treated, or of both public and private lands onto which an herbicide has drifted. These exposures include dermal (skin) contact with foliage or surface water, inhalation of a pesticide mist, or ingestion of fruits onto which an herbicide has settled. Accidental exposures of the public include entering an area that is being or has recently been treated or (for some compounds) drinking water or eating fish from a waterbody into which the compound has been spilled.

The six herbicides evaluated by BLM for the PEIS (dicamba, diflufenzopyr, diquat, fluridone, imazapic, and sulfometuron methyl) were characterized as having "slight to very slight acute toxicity to humans" (acute but reversible skin and eye irritation), and none of the six is designated as a potential carcinogen. As shown in Table 11, risks to public receptors from these compounds except diquat were rated as none or low for typical or maximum application rates and accidental exposures. Risks were comparable for workers, although slightly higher (low to moderate) for accidental exposures. Diquat showed a higher risk than the other compounds, with a rating of low to moderate for accidental exposures of the public and high for accidental exposures of workers or for routine exposures of mixer-loaders with aerial application at the maximum rate (Table 11).

Three of the nine additional herbicides evaluated by BLM in EISs from 1988 to 1991 (bromacil, diuron, and tebuthiuron) showed generally low risks to workers and the public, with somewhat greater risks from accidental exposures. However, note in Table 11 that high risks were associated with some exposure categories for bromacil, diuron, and tebuthiuron. In addition, bromacil was the only one of the 18 herbicides planned for use in the GSFO that poses a cancer risk (to pilots and mixer-loaders for aerial applications at the maximum application rates). The six other compounds for which the PEIS compiled information from earlier EISs (2,4-DP, asulam, atrazine, fosamine, mefluidide, and simazine) were dropped from the list of approved herbicides due to a combination of infrequent use and a determination by BLM that "the risks to non-target plants and animals, and especially sensitive species of concern, have not been adequately evaluated." None of these six herbicides would be used in the GSFO under any of the alternatives.

The nine USFS-evaluated herbicides (2,4-D, chlorsulfuron, clopyralid, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr) showed slight to very slight toxicity to humans and no carcinogenicity. Risks were generally rated as low to none for both receptor groups and all three exposure rates (Table 11). Risks were higher (moderate) for hexazinone from accidental exposure (direct spraying onto the body), consumption of pond water containing a spill, and subsistence-level consumption of fish from contaminated ponds. Consistently greatest risks were associated with exposure to 2,4-D. These included several moderate ratings for workers and public receptors and high ratings for consumption of contaminated pond water and subsistence-level of fish from a contaminated pond.

The HHRA portion of the PEIS found no risks to humans from the inert ingredients associated with the herbicides, including adjuvants (see Appendix D).

Table 11a. Risks to Humans from Typical and Maximum Application Rates of BLM-Approved Herbicides (2,4-D to Fluridone) [1]

Method of Exposure	Active Ingredient and Application Rate [2]																	
	2,4-D		Bromacil		Chlorsulfuron		Clopyralid		Dicamba		Diflufenzopyr		Diquat		Diuron		Fluridone	
	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M
Risk to Occupational Receptors [3]																		
Pilot	L	L	**H**	**H**	0	0	0	0	-	-	-	-	L	M	**H**	**H**	0	0
Aerial Mixer-Loader	L	L	**H**	**H**	0	0	0	0	0	0	0	0	M	**H**	**H**	**H**	0	L
Backpack/Horseback	L	L	0	**H**	0	0	0	0	0	0	0	0	L	M	**H**	**H**	0	0
Mechanical/Boom	L	M	0	**H**	0	L	0	0	0	0	0	0	0	L	**H**	**H**	0	0
Ground Mixer-Loader	-	-	0	**H**	-	-	-	-	0	0	0	0	0	L-M	**H**	**H**	0	0
Public Receptors [3]																		
Nearby Resident	-	-	0	0	-	-	0	0	0	0	0	0	L	L	0	0	0	0
Direct Spray onto Skin	0	L	**H**	**H**	0	0	0	0	0	0	0	0	0	L	**H**	**H**	0	0
Contacting Freshly Sprayed Vegetation	0	0	0	0	0	0	0	0	0	0	0	0	0	L	**H**	**H**	0	0
Eating Fruit [4]	L	M	**H**	**H**	0	0	0	0	0	0	0	0	L	L	**H**	**H**	0	0
Eating Fish (Drift) [4]	M	M	**-**	**-**	0	0	0	0	-	-	-	-	-	-	**-**	**-**	-	-
Eating Fish (Direct Spray or Spill) [4]	**H**	**H**	**H**	**H**	0	0	0	0	-	-	-	-	-	-	**H**	**H**	-	-
Drinking Water (Drift)	L	L	**0**	**0**	0	0	0	0	0	0	0	0	0	0	**-**	**-**	0	0
Drinking Water (Direct Spray or Spill	M	**H**	**H**	**H**	0	0	0	0	-	-	-	-	-	-	**H**	**H**	-	-

[1] Source: Synthesized from different studies compiled in HHRA for PEIS (BLM 2007a).
[2] T = Typical application rate; M = maximum application rate.
[3] H = high risk, M = moderate risk, L = low risk, 0 = no risk. Hyphen = not evaluated or not reported.
[4] **I**ncidental consumption directly sprayed fruit or subsistence-level consumption of fruit exposed to drift.

Table 11b. Risks to Humans from Typical and Maximum Application Rates of BLM-Approved Herbicides (Glyphosate to Triclopyr) [1]

Method of Exposure	Active Ingredient and Application Rate[2]																	
	Glyphosate		Hexazinone		Imazapic		Imazapyr		Metsulfuron Methyl		Picloram		Sulfometuron Methyl		Tebuthiuron		Triclopyr	
	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M
RISK TO OCCUPATIONAL RECEPTORS [3]																		
Pilot	0	0	0	L	-	-	0	0	0	0	0	0	-	-	**H**	**H**	0	L
Aerial Mixer-Loader	0	0	0	L	0	0	0	0	0	0	0	0	0	0	**H**	**H**	0	L
Backpack/Horseback Applicator	0	0	0	L	0	0	0	0	0	0	0	0	0	0	0	**H**	0	L
Mechanical/Boom Applicator (ATV)	0	0	0	L	0	0	0	0	0	0	0	0	0	0	0	**H**	0	L
Ground Mixer-Loader	-	-	-	-	0	0	-	-	-	-	-	-	0	0	0	**H**	-	-
RISK TO PUBLIC RECEPTORS [3]																		
Nearby Resident	-	-	-	-	0	0	-	-	-	-	-	-	0	0	0	0	-	-
Direct Spray onto Skin	0	0	0	L-M	0	0	0	0	0	0	0	0	0	0	**H**	**H**	L	M
Contacting Freshly Sprayed Vegetation	0	0	0	L	0	0	0	0	0	0	0	0	0	0	0	0	L	L
Eating Fruit [4]	0	0	0	L	0	0	0	0	0	0	0	0	0	0	**H**	**H**	0	L
Eating Fish (Drift) [4]	0	0	0	L	-	-	0	0	0	0	0	0	-	-	-	-	0	0
Eating Fish (Direct Spray or Spill) [4]	**0**	**0**	M	M	-	-	0	0	0	0	0	0	-	-	0	0	0	0
Drinking Water (Drift)	0	0	0	L	0	0	0	0	0	0	0	0	0	0	-	-	0	0
Drinking Water (Direct Spray or Spill)	0	**L**	M	M	-	-	0	0	0	0	0	L	-	-	**H**	**H**	0	L

[1] Source: Synthesized from different studies compiled in HHRA for PEIS (BLM 2007a).
[2] T = Typical application rate; M = maximum application rate.
[3] H = high risk, M = moderate risk, L = low risk, 0 = no risk. Hyphen = not evaluated or not reported.
[4] **I**ncidental consumption directly sprayed fruit or subsistence-level consumption of fruit exposed to drift.

Conclusions

Based on the toxicity and exposure assessments of the HHRAs, risks of adverse effects to both occupational and public receptors from the use of herbicides on BLM lands are generally negligible (none) for routine exposures at typical application rates. Somewhat greater risks (low for public, low to moderate for occupational) are associated with routine exposures at maximum application rates. Risks from accidental exposures to a concentrated chemical are generally low to moderate for both groups. Exceptions to the generalization of no or low risks to the public and low to moderate risks to mixers and applicators from the use of herbicides include the following exposure scenarios:

- Accidental exposure of occupational receptors (mixer-loaders and applicators) to 2,4-D, bromacil, diquat, diuron, fluridone, and tebuthiuron.
- Routine exposure of occupational receptors (mixer-loaders and pilots) to bromacil at maximum concentration rates. This includes a cancer risk for bromacil—the only one of the 18 herbicides proposed to be used by the GSFO documented to have this risk.
- Accidental exposure of public receptors to 2,4-D, bromacil, diuron, and tebuthiuron, including being directly sprayed, drinking directly sprayed water, eating fish from directly sprayed water, or eating fruit that has been directly sprayed.

Note in Tables 11a and 11b that none of the high risks is associated with routine application of herbicides, under either typical or maximum concentration exposures or for either occupational or public receptors.

Prevention or Mitigation of Adverse Impacts

To minimize risks to occupational and public receptors from exposure herbicides, implementation by the GSFO of any alternatives involving herbicides would include the following SOPs (see Appendix E):

- Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of 0.25 mile for aerial applications (Alternative A only) and 100 feet for ground-based applications, unless a written waiver is granted.
- Use protective equipment as directed by the herbicide label.
- Post treated areas with appropriate signs at common public access areas.
- Observe restricted entry intervals specified by the herbicide label.
- Provide public notification in newspapers or other media where the potential exists for public exposure.
- Maintain a copy of Material Safety Data Sheets at work sites.
- 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.

In addition to SOPs, the GSFO would implement the following mitigation measures to minimize risks to workers and the public for the alternatives including use of herbicides (see Appendix F):

- Avoid the maximum application rate when using 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr.
- Avoid applying bromacil or diuron aerially.
- Evaluate the need to use diuron on a case-by-case basis due to moderate or high risks to workers with all application methods.
- Avoid applying chlorsulfuron at the maximum rate when using broadcast ground spray.
- Avoid applying diquat using the horseback or backpack methods.
- Avoid applying diquat near human residential or subsistence food-gathering areas.
- Avoid applying hexazinone using an over-the-shoulder broadcast applicator.

3.14.2.2 Impacts by Alternative

Alternative A – Proposed Action

The Proposed Action would represent a somewhat greater risk to both occupational and public receptors than the other alternatives analyzed (see below). This is because only the Proposed Action would include aerial applications on up to 4,000 acres per year in addition to 1,000 acres per year using ground methods. The SOPs and mitigation measures noted above would reduce these risks to acceptable levels (none or low) for a given herbicide, application rate, and treatment method.

Alternative B – No Action (Current Management)

The No Action alternative would continue the current approach to weed treatments on BLM lands within the GSFO area—i.e., precluding use of the four newly approved herbicides and of aerial application of herbicides. Not using aerial applications would allow less effective treatment of some large or remote infestations. The total area treated annually under Alternative B would be no more than 1,000 acres, compared to 5,000 acres for the Proposed Action. Another difference with Alternative B is that the four herbicides approved in the PEIS would not be available. One of these (imazapic) is of particular benefit in treating cheatgrass, one of the most widespread, aggressive, and difficult weeds in the area. The lack of availability of the four new herbicides would probably not affect impacts to human health, unless this lack would result in greater use of the three higher risk herbicides bromacil, diuron, and tebuthiuron. A reduced ability by BLM to effectively control weeds on public lands may result in new infestations along roadways or in adjacent non-BLM lands. This may in turn result in more use of herbicides by the Counties, the Forest Service, or private landowners. Therefore, reduced risks to humans in relation to BLM's use of herbicides may be offset to some extent by increased use of herbicides on non-BLM lands.

Alternative C – No Herbicide Use

Implementing Alternative C would preclude the use of herbicides to control weeds in the GSFO area and thus eliminate the associated risks to occupational and public receptors described for the other alternatives. This would be accompanied by a greatly diminished ability to reduce the current acreage of noxious or other invasive weed species and prevent new or expanded infestations. While some manual or biological control methods are effective for certain weeds in certain situations, they are limited in their effectiveness for treating large populations or more aggressive species. An inability by BLM to effectively control weeds on public lands may result in new infestations along roadways or on adjacent private lands. This may in turn result in more use of herbicides by the Counties, the Forest Service, or private landowners, somewhat increasing risks from application on non-BLM lands.

Alternative D – No Aerial Application of Herbicides

This alternative is similar to Alternative B in that no aerial herbicide application would occur but dissimilar in that it would allow use of the four newly approved herbicides. Not using aerial application would avoid the associated greater risks to mixer-loaders and pilots from exposure to the more concentrated chemicals, and the greater risks of drift into offsite ponds, agricultural lands, gardens, orchards, and recreational or residential areas. However, much less area could be treated, with a maximum of 1,000 acres per year, compared to 5,000 acres per year under Alternative A.

Although not using aerial applications would reduce the risk of public exposures on BLM lands, the GSFO's reduced ability to manage weeds on its lands could result in new infestations along roadways or in adjacent non-BLM lands. These could in turn result in more use of herbicides by the Counties, the Forest Service, or private landowners. Therefore, reduced risks to public receptors compared to the Proposed Action may be offset to some extent by increased risks from treatments on non-BLM lands.

4. PREPARERS AND CONTRIBUTORS

The following table lists the representatives of the BLM, USFS, and USFWS who participated in the preparation of this programmatic EA and the associated BA. Additional input and review was provided by Carol Dawson, Botanist in BLM's Colorado State Office, Lakewood, Colorado.

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APPENDIX A

State-Listed Noxious Weeds in Colorado

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State-listed Noxious Weeds in Colorado

List A – Weed species designated by the Commissioner for eradication.	
African rue (*Peganum harmala*) Camelthorn (*Alhagi pseudalhagi*) Common crupina (*Crupina vulgaris*) Cypress spurge (*Euphorbia cyparissias*) Dyer's woad (*Isatis tinctoria*) Giant salvinia (*Salvinia molesta*) Hydrilla (*Hydrilla verticillata*) Meadow knapweed (*Centaurea pratensis*) Mediterranean sage (*Salvia aethiopis*)	Medusahead (*Taeniatherum caput-medusae*) Myrtle spurge (*Euphorbia myrsinites*) Orange hawkweed (*Hieracium aurantiacum*) Purple loosestrife (*Lythrum salicaria*) Rush skeletonweed (*Chondrilla juncea*) Sericea lespedeza (*Lespedeza cuneata*) Squarrose knapweed (*Centaurea virgata*) Tansy ragwort (*Senecio jacobaea*) Yellow starthistle (*Centaurea solstitialis*)
List B – Weed species for which the Commissioner (in consultation with the state noxious weed advisory committee, local governments, and other interested parties) develops and implements state noxious weed management plans designed to stop their continued spread.	
Absinth wormwood (*Artemisia absinthium*) Black henbane (*Hyoscyamus niger*) Bouncingbet (*Saponaria officinalis*) Bull thistle (*Cirsium vulgare*) Canada thistle (*Cirsium arvense*) Chinese clematis (*Clematis orientalis*) Common tansy (*Tanacetum vulgare*) Common teasel (*Dipsacus fullonum*) Corn chamomile (*Anthemis arvensis*) Cutleaf teasel (*Dipsacus laciniatus*) Dalmatian toadflax, broad-leaved (*Linaria dalmatica*) Dalmatian toadflax, narrow-leaved (*Linaria genistifolia*) Dame's rocket (*Hesperis matronalis*) Diffuse knapweed (*Centaurea diffusa*) Eurasian watermilfoil (*Myriophyllum spicatum*) Hoary cress or whitetop (*Cardaria draba*) Houndstongue (*Cynoglossum officinale*) Leafy spurge (*Euphorbia esula*) Mayweed chamomile (*Anthemis cotula*) Moth mullein (*Verbascum blattaria*)	Musk thistle (*Carduus nutans*) Oxeye daisy (*Chrysanthemum leucanthemum*) Perennial pepperweed or tall whitetop (*Lepidium latifolium*) Plumeless thistle (*Carduus acanthoides*) Quackgrass (*Elytrigia repens*) Redstem filaree (*Erodium cicutarium*) Russian knapweed (*Acroptilon repens*) Russian-olive (*Elaeagnus angustifolia*) Salt-cedar or Tamarisk (*Tamarix chinensis, T. parviflora*, and *T. ramosissima*) Scentless chamomile (*Matricaria perforata*) Scotch thistle (*Onopordum acanthium*) Scotch thistle (*Onopordum tauricum*) Spotted knapweed (*Centaurea maculosa*) Spurred anoda (*Anoda cristata*) Sulfur cinquefoil (*Potentilla recta*) Venice mallow (*Hibiscus trionum*) Wild caraway (*Carum carvi*) Yellow nutsedge (*Cyperus esculentus*) Yellow toadflax (*Linaria vulgaris*)
List C – Weed species for which the Commissioner (in consultation with the state noxious weed advisory committee, local governments, and other interested parties) will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of List C species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of these species.	
Chicory (*Cichorium intybus*) Common burdock (*Arctium minus*) Common mullein (*Verbascum thapsus*) St. Johnswort (*Hypericum perforatum*) Downy brome or cheatgrass (*Bromus tectorum*) Field bindweed (*Convolvulus arvensis*) Halogeton (*Halogeton glomeratus*)	Johnsongrass (*Sorghum halepense*) Jointed goatgrass (*Aegilops cylindrica*) Perennial sowthistle (*Sonchus arvensis*) Poison hemlock (*Conium maculatum*) PunctureVine (*Tribulus terrestris*) Velvetleaf (*Abutilon theophrasti*) Wild proso millet (*Panicum miliaceum*)

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APPENDIX B

Special Status Species Present or Potentially Present in the GSFO Area

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Special Status Plant and Animal Species in the GSFO Area

Scientific Name	Common Name	Status*	Habitat	Probability of Occurrence on GSFO
Plants				
Astragalus debequaeus	DeBeque milkvetch	BS	Varicolored, fine-textured, seleniferous or saline soils of Wasatch Formation- Atwell Gulch Member; 5100-6400 feet.	Definite
Astragalus naturitensis	Naturita milkvetch	BS	Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000-7,000 feet.	Likely
Lesquerella parviflora	Piceance bladderpod	BS	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas; 6200-8600 feet. Known sites N & S of GSFO	Likely
*Mentzelia rhizomata (*formerly *Nuttallia argillosa)*	Roan cliffs blazing star	BS	Steep, eroding talus slopes of shale, Green River Formation; 5,800-9,000 feet.	Definite
Penstemon harringtonii	Harrington's penstemon	BS	Open sagebrush or sagebrush sites with encroaching pinyon/juniper. Soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials (basalt); 6,200-10,000 feet.	Definite
Cirsium perplexans	Adobe thistle	BS	Reddish to tan vertisols with shrink-swell cracks, near DeBeque.	Definite
Penstemon debilis	Parachute penstemon	C	Sparsely vegetated, south-facing, steep, white shale talus of the Parachute Creek Member of the Green River Formation; 8,000-9,000 feet.	Definite
Phacelia submutica	DeBeque phacelia	C	Sparsely vegetated, steep slopes in chocolate-brown or gray clay on Atwell Gulch and Shire Members, Wasatch Formation. Soils often have large cracks because of the high shrink-swell potential of the clays; 4,700-6,200 feet.	Definite
Physaria obcordata	Piceance twinpod	FT	Barren white outcrops and steep slopes exposed by creek downcutting. Parachute Creek Member of the Green River Formation: 5,900-7,800 feet.	Possible
Sclerocactus glaucus	Colorado hookless cactus	FT	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities; often with well-formed microbiotic crusts; 4,500-6,000 feet.	Definite
Spiranthes diluvialis	Ute ladies' tresses orchid	FT	Sub-irrigated alluvial soils along streams, and in open meadows in floodplains; 4,500-6,800 feet.	Definite

Scientific Name	Common Name	Status*	Habitat	Probability of Occurrence on GSFO
Wildlife				
Bufo boreas	Boreal toad	BS	Subalpine ponds, marshes, and slow-flowing streams.	Possible
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	C	Mature cottonwood riparian woodlands.	Possible
Crotalus viridis concolor	Midget faded rattlesnake	BS	Desert scrub, rocky outcrops, and canyonlands.	Definite
Haliaeetus leucocephalus	Bald eagle	DM, BS	Nests and roosts in tall trees (typically cottonwoods) along the Colorado River; roosts along major tributaries; hunts for fish and for terrestrial wildlife in adjacent uplands.	Definite
Lampropeltis triangulum taylori	Milk snake	BS	Grasslands, sandhills, canyons and ponderosa pine, pinyon-juniper woodland and arid river valleys.	Likely
Lynx canadensis	Canada lynx	FT	Habitat suitable to support viable populations of lynx is thought to consist of 15-25 square mile areas of contiguous spruce-fir and/or lodgepole pine forests occurring on slopes of less than 30 percent.	Definite
Rana pipiens	Northern leopard frog	BS	Permanent ponds, lake shores, cutoff meanders	Definite
Spea intermontana	Great Basin spadefoot	BS	Pinyon/juniper, sagebrush, semi-desert shrub, dry rocky slopes and canyons, elevation range less than 6,000 feet.	Definite
Strix occidentalis lucida	Mexican spotted owl	FT	Breeds in dense old-growth conifers and deciduous (especially in steep walled canyons). Nests on cliffs and abandoned platform nests of ravens, eagles, and hawks.	Unlikely
Fish				
Catostomus discobolus	Bluehead sucker	BS	Colorado River Basin.	Definite
Catostomus latipinnis	Flannelmouth sucker	BS	Colorado River Basin.	Definite
Gila cypha	Humpback chub	BS	Critical habitat: Colorado River west of Ruby Canyon.	Unlikely
Gila elegans	Bonytail chub	FE	Critical habitat: Colorado River west of Ruby Canyon.	Unlikely
Gila robusta	Roundtail chub	FE	Colorado River Basin.	Possible
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	BS	Isolated coldwater tributaries in the Colorado River basin.	Definite
O. c. stomias	Greenback cutthroat trout	FT	Isolated streams in the Colorado River basin.	Definite
Ptychocheilus lucius	Colorado pikeminnow	FE	Critical habitat: Colorado River west from Rifle.	Possible
Xyrauchen texanus	Razorback sucker	FE	Critical habitat: Colorado River west from Rifle.	Possible

*BS = BLM sensitive species; DM = Delisted species that has recovered and will be monitored for 5 years; C = Candidate for listing under the ESA; FE = Federal endangered species; FT = Federal threatened species. No species currently proposed for listing as threatened or endangered occur in the GSFO area

APPENDIX C

Best Management Practices for Preventing Infestations Of Noxious and Invasive Weeds

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Best Management Practices for Noxious and Invasive Weed Prevention

This list incorporates many suggested practices under many types of land management operation types and is designed to allow managers to pick and choose those practices that are most applicable and feasible for each situation (DOI 2005).

A. Site-Disturbing Projects

Pre-project Planning

- Environmental analyses for projects and maintenance programs should assess weed risks, analyze high-risk sites for potential weed establishment and spread, and identify prevention practices.
- Determine site-specific restoration and monitoring needs and objectives at the onset of project planning.
- Learn to recognize noxious and invasive weeds.
- Inventory all proposed projects for weeds prior to ground-disturbing activities. If weeds are found, they would be treated (if the timing was appropriate) or removed (if seeds were present) to limit weed seed production and dispersal.
- Restrict movement of equipment and machinery *from* weed-contaminated areas *to* non-contaminated areas.
- Locate and use weed-free project staging areas. Avoid or minimize travel through weed infested areas, or restrict travel to periods when spread of disseminules is least likely.
- Identify sites where equipment can be cleaned. Remove mud, dirt, and plant parts from project equipment before moving it into a project area. Seeds and plant parts should be collected and incinerated when possible.
- If certified weed-free gravel pits become available in the county, the use of certified weed-free gravel would be required wherever gravel is applied to public lands (e.g., roads).
- Maintain stockpiled, non-infested material in a weed-free condition. Topsoil stockpiles should be promptly revegetated to maintain soil microbial health and reduce the potential for weeds.
- Use native seed mixes when practical. A certified seed laboratory should test each lot according to Association of Official Seed Analysts standards (which include an all-state noxious weed list) and provide documentation of the seed inspection test. The seed should contain no noxious, prohibited, or restricted weed seeds and should contain no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 2.0 percent of "other crop" seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended.

Project Implementation

- Minimize soil disturbance. To the extent practicable, native vegetation should be retained in and around project activity areas, and soil disturbance kept to a minimum.

- If a disturbed area must be left bare for a considerable length of time, cover the area with weed barrier until revegetation is possible.

Post-project

- Clean all equipment before leaving the project site when operating in weed infested areas.

- Inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment. Proper disposal means bagging and incinerating seeds and plant parts or washing equipment in an approved containment area.

- Revegetate disturbed soil where appropriate to optimize plant establishment for that specific site. Define revegetation objectives for each site. Revegetation may include topsoil replacement, planting, seeding, fertilization, and certified weed-free mulching as necessary. Use native material where appropriate and feasible.

- Monitor sites where seed, hay, straw, or mulch has been applied. Eradicate weeds before they form seed. In contracted projects, contract specifications could require that the contractor control weeds for a specified length of time.

- Inspect and document all ground-disturbing activities in noxious weed infested areas for at least three growing seasons following completion of the project. For ongoing projects, continue to monitor until reasonably certain that no weeds are present. Plan for follow-up treatments based on inspection results.

B. Roads and Utilities

Pre-project Planning

- Communicate with contractors, local weed districts or weed management areas about projects and best management practices for prevention.

- Remove mud, dirt, and plant parts from project equipment before moving it into a project area. Seeds and plant parts should be collected and incinerated when practical, or washed off in an approved containment area.

- Avoid acquiring water for road dust abatement where access to water is through weed-infested sites.

- Treat weeds on travel rights-of-ways before seed formation so construction equipment doesn't spread weed seed.

- Schedule and coordinate blading or pulling of noxious weed-infested roadsides or ditches in consultation with the local weed specialist. When it is necessary to blade weed-infested roadsides or ditches, schedule the activity when disseminules are least likely to be viable.

Project Implementation

- Retain shade to suppress weeds by minimizing the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance; particularly on south aspects.

- Do not blade or pull roadsides and ditches infested with noxious weeds unless doing so is required for public safety or protection of the roadway. If the ditch must be pulled, ensure weeds remain onsite. Blade from least infested to most infested areas.

Post-project

- Clean all equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts before leaving the project site if operating in areas infested with weeds. Seeds and plant parts should be collected and incinerated when possible.

- When seeding has been specified for construction and maintenance activities, seed all disturbed soil (except travel route) soon after work is completed.

- Use a certified weed-free seed mix suitable for local environmental conditions that includes fast, early growing (preferably native) species to provide quick revegetation. Consider applying weed-free mulch with seeding.

- Periodically inspect roads and rights-of-way for noxious weeds. Train staff to recognize weeds and report locations to the local weed specialist. Follow-up with treatment when needed.

- When reclaiming roads, treat weeds before roads are made impassable. Inspect and follow up based on initial inspection and documentation.

- To avoid weed infestations, create and maintain healthy plant communities whenever possible, including utility rights-of-ways, roadsides, scenic overlooks, trailheads, and campgrounds.

C. Wilderness Recreation

- Inspect and clean mechanized trail vehicles of weeds and weed seeds.

- Wash boots and socks before hiking into a new area. Inspect and clean packs, equipment, and bike tires.

- Avoid hiking through weed infestations whenever possible.

- Keep dogs and other pets free of weed seeds.

- Avoid picking unidentified "wildflowers" and discarding them along trails or roadways.

- Maintain trailheads, campgrounds, visitor centers, boat launches, picnic areas, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition. Consider high-use recreation areas as high priority sites for weed eradication.

- Sign trailheads and access points to educate visitors on noxious and invasive weeds and the consequences of their activities.

- In areas susceptible to weed invasion, limit vehicles to designated, maintained travel routes. Inspect and document travel corridors for weeds and treat as necessary.

D. Watershed Management

- Frequently and systematically inspect and document riparian areas and wetlands for noxious weed establishment and spread. Eradicate new infestations immediately since effective tools for riparian-area weed management are limited.

- Promote dense growth of desirable vegetation in riparian areas (where appropriate) to minimize the availability of germination sites for weed seeds or propagules transported from upstream or upslope areas.

- Address the risk of invasion by noxious weeds and other invasive species in watershed restoration projects and water quality management plans.

E. Grazing Management

- Consider prevention practices and cooperative management of weeds in grazing allotments. Prevention practices may include:
    - Altering season of use
    - Minimizing ground disturbance
    - Exclusion
    - Preventing weed seed transportation
    - Maintaining healthy vegetation
    - Revegetation
    - Inspection
    - Education
    - Reporting

- Provide certified weed-free supplemental feed in a designated area so new weed infestations can be detected and treated immediately. Pelletized feed is unlikely to contain viable weed seed.

- If livestock may contribute to seed spread in a weed-infested area, schedule livestock use prior to seed-set or after seed has fallen.

- If livestock were transported from a weed-infested area, annually inspect and treat entry units for new weed infestations.

- Consider closing infested pastures to livestock grazing when grazing will either continue to exacerbate the condition or contribute to weed seed spread. Designate those pastures as unsuitable range until weed infestations are controlled.

- Manage the timing, intensity (utilization), duration, and frequency of livestock activities to maintain the competitive ability of desirable plants and retain litter cover. The objective is to prevent grazers from selectively removing desirable plant species and leaving undesirable species.

- Exclude livestock grazing on newly seeded areas with fencing to ensure that desired vegetation is well established, usually after 2-3 growing seasons.

- Reduce ground disturbance, including damage to biological soil crusts. Consider changes in the timing, intensity, duration, or frequency of livestock use; location and changes in salt grounds; restoration or protection of watering sites; and restoration of yarding/loafing areas, corrals, and other areas of concentrated livestock use.

- Inspect areas of concentrated livestock use for weed invasion, especially watering locations and other sensitive areas that may be particularly susceptible to invasion. Inventory and manage new infestations.

- Defer livestock grazing in burned areas until vegetation is successfully established, usually after 2-3 growing seasons.

F. Outfitting / Recreation Pack and Saddle Stock Use

- Allow only certified weed-free hay/feed on BLM lands.

- Inspect, brush, and clean animals (especially hooves and legs) before entering public land. Inspect and clean tack and equipment.

- Regularly inspect trailheads and other staging areas for backcountry travel. Bedding in trailers and hay fed to pack and saddle animals may contain weed seed or propagules.

- Tie or contain stock in ways that minimize soil disturbance and prevent loss of desirable native species.

- Authorized trail sites for tying pack animals should be monitored several times per growing season to quickly identify and eradicate new weeds. Trampling and permanent damage to desired plants are likely. Tie-ups should be located away from water and in shaded areas where the low light helps suppress weed growth.

- Educate outfitters to look for and report new weed infestations.

G. Wildlife

- Periodically inspect and document areas where wildlife concentrate in the winter and spring and cause excess soil disturbance.

- Use weed-free materials for all wildlife management activities.

- Incorporate weed prevention into all wildlife habitat improvement project designs.

H. Fire

Fire Management Plans

- Prescribed fire plans should include pre-burn invasive weed inventory and risk assessment components as well as post-burn mitigation components.

- Integrate prescribed fire and other weed management techniques to achieve best results. This may involve post-burn herbicide treatment or other practices that require careful timing.

- Include weed prevention and follow-up monitoring in all prescribed fire activities. Include in burn plans the possibility for post-burn weed treatment.

Incident Planning

- Increase weed awareness and weed prevention by providing training to new and/or seasonal fire staff on invasive weed identification and prevention.

- For prescribed burns, inventory the project area and evaluate potential weed spread with regard to the fire prescription. Areas with moderate to high weed cover should be managed for at least 2 years prior to the prescribed burn to reduce the number of weed seeds in the soil. Continue weed management after the burn.

- Ensure that a weed specialist is included on a Fire Incident Management Team when wildfire or prescribed operations occur in or near a weed-infested area. Include a discussion of weed prevention operational practices in all fire briefings.

- Use operational practices to reduce weed spread (e.g., avoid weed infestations when locating fire lines).

- Identify and periodically inspect potential helispots, staging areas, incident command posts, base camps, etc. and maintain a weed-free condition. Encourage network airports and helibases to do the same.

- Develop a burned-area integrated weed management plan, including a monitoring component to detect and eradicate new weeds early.

Fire-fighting

- Ensure that all equipment (including borrowed or rental equipment) is free of weed seed and propagules before entering incident location.

- When possible, use fire suppression tactics that reduce disturbances to soil and vegetation, especially when creating fire lines.

- Use wet or scratch-lines where possible instead of fire breaks made with heavy equipment.

- Given the choice of strategies, avoid ignition and burning in areas at high risk for weed establishment or spread.

- Hose off vehicles on site if they have traveled through infested areas.

- Inspect clothing for weed seeds if foot travel occurred in infested areas.

- When possible, establish incident bases, fire operations staging areas, and aircraft landing zones in areas that have been inspected and are verified to be free of invasive weeds.

- Cover weed infested cargo areas and net-loading areas with tarps if weeds exist and can't be removed or avoided.

- Flag off high-risk weed infestations in areas of concentrated activity and show weeds on facility maps.

- If fire operations involve travel or work in weed infested areas, a power wash station should be staged at or near the incident base and helibase. Wash all vehicles and equipment upon arrival from and departure to each incident. This includes fuel trucks and aircraft service vehicles.

- Identify the need for possible fire rehab to prevent or mitigate weed invasion during fire incident and apply for funding during the incident.

Post-fire Rehabilitation

- Have a weed specialist review burned area rehabilitation reports to ensure proper and effective weed prevention and management is addressed.

- Thoroughly clean the undercarriage and tires of vehicles and heavy equipment before entering a burned area.

- Treat weeds in burned areas. Weeds can recover as quickly as 2 weeks following a fire.

- Schedule inventories 1 month and 1 year post-fire to identify and treat infestations. Eradicate or contain newly emerging infestations.

- Restrict travel to established roads to avoid compacting soil that could hinder the recovery of desired plants.

- Determine soon after a fire whether revegetation is necessary to speed recovery of a native plant community, or whether desirable plants in the burned area will recover naturally. Consider the severity of the burn and the proportion of weeds to desirable plants on the land before it burned. In general, more severe burns and higher pre-burn weed populations increase the necessity of revegetation. Use a certified weed-free native seed mix.

- Inspect and document weed infestations on fire access roads, equipment cleaning sites, and staging areas. Control infestations to prevent spread within burned areas.

- Seed and straw mulch to be used for burn rehabilitation (for wattles, straw bales, dams, etc.) should be certified weed-free.

- Replace soil and vegetation right side up when rehabbing fire line.

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APPENDIX D

Herbicides and Adjuvants Approved for Use on BLM-Administered Lands in Colorado

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Herbicides Approved for Use on BLM-Administered Lands in Colorado*
Updated September 28, 2007

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
Bromacil	Hyvar X	DuPont	352-287
	Hyvar XL	DuPont	352-346
Bromacil + Diuron	Kroval I DF	DuPont	352-505
	Weed Blast Res. Weed Cont.	Loveland Products Inc.	34704-576
	DiBro 2+2	Nufarm Americas Inc.	228-227
	DiBro 4+4	Nufarm Americas Inc.	228-235
	DiBro 4+2	Nufarm Americas Inc.	228-386
	Weed Blast 4G	SSI Maxim Co., Inc.	34913-19
Chlorsulfuron	Telar DF	DuPont	352-522
	Telar XP	DuPont	352-654
Clopyralid	Spur	Albaugh Inc.	42750-89
	Pyramid R&P	Albaugh Inc.	42750-94
	Clopyralid 3	Alligare, LLC	42750-94-81927
	Reclaim	Dow AgroSciences	62719-83
	Stinger	Dow AgroSciences	62719-73
	Transline	Dow AgroSciences	62719-259
	CleanSlate	Nufarm Americas Inc.	228-491
Clopyralid + 2,4-D	Curtail	Dow AgroSciences	62719-48
	Commando	Albaugh Inc.	42750-92
2,4-D	Agrisolution 2,4-D LV6	Agriliance, LLC	1381-101
	Agrisolution 2,4-D Amine 4	Agriliance, LLC	1381-103
	Agrisolution 2,4-D LV4	Agriliance, LLC	1381-102
	2,4-D Amine 4	Albaugh Inc./Agri Star	42750-19
	2,4-D LV 4	Albaugh Inc./Agri Star	42750-15
	Solve 2,4-D	Albaugh Inc./Agri Star	42750-22
	2,4-D LV 6	Albaugh Inc./Agri Star	42750-20
	Five Star	Albaugh Inc./Agri Star	42750-49
	D-638	Albaugh Inc./Agri Star	42750-36
	2,4-D LV6	Helena Chemical Co.	4275-20-5905
	2,4-D Amine	Helena Chemical Co.	5905-72
	Opti-Amine	Helena Chemical Co.	5905-501
	Barrage HF	Helena Chemical Co.	5905-529
	HardBall	Helena Chemical Co.	5905-549
	Unison	Helena Chemical Co.	5905-542
	Amine 4CA 2,4-D Weed Killer	Loveland Products Inc.	34704-5
	Clean Amine	Loveland Products Inc.	34704-120
	Low Vol 4 Ester Weed Killer	Loveland Products Inc.	34704-124
	Low Vol 6 Ester Weed Killer	Loveland Products Inc.	34704-125
	LV-6 Ester Weed Killer	Loveland Products Inc.	34704-6
	Saber	Loveland Products Inc.	34704-803
	Saber CA	Loveland Products Inc.	34704-803
	Salvo	Loveland Products Inc.	34704-609

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
2,4-D (continued)	Savage DF	Loveland Products Inc.	34704-606
	Aqua-Kleen	NuFarm Americas Inc.	71368-4
	Esteron 99C	NuFarm Americas Inc.	62719-9-71368
	Weedar 64	NuFarm Americas Inc.	71368-1
	Weedone LV-4	NuFarm Americas Inc.	228-139-71368
	Weedone LV-4 Solventless	NuFarm Americas Inc.	71368-14
	Weedone LV-6	NuFarm Americas Inc.	71368-11
	Formula 40	Nufarm Americas Inc.	228-357
	2,4-D LV 6 Ester	Nufarm Americas Inc.	228-95
	Platoon	Nufarm Americas Inc.	228-145
	WEEDstroy AM-40	Nufarm Americas Inc.	228-145
	Hi-Dep	PBI Gordon	2217-703
	2,4-D Amine	Setre (Helena)	5905-72
	Barrage LV Ester	Setre (Helena)	5905-504
	2,4-D LV4	Setre (Helena)	5905-90
	2,4-D LV6	Setre (Helena)	5905-93
	Clean Crop Amine 4	UAP-Platte Chemical Co.	34704-5 CA
	Clean Crop Low Vol 6 Ester	UAP-Platte Chemical Co.	34704-125
	Salvo LV Ester	UAP-Platte Chemical Co.	34704-609
	2,4-D 4# Amine Weed Killer	UAP-Platte Chemical Co.	34704-120
	Clean Crop LV-4 ES	UAP-Platte Chemical Co.	34704-124
	Savage DF	UAP-Platte Chemical Co.	34704-606
	Cornbelt 4 lb. Amine	Van Diest Supply Co.	11773-2
	Cornbelt 4# LoVol Ester	Van Diest Supply Co.	11773-3
	Cornbelt 6# LoVol Ester	Van Diest Supply Co.	11773-4
	Amine 4	Wilbur-Ellis	2935-512
	Lo Vol-4	Wilbur-Ellis	228-139-2935
	Lo Vol-6 Ester	Wilbur-Ellis	228-95-2935
Dicamba	Dicamba DMA	Albaugh Inc./Agri Star	42750-40
	Vision	Albaugh Inc.	42750-98
	Clarity	BASF Ag. Products	7969-137
	Rifle	Loveland Products Inc.	34704-861
	Banvel	MicroFlo Company	51036-289
	Diablo	Nufarm Americas Inc.	228-379
	Vanquish Herbicide	Nufarm Americas Inc.	228-397
Dicamba + 2,4-D	Outlaw	Albaugh Inc./Agri Star	42750-68
	Range Star	Albaugh Inc./Agri Star	42750-55
	Weedmaster	BASF Ag. Products	7969-133
	Rifle-D	Loveland Products Inc.	34704-869
	KambaMaster	Nufarm Americas Inc.	71368-34
	Veteran 720	Nufarm Americas Inc.	228-295
Dicamba + Diflufenzopyr	Distinct	BASF Ag. Products	7969-150
	Overdrive	BASF Ag. Products	7969-150
Diquat	Reward	Syngenta Crop Prot., Inc.	100-1091

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
Diuron	Diuron 80DF	Agriliance, LLC	9779-318
	Karmex DF	Griffin Company	1812-362
	Direx 80DF	Griffin Company	1812-362
	Direx 4L	Griffin Company	1812-257
	Direx 4L-CA	Griffin Company	1812-257
	Diuron 4L	Loveland Products Inc.	34704-854
	Diuron 80 WDG	Loveland Products Inc.	34704-648
	Diuron 4L	Makteshim Agan of N.A.	66222-54
	Diuron 80WDG	UAP-Platte Chemical Co.	34704-648
	Vegetation Man. Diuron 80 DF	Vegetation Man., LLC	66222-51-74477
	Diuron-DF	Wilbur-Ellis	00352-00-508-02935
Fluridone	Avast!	SePRO	67690-30
	Sonar AS	SePRO	67690-4
	Sonar Precision Release	SePRO	67690-12
	Sonar Q	SePRO	67690-3
	Sonar SRP	SePRO	67690-3
Glyphosate	Aqua Star	Albaugh Inc./Agri Star	42750-59
	Forest Star	Albaugh Inc./Agri Star	42570-61
	Gly Star Original	Albaugh Inc./Agri Star	42750-60
	Gly Star Plus	Albaugh Inc./Agri Star	42750-61
	Gly Star Pro	Albaugh Inc./Agri Star	42750-61
	Glyphosate 4 PLUS	Alligare, LLC	81927-9
	Glyfos	Cheminova	4787-31
	Glyfos PRO	Cheminova	67760-57
	Glyfos Aquatic	Cheminova	4787-34
	ClearOut 41	Chem. Prod. Tech., LLC	70829-2
	ClearOut 41 Plus	Chem. Prod. Tech., LLC	70829-3
	Accord Concentrate	Dow AgroSciences	62719-324
	Accord SP	Dow AgroSciences	62719-322
	Accord XRT	Dow AgroSciences	62719-517
	Glypro	Dow AgroSciences	62719-324
	Glypro Plus	Dow AgroSciences	62719-322
	Rodeo	Dow AgroSciences	62719-324
	Mirage	Loveland Products Inc.	34704-889
	Mirage Plus	Loveland Products Inc.	34704-890
	Aquamaster	Monsanto	524-343
	Roundup Original	Monsanto	524-445
	Roundup Original II	Monsanto	524-454
	Roundup Original II CA	Monsanto	524-475
	Honcho	Monsanto	524-445
	Honcho Plus	Monsanto	524-454
	Roundup PRO	Monsanto	524-475
	Roundup PRO Concentrate	Monsanto	524-529
	Roundup PRO Dry	Monsanto	524-505

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
Glyphosate (cont.)	GlyphoMate 41	PBI Gordon Corp.	2217-847
	Aqua Neat	Nufarm Americas Inc.	228-365
	Foresters	Nufarm Americas Inc.	228-381
	Razor	Nufarm Americas Inc.	228-366
	Razor Pro	Nufarm Americas Inc.	228-366
	Rattler	Setre (Helena)	524-445-5905
	Buccaneer	Tenkoz	55467-10
	Buccaneer Plus	Tenkoz	55467-9
	Mirage Herbicide	UAP-Platte Chemical Co.	524-445-34704
	Mirage Plus Herbicide	UAP-Platte Chemical Co.	524-454-34704
	Glyphosate 4	Vegetation Man., LLC	73220-6-74477
Glyphosate + 2,4-D	Landmaster BW	Albaugh Inc./Agri Star	42570-62
	Campaign	Monsanto	524-351
	Landmaster BW	Monsanto	524-351
Glyphosate + Dicamba	Fallowmaster	Monsanto	524-507
Hexazinone	Velpar ULW	DuPont	352-450
	Velpar L	DuPont	352-392
	Velpar DF	DuPont	352-581
	Pronone MG	Pro-Serve	33560-21
	Pronone 10G	Pro-Serve	33560-21
	Pronone 25G	Pro-Serve	33560-45
	Pronone Power Pellet	Pro-Serve	33560-41
Hexazinone + Sulfometuron	Westar	DuPont Crop Protection	352-626
Imazapic	Plateau	BASF	241-365
	Panoramic 2SL	Alligare, LLC	66222-141-81927
Imazapic + Glyphosate	Journey	BASF Ag. Products	241-417
Imazapyr	Arsenal Railroad Herbicide	BASF Ag. Products	241-273
	Chopper	BASF Ag. Products	241-296
	Arsenal Applicators Conc.	BASF Ag. Products	241-299
	Arsenal	BASF Ag. Products	241-346
	Arsenal PowerLine	BASF Ag. Products	241-431
	Stalker	BASF Ag. Products	241-398
	Habitat	BASF Ag. Products	241-426
	Imazapyr E-Pro 2 –VM & Aquatic Herbicide	Etigra	81959-8
	Polaris RR	Nufarm Americas Inc.	241-273-228
	Polaris SP	Nufarm Americas Inc.	241-296-228
	Polaris AC	Nufarm Americas Inc.	241-299-228
	Polaris AQ	Nufarm Americas Inc.	241-426-228
	Polaris Herbicide	Nufarm Americas Inc.	241-346-228
	SSI Maxim Arsenal 0.5G	SSI Maxim Co., Inc.	34913-23
	Ecomazapyr 2 SL	Vegetation Man., LLC	74477-6
	Imazapyr 2 SL	Vegetation Man., LLC	74477-4
	Imazapyr 4 SL	Vegetation Man., LLC	74477-5
Imazapyr + Diuron	Mojave 70 EG	Alligare, LLC	74477-9-81927
	Sahara DG	BASF Ag. Products	241-372

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
Imazapyr + Diuron (cont.)	SSI Maxim Topsite 2.5G	SSI Maxim Co., Inc.	34913-22
Metsulfuron methyl	Escort	DuPont	352-439
	Escort XP	DuPont	352-439
	Metsulfuron Methyl DF	Vegetation Man., L.L.C.	74477-2
	Patriot	Nufarm Americas Inc.	228-391
	PureStand	Nufarm Americas Inc.	71368-38
	MSM E-AG 60 EG Herbicide	Etigra	81959-14
	MSM E-Pro 60 EG Herbicide	Etigra	81959-14
Metsulfuron methyl + Dicamba + 2,4-D	Cimarron MAX	DuPont	352-615
Picloram	Triumph K	Albaugh, Inc.	42750-81
	Triumph 22K	Albaugh, Inc.	42750-79
	Picloram K	Alligare, LLC	42750-81-81927
	Picloram 22K	Alligare, LLC	42750-79-81927
	Grazon PC	Dow AgroSciences	62719-181
	OutPost 22K	Dow AgroSciences	62719-6
	Tordon K	Dow AgroSciences	62719-17
	Tordon 22K	Dow AgroSciences	62719-6
Picloram + 2,4-D	Picloram + D	Alligare, LLC	42750-80-81927
	Tordon 101M	Dow AgroSciences	62719-5
	Tordon 101 R Forestry	Dow AgroSciences	62719-31
	Tordon RTU	Dow AgroSciences	62719-31
	Grazon P+D	Dow AgroSciences	62719-182
	HiredHand P+D	Dow AgroSciences	62719-182
	Pathway	Dow AgroSciences	62719-31
	GunSlinger	Albaugh, Inc.	42750-80
Sulfometuron methyl	Oust	DuPont	352-401
	Oust XP	DuPont	352-601
	SFM 75	Vegetation Man., LLC	72167-11-74477
	Spyder	Nufarm Americas Inc.	228-408
Tebuthiuron	Spike 20P	Dow AgroSciences	62719-121
	Spike 80W	Dow AgroSciences	62719-107
	Spike 1G	Dow AgroSciences	1471-104
	Spike 40P	Dow Agro Sciences	62719-122
	Spike 80DF	Dow AgroSciences	62719-107
	SpraKil S-5 Granules	SSI Maxim Co., Inc.	34913-10
Tebuthiuron + Diuron	SpraKil SK-13 Granular	SSI Maxim Co., Inc.	34913-15
	SpraKil SK-26 Granular	SSI Maxim Co., Inc.	34913-16
Triclopyr	Element 3A	Dow AgroSciences	62719-37
	Element 4	Dow AgroSciences	62719-40
	Forestry Garlon XRT	Dow AgroSciences	62719-553
	Garlon 3A	Dow AgroSciences	62719-37
	Garlon 4	Dow AgroSciences	62719-40
	Garlon 4 Ultra	Dow AgroSciences	62719-527
	Remedy	Dow AgroSciences	62719-70
	Remedy Ultra	Dow AgroSciences	62719-552

Active Ingredient	Trade Name	Manufacturer	EPA Registration Number
Triclopyr (cont.)	Pathfinder II	Dow AgroSciences	62719-176
	Tahoe 3A	Nufarm Americas Inc.	228-384
	Tahoe 3A	Nufarm Americas Inc.	228-518
	Tahoe 4E	Nufarm Americas Inc.	228-385
	Ecotriclopyr 3 SL	Vegetation Man., LLC	72167-49-74477
	Triclopyr 3 SL	Vegetation Man., LLC	72167-49-74477
Triclopyr + 2,4-D	Crossbow	Dow AgroSciences	62719-260
Triclopyr + Clopyralid	Redeem R&P	Dow AgroSciences	62719-337

** Refer to the complete label before considering the use of any herbicide formulation. Label changes can impact the intended use through, for example, the creation or elimination of Special Local Need (SLN) or 24(c) registrations; changes in application sites, rates, and timing; and county restrictions.*

Adjuvants Approved for Use on BLM-Administered Lands in Colorado
Updated September 28, 2007

Adjuvant Class	Adjuvant Type	Trade Name	Manufacturer
Surfactant	**Non-ionic**	Agrisolutions Preference	Agriliance, LLC
		Aqufact	Aqumix, Inc.
		Brewer 90-10	Brewer International
		Baron	Crown (Estes Incorporated)
		N.I.S. 80	Estes Incorporated
		Spec 90/10	Helena Chemical Co.
		Optima	Helena Chemical Co.
		Induce	Setre (Helena)
		Actamaster Spray Adjuvant	Loveland Products Inc.
		Actamaster Soluble Spray Adj.	Loveland Products Inc.
		Activator 90	Loveland Products Inc.
		LI-700	Loveland Products Inc.
		Spreader 90	Loveland Products Inc.
		UAP Surfactant 80/20	Loveland Products Inc.
		X-77	Loveland Products Inc.
		Red River 90	Red River Specialties, Inc.
		Cornbelt Premier 90	Van Diest Supply Co.
		Spray Activator 85	Van Diest Supply Co.
		R-900	Wilbur-Ellis
		Super Spread 90	Wilbur-Ellis
		Super Spread 7000	Wilbur-Ellis
	Spreader/Sticker	Agri-Trend Spreader	Agri-Trend
		TopFilm	Biosorb, Inc.
		Bind-It	Estes Incorporated
		Surf-King PLUS	Crown (Estes Incorporated)
		CWC 90	CWC Chemical, Inc.
		Cohere	Helena Chemical Co.
		Attach	Loveland Products Inc.

Adjuvant Class	Adjuvant Type	Trade Name	Manufacturer
Surfactant (continued)	**Spreader/Sticker (cont.)**	Bond	Loveland Products Inc.
		Tactic	Loveland Products Inc.
		Nu-Film-IR	Miller Chem. & Fert. Corp.
		Lastick	Setre (Helena)
		Insist 90	Wilbur-Ellis
		R-56	Wilbur-Ellis
	Silicone-based	SilEnergy	Brewer International
		Silnet 200	Brewer International
		Bind-It MAX	Estes Incorporated
		Thoroughbred	Estes Incorporated
		Aero Dyne-Amic	Helena Chemical Co.
		Dyne-Amic	Helena Chemical Co.
		Kinetic	Setre (Helena)
		Freeway	Loveland Products Inc.
		Phase	Loveland Products Inc.
		Phase II	Loveland Products Inc.
		Silwet L-77	Loveland Products Inc.
		Sun Spreader	Red River Specialties, Inc.
		Sylgard 309	Wilbur-Ellis
		Syl-Tac	Wilbur-Ellis
Oil-based	**Crop Oil Concentrate**	Brewer 83-17	Brewer International
		Majestic	Crown (Estes Incorporated)
		Agri-Dex	Helena Chemical Co.
		Crop Oil Concentrate	Helena Chemical Co.
		Crop Oil Concentrate	Loveland Products Inc.
		Herbimax	Loveland Products Inc.
		Red River Forestry Oil	Red River Specialties, Inc.
		R.O.C. Rigo Oil Conc.	Wilbur-Ellis
		Mor-Act	Wilbur-Ellis
	Methylated Seed Oil	SunEnergy	Brewer International
		Sun Wet	Brewer International
		Methylated Spray Oil Conc.	Helena Chemical Co.
		MSO Concentrate	Loveland Products Inc.
		Red River Supreme	Red River Specialties, Inc.
		Sunburn	Red River Specialties, Inc.
		Sunset	Red River Specialties, Inc.
		Hasten	Wilbur-Ellis
		Super Spread MSO	Wilbur-Ellis
	Methylated Seed Oil + Organosilicone	Inergy	Crown (Estes Incorporated)
	Vegetable Oil	Noble	Estes Incorporated
		Amigo	Loveland Products Inc.
		Competitor	Wilbur-Ellis

Adjuvant Class	Adjuvant Type	Trade Name	Manufacturer
Fertilizer-based	**Nitrogen-based**	Quest	Setre (Helena)
		Dispatch	Loveland Products Inc.
		Dispatch 111	Loveland Products Inc.
		Dispatch 2N	Loveland Products Inc.
		Dispatch AMS	Loveland Products Inc.
		Flame	Loveland Products Inc.
		Bronc	Wilbur-Ellis
		Bronc Max	Wilbur-Ellis
		Bronc Max EDT	Wilbur-Ellis
		Bronc Plus Dry EDT	Wilbur-Ellis
		Bronc Total	Wilbur-Ellis
		Cayuse Plus	Wilbur-Ellis
Special Purpose or Utility	**Buffering Agent**	Buffers P.S.	Helena Chemical Co.
		Spray-Aide	Miller Chem. & Fert. Corp.
		Oblique	Red River Specialties, Inc.
		Tri-Fol	Wilbur-Ellis
	Colorant	Hi-Light	Becker-Underwood
		Hi-Light WSP	Becker-Underwood
		Marker Dye	Loveland Products Inc.
		BullsEye	Milliken Chemical
		Signal	Precision
	Compatibility/ Suspension Agent	E Z MIX	Loveland Products Inc.
		Support	Loveland Products Inc.
		Blendex VHC	Setre (Helena)
	Deposition Aid	Cygnet Plus	Brewer International
		Poly Control 2	Brewer International
		CWC Sharpshooter	CWC Chemical, Inc.
		ProMate Impel	Helena Chemical Co.
		Pointblank	Helena Chemical Co.
		Strike Zone DF	Helena Chemical Co.
		Compadre	Loveland Products Inc.
		Intac Plus	Loveland Products Inc.
		Liberate	Loveland Products Inc.
		Reign	Loveland Products Inc.
		Weather Gard	Loveland Products Inc.
		Mist-Control	Miller Chem. & Fert. Corp.
		Secure Ultra	Red River Specialties, Inc.
		Bivert	Wilbur-Ellis
		Coverage G-20	Wilbur-Ellis
		EDT Concentrate	Wilbur-Ellis
		Sta Put	Setre (Helena)

Adjuvant Class	Adjuvant Type	Trade Name	Manufacturer
Special Purpose or Utility (cont.)	**Defoaming Agent**	Defoamer	Brewer International
		Fighter-F 10	Loveland Products Inc.
		Fighter-F Dry	Loveland Products Inc.
		Foam Fighter	Miller Chem. & Fert. Corp.
		Foam Buster	Setre (Helena)
		Cornbelt Defoamer	Van Diest Supply Co
		No Foam	Wilbur-Ellis
	Diluent/Deposition Agent	Improved JLB Oil Plus	Brewer International
		JLB Oil Plus	Brewer International
		Hy-Grade I	CWC Chemical, Inc
		Hy-Grade EC	CWC Chemical, Inc
		Red River Basal Oil	Red River Specialties, Inc.
	Foam Marker	Align	Helena Chemical Co.
		R-160	Wilbur-Ellis
	Invert Emulsion Agent	Redi-vert II	Wilbur-Ellis
	Tank Cleaner	Wipe Out	Helena Chemical Co.
		All Clear	Loveland Products Inc.
		Tank and Equipment Cleaner	Loveland Products Inc.
		Kutter	Wilbur-Ellis
		Neutral-Clean	Wilbur-Ellis
		Cornbelt Tank-Aid	Van Diest Supply Co.
	Water Conditioner	Rush	Crown (Estes Incorporated)
		Blendmaster	Loveland Products Inc.
		Choice	Loveland Products Inc.
		Choice Xtra	Loveland Products Inc.
		Choice Weather Master	Loveland Products Inc.
		Cut-Rate	Wilbur-Ellis

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APPENDIX E

Standard Operating Procedures for Weed Treatments on BLM Lands in the GSFO Area

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Resource Element	Standard Operating Procedure
General See 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*)	• Prepare spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to 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 product label for use and storage. • Have licensed applicators apply herbicides. • Use only EPA-approved herbicides and follow product label directions and "advisory" statements. • Review, understand, and conform to the "Environmental Hazards" section on the herbicide label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or 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 areas, 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 copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs available for review at http://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spills to minimize risks to resources. • 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. • Minimize drift by not applying herbicides when winds exceed 10 mph (6 mph for aerial applications) or a serious rainfall event is imminent. • 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 and low volatility formulations, 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 label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Clean OHVs to remove seeds.

Resource Element	Standard Operating Procedure
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 stormwater runoff and water turbidity. • Review hydrogeologic 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 a water 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.

Resource Element	Standard Operating Procedure
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 revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Use native or sterile species for revegetation 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 or hay mulch for revegetation 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, needed 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 offsite 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. • Avoid using glyphosate formulations that include the adjuvant R-11 in aquatic ecosystems and either avoid using formulations with the surfactant POEA or seek to use the formulation with the lowest amount of POEA available to reduce risks to amphibians and aquatic organisms.

Resource Element	Standard Operating Procedure
Threatened, Endangered, and Sensitive Species See Manual 6840 (Special Status Species)	• 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 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 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 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.
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 offsite 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 not easily seen (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) revegetating 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 WSAs) and H-8560-1 (Management of Designated WSAs) and Manual 8351 (WSRs)	• 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. • Revegetate 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.

Resource Element	Standard Operating Procedure
Wilderness and Other Special Areas (cont.)	• Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals when they are the minimum method 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. Within 0.25 mile on either side of the river of all eligible or suitable WSRs, proposed treatments must preserve the identified Outstanding Remarkable Values and preliminary classifications.
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 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 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. • Observe restricted entry intervals specified by the herbicide 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 tribe 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 education 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.

Resource Element	Standard Operating Procedure
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 0.25 mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide 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.
Cultural Resources and Native American Religious Concerns See Handbooks H-8120-1 (Guidelines for Conducting Tribal Consultation) and Manuals 8100 (The Foundations for Managing Cultural Resources), 8120 (Tribal Consultation Under Cultural Resource Authorities).	• Follow standard procedures for compliance with Section 106 of the NHPA, as implemented through the Colorado State protocol. • 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 areas that may be visited by Native peoples after treatments. • Native American Traditional Cultural Properties (TCPs) are to be considered in the planning and completion of Federal actions in accordance with Section 106 of the NHPA, as amended (Guidelines of Bulletin 38 of the National Register). Physically affecting the integrity of traditional cultural properties, including plant collecting places, should be avoided when possible. To protect and preserve Native American religious practices, the Executive Order of May 24, 1996 requires the implementation of "procedures to ensure reasonable notice of Proposed Actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites." This notice further states, "where appropriate, agencies shall maintain the confidentiality of sacred sites." The GSFO will protect TCPs in consultation with the appropriate tribal representatives. • Any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361). See also: 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.

APPENDIX F

Mitigation Measures for Weed Treatments on BLM Lands in the GSFO Area

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Vegetation Treatments EIS 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 (Appendix C).
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 of concern. • Establish appropriate (herbicide specific) buffer zones around downstream water bodies, habitats, and species/populations of interest. Consult the ERAs for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. • 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 in watersheds with characteristics suitable for potential surface runoff, and have fish-bearing streams, during periods when fish are in life stages most sensitive to the herbicide(s) used. • 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 (see Appendix C and recommendations in individual ERAs). • Avoid using the adjuvant R-11® in aquatic environments and either avoid using glyphosate formulations containing the surfactant POEA or seek to use formulations with the least amount of POEA to reduce risks to aquatic organisms.
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 the surfactant POEA or seek to use formulations with the least amount of POEA to reduce risks to amphibians and aquatic organisms. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Section 3.3) to limit contamination of offsite vegetation, which may serve as forage for wildlife.

Resource	Mitigation Measures
Wildlife (continued)	• Do not aerially apply diquat directly to wetlands or riparian areas. • To protect special status 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*. Apply these measures to special status species (refer to conservation measures for a similar size and type of species and same trophic guild).
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 (see Vegetation section in Chapter 4) to limit contamination of offsite rangeland vegetation.
Cultural Resources and Native American Religious Concerns	• Do not exceed the typical application rate when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr in 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. • A cultural resource inventory shall be conducted and Historic properties will be identified and protected prior to any direct or indirect impact by weed treatments on a project-by-project basis. Consultation with the SHPO, tribes, and other consulting parties will be conducted in accordance to the legal requirements of Section 106 of the NHPA as implemented through the Colorado State protocol.
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. Refer to the Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, Recreation, and Human Health and Safety sections.
Recreation	• Mitigation measures that may apply to recreational resources are associated with human and ecological health. Refer to the Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, and Human Health and Safety sections. • Avoid aerial applications of bromacil, diuron, and tebuthiuron in areas likely to receive backcountry use during or within 1 week after spraying.
Social and Economic Values	None proposed.
Human Health and Safety	• Avoid the maximum application rate when using 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr. • Avoid applying bromacil or diuron aerially. • Evaluate the need to use diuron on a case-by-case basis due to moderate or high risks to workers with all application methods. • Avoid applying chlorsulfuron at the maximum application rate when using a broadcast ground spray. • Avoid applying diquat using the horseback or backpack methods. • Avoid applying diquat near residential or subsistence food-gathering areas. • Avoid applying hexazinone using an over-the-shoulder broadcast applicator.

APPENDIX G

Conservation Measures for Federally Listed, Proposed, or Candidate Threatened or Endangered Species

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A. GENERAL

- The BLM will identify appropriate application methods, including rate, time, and mode of application (source characterization) for projects involving the use of herbicides.

- The BLM will use interactive spreadsheets developed during preparation of the ERAs cited in the PEIS and PBA (BLM 2007a, d) to evaluate the potential for deleterious chemical exposures to plant and animal species of special concern from use of herbicides to treat weed infestations. Species listed as threatened, endangered, proposed, or candidate (TEPC) under the ESA will be sorted into the ERA surrogate classes based on food and shelter requirements and taxonomic similarity. Information on the chemical characteristics of the herbicide, the mode and rate of application of the herbicide, and local environmental conditions (e.g., soil type, rainfall) will be considered in this evaluation. The resultant exposure risks can then be compared to a table listing risk levels to determine the potential for an acute or chronic risk to the species of interest. Risk levels for TEPC species are provided in the ERAs.

- The BLM will incorporate SOPs, mitigation measures, and conservation measures identified in the PEIS and PBA or in future ERAs and BAs that address herbicides, TEPC species, and site conditions similar to those for projects in the GSFO area.

- The BLM will use herbicides in a manner consistent with labeling instructions, design criteria, and any issued reasonable and prudent measures with terms and conditions to ensure that unlawful taking of a TEPC species does not occur. In the unanticipated and unlikely event of an adverse effect on any TEPC species, formal consultation will be initiated with the USFWS pursuant to ESA Section 7. The biological opinion (BO) issued by the USFWS at the conclusion of that process will include a statement exempting the BLM from the prohibitions against the "take" of a listed species under the incidental take provisions of ESA Section 9.

B. PLANTS

At a minimum, the following must be included with all weed management plans:

- Survey all proposed treatment areas within potential TEPC habitat by a botanically qualified biologist, botanist, or ecologist to determine the presence/absence of the species.

- Establish site-specific no activity buffers by a qualified botanist, biologist, or ecologist in areas of occupied habitat within the proposed project area. To protect occupied habitat, do not conduct treatment activities within these buffers.

- Collect baseline information on the existing condition of TEPC plant species and their habitats in the proposed project area.

- Establish pre-treatment monitoring programs to track the size and vigor of TEPC populations and the state of their habitats. These monitoring programs would help in anticipating the future effects of vegetation treatments on TEPC plant species.

- Assess the need for site revegetation post treatment to minimize the opportunity for noxious weed invasion and establishment.

The following considerations must also be addressed in the plans:

- Because of high risk for damage to TEPC plants and their habitat from use of domestic animals to contain weeds, avoid this method within 330 feet of sensitive plant populations UNLESS the grazing treatment is specifically designed to maintain or improve existing populations of desirable species.

- Avoid use of OHVs (ATVs and 4WD vehicles) for ground treatments in suitable or occupied habitat.

- Do not use biological control agents (except for domestic animals) that affect target plants in the same genus as TEPC species present or potentially present in the area. Establish buffer distances based on the dispersal distance of the biocontrol agent.

- Prior to using biological control agents that affect target plants in the same family as TEPC species, evaluate the specificity of the agent with respect to factors such as physiology and morphology and determine risks to the TEPC species.

- Conduct post-treatment monitoring to determine the effectiveness of the project.

In addition, the following guidance must be considered in all weed management plans in which herbicide treatments are proposed to minimize or avoid risks to TEPC species. The exact conservation measures to be included in management plans would depend on the herbicide that would be used, the desired mode of application, and the conditions of the site. Given the potential for offsite drift and surface runoff, populations of TEPC species on lands not administered by the BLM would need to be considered if they are located near proposed herbicide treatment sites.

- Do not use herbicide treatments in areas where TEPC plant species may be subject to direct spray .

- Ensure that applicators review, understand, and conform to the "Environmental Hazards" section on herbicide labels (this section warns of known pesticide risks and provides practical ways to avoid harm to organisms or the environment).

- To avoid negative effects to TEPC plant species from offsite drift, surface runoff, and/or wind erosion, establish suitable buffer zones between treatment sites and known or suspected of TEPC plants and apply the site-specific precautions outlined below.

- Follow all instructions and standard operating procedures (SOPs) to avoid spill or direct spray of herbicides into aquatic habitats that support TEPC plant species.

- Follow all BLM operating procedures for avoiding herbicide treatments during climatic conditions that would increase the likelihood of spray drift or surface runoff.

The buffer distances listed below for broadcast spraying of the BLM-approved herbicides are conservative estimates compiled from ERAs cited in the PEIS and PBA (BLM 2007a, d). In most cases, a suggested buffer represents the first modeled distance from an application site for which no risks were predicted. Manual or spot treatments of undesirable vegetation may occur within the listed buffer zones if it is determined that TEPC plants would not be affected. Additional precautions during spot treatments within buffer distances from TEPC plants or their habitat would be considered while planning local projects and included as conservation measures in local-level NEPA.

Note that the buffer distances for aquatic TEPC plants reported in ERAs are typically smaller than those for terrestrial TEPC plants, indicating less susceptibility to injury or mortality from direct spray or aerial drift. The buffer distances for aquatic plants refer only to emergent or submergent species (i.e., that occur

in seasonally or permanently inundated sites). Buffer distances used by the GSFO for herbicide treatments in proximity to riparian plants or non-aquatic wetland plants (including the Ute ladies'-tresses orchid) would be the same as for terrestrial TEPC plants.

2,4-D

- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not use aquatic formulations in aquatic habitats containing aquatic TEPC plants.

Bromacil

- Do not apply aerially.
- Do not apply within 1,200 feet of terrestrial TEPC plants.
- Do not apply within 100 feet of aquatic habitat containing aquatic TEPC plants when using a low boom at the typical rate.
- Do not apply within 900 feet of aquatic habitat containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Chlorsulfuron

- Do not apply aerially within 1,500 feet of terrestrial TEPC plants.
- Do not apply aerially at the typical application rate within 100 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply aerially at the maximum application rate within 300 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply by ground methods within 1,200 feet of terrestrial TEPC plants.
- Do not apply by ground methods within 25 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Clopyralid

- Do not apply aerially within 0.5 mile of terrestrial TEPC plants.
- Do not apply using a low boom at the typical rate within 900 of terrestrial TEPC plants.
- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Dicamba

- Do not apply within 1,050 feet of terrestrial TEPC plants.
- Do not apply within 25 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Diflufenzopyr

- Do not apply aerially.
- Do not apply within 100 feet of terrestrial TEPC plants using a low boom at the typical rate.
- Do not apply within 900 feet of terrestrial TEPC plants using a low boom at the maximum rate.
- Do not apply within 500 feet of terrestrial TEPC plants using a high boom at either rate.
- Do not apply within 25 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Diquat

- Do not apply aerially within 1,200 feet of terrestrial TEPC plants.
- Do not apply by ground methods within 900 feet of terrestrial TEPC plants at the typical rate.
- Do not apply by ground methods within 1,000 feet of terrestrial TEPC plants at the maximum rate.
- Do not use in aquatic habitats containing aquatic TEPC plants.

Diuron

- Do not apply aerially.
- Do not apply within 1,100 feet of terrestrial TEPC plants.
- Do not apply within 900 feet of aquatic habitats containing aquatic TEPC plants when using a low boom at the typical rate.
- Do not apply within 1,100 feet of aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Fluridone

- Do not apply within 0.5 mile of terrestrial TEPC plants.

Glyphosate

- Do not apply aerially within 300 feet of terrestrial TEPC plants.
- Do not apply within 50 feet of terrestrial TEPC plants when using a low boom at the typical rate.
- Do not apply within 300 feet of terrestrial TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 0.5 mile of terrestrial TEPC plants when using a high boom at either rate.

Hexazinone

- Do not apply aerially within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not apply within 300 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the typical rate.

- Do not apply within 900 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate.
- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a high boom at either rate.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Imazapic

- Do not apply aerially at the typical rate within 300 feet of terrestrial TEPC plants.
- Do not apply aerially at the maximum rate within 900 feet of terrestrial TEPC plants.
- Do not apply aerially at the typical rate within 100 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply aerially at the maximum rate within 300 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply by ground methods within 25 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Imazapyr

- Do not apply within 900 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants at the typical ate when using aerial or ground methods at the typical rate.
- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using aerial or ground methods at the maximum rate.
- Do not use aquatic formulations in aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Metsulfuron Methyl

- Do not apply aerially within 0.5 mile of terrestrial TEPC plants or aquatic habitats in which TEPC plants occur.
- Do not apply within 900 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the typical rate.
- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Overdrive® (dicamba + diflufenzopyr)

- Do not apply aerially.
- Do not apply within 100 feet of terrestrial TEPC plants when using a low boom at the typical rate.
- Do not apply within 900 feet of terrestrial TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not apply within 25 feet of aquatic habitats containing aquatic TEPC plants.

- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Picloram

- Do not apply by within 0.5 mile of terrestrial TEPC plants.

Sulfometuron Methyl

- Do not apply within 1,500 feet of terrestrial TEPC plants.
- Do not apply aerially within 1,500 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply by ground methods within 900 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Tebuthiuron

- Do not apply aerially.
- Do not apply within 25 feet of terrestrial TEPC plants when using a low boom at the typical rate.
- Do not apply within 50 feet of terrestrial TEPC plants when using a low boom at the maximum rate or a high boom at the typical rate.
- Do not apply within 900 feet of terrestrial TEPC plants when using a high boom at the maximum rate.
- Do not apply within 25 feet of aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Triclopyr Acid

- Do not apply aerially at the typical rate within 500 feet of terrestrial TEPC plants at the typical rate.
- Do not apply aerially at the maximum rate within 0.5 mile or terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not apply within 300 feet of terrestrial TEPC plants using a low boom at the typical rate.
- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- If applying to aquatic habitats containing aquatic TEPC plants occur, do not exceed the targeted water concentration on the product label.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

Triclopyr BEE

- Do not apply aerially at the typical rate within 500 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not apply aerially at the maximum rate within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants.
- Do not apply within 300 feet of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the typical rate.

- Do not apply within 0.5 mile of terrestrial TEPC plants or aquatic habitats containing aquatic TEPC plants when using a low boom at the maximum rate or a high boom at either rate.
- Do not use aquatic formulations in aquatic habitats containing aquatic TEPC plants.
- Do not apply within 0.5 mile of TEPC plants in areas where wind erosion is likely.

In addition to the selection of specific locations, herbicides, application methods, application rates, and buffer distances for specific sites during the annual treatment planning, the GSFO would also consider measures to prevent the spread of weeds in occupied or suitable habitat conjunction with weed treatments and all projects involving ground-disturbing activities. These measures include the following:

- Seed cleared areas that are prone to invasion by downy brome or other noxious weeds with an appropriate seed mixture to reduce the probability of noxious weeds or other undesirable plants becoming established on the site.
- Where seeding is warranted, seed bares areas (whether from ground disturbance or removal of weeds) as soon as appropriate after treatment, considering the time of year and any waiting period following use of a specific herbicide.
- Use only native species when revegetating bares areas in occupied or suitable habitat and use only species that are compatible with the specific habitat or TEPC plant.
- Use only native seed that is certified free of noxious weed seeds in occupied or suitable TEPC species habitat.
- Use only certified weed-free straw and hay bales for mulch or erosion control in occupied or suitable TEPC species habitat.
- Wash vehicles and heavy equipment used during weed treatment activities prior to arriving at a new location to avoid transferring noxious weed seeds.

In addition, the GSFO would develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

C. AQUATIC ANIMALS

Conservation Measures for Site Access and Fueling/Equipment Maintenance

For treatments occurring in watersheds with TEPC species or designated critical habitat, or in undesignated critical habitat (i.e., unoccupied habitat critical to species recovery):

- Where feasible, access work site only on existing roads, and limit all travel on roads when damage to the road surface will result or is occurring.
- Where TEPC aquatic species occur, consider ground-disturbing activities on a case by case basis, and implement SOPs to ensure minimal erosion or impact to the aquatic habitat.
- Do not conduct biomass removal (harvest) activities that will alter the timing, magnitude, duration, or spatial distribution of peak, high, and low flows outside the range of natural variability.

- **Within riparian areas**, do not drive vehicles off established roads; do not land helicopters except in emergencies.

- **Outside riparian areas**, do not drive vehicles off established roads on slopes steeper than 20%.

- **Within 150 feet of wetlands or riparian areas**, do not fuel/refuel equipment, store fuel, or perform equipment maintenance (locate all fueling and fuel storage areas, as well as service landings outside protected riparian areas).

- Prior to helicopter fueling operations, prepare a transportation, storage, and emergency spill plan and obtain the appropriate approvals; for other heavy equipment fueling operations use a slip-tank not greater than 250 gallons; prepare spill containment and cleanup provisions for maintenance operations.

Conservation Measures Related to Revegetation Treatments

- **Outside riparian areas**, avoid hydromulching within buffer zones established at the local level. This precaution will limit adding sediments and nutrients and increasing water turbidity.

- **Within riparian areas**, engage in consultation at the local level to ensure that revegetation activities incorporate knowledge of site-specific conditions and project design.

Conservation Measures Related to Herbicide Treatments

- Maintain equipment used for transportation, storage, or application of chemicals in a leak-proof condition.

- Do not store or mix herbicides, or conduct post-application cleaning within riparian areas.

- Ensure that trained personnel monitor weather conditions at spray times during application.

- Strictly enforce all herbicide labels.

- Follow all instructions and SOPs to avoid spilling or direct spraying herbicides into aquatic habitats.

- Do not broadcast spray when wind velocity exceeds 10 mph.

- Do not broadcast spray within 100 feet of open water when wind velocity exceeds 5 mph.

- Do not broadcast spray if precipitation is occurring or is expected within 24 hours.

- Do not broadcast spray if air turbulence is sufficient to affect the normal spray pattern.

- Do not broadcast spray in upland habitats within 0.5 mile of aquatic habitat when the potential exists for runoff from the treated area into the aquatic habitat.

- Use only herbicides approved for use in aquatic systems when treating weeds in riparian areas, 100-year floodplains, or Designated Critical Habitat for TEPC fish species.

- Treat the smallest area that will achieve the desired level of weed control.

- Use the typical application rate, rather than the maximum application rate, whenever practicable based on the weed species, site conditions, application method, and desired level of weed control.

The special restrictions and buffer distances provided below are based on the information provided by ERAs and are designed to provide protection to TEPC plants. Observe the following buffers or restrictions on application methods for specific herbicides:

- Do not use diquat, terrestrial formulations of glyphosate, or triclopyr BEE to treat aquatic vegetation where aquatic vertebrates or TEPC aquatic invertebrates occur or may occur.

- Do not use chlorsulfuron, imazapic, imazapyr, metsulfuron methyl, or sulfometuron methyl to treat upland sites with the potential for transport by runoff or aerial drift into streams, ponds, or lakes where aquatic vertebrates or TEPC aquatic invertebrates occur or may occur.

- Do not broadcast spray diquat, glyphosate, picloram, or triclopyr BEE by either aerial or ground methods to treat upland sites adjacent to aquatic habitats that support or may support aquatic vertebrates or TEPC aquatic invertebrates.

- Do not use glyphosate formulations that include R-11 and either avoid formulations with the surfactant POEA or use the formulation with the lowest amount of POEA available.

- Do not apply diuron within 100 feet of aquatic habitat using a low boom or a high boom at the typical application rate, or within 900 feet of aquatic habitat using a high boom at the maximum rate.

- Do not apply diuron where the potential exists for aerial drift into fish-bearing waters.

Conservation Measures Related to Biological Control Treatments using Livestock

For treatments in **watersheds** that support TEPC species or in critical habitat:

- Where terrain permits, locate stock handling facilities, camp facilities, and improvements at least 300 feet from lakes, streams, and springs.

- Educate stock handlers about at-risk fish species and how to minimize negative effects to the species and their associated habitat.

- Employ appropriate dispersion techniques to range management, including judicial placement of salt blocks, troughs, and fencing, to prevent damage to riparian areas but increase weed control.

- Equip each watering trough with a float valve.

For treatments within **riparian** areas, more protective measures are required:

- Do not conduct weed treatments involving domestic animals, except where it is determined that these treatments will not damage the riparian system, or will provide long-term benefits to riparian and adjacent aquatic habitats.

- Do not locate troughs, storage tanks, or guzzlers near streams with TEPC species, unless their placement will enhance weed-control effectiveness without damaging the riparian system.

In addition, the GSFO would develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

D. WILDLIFE

Conservation Measures – Canada Lynx

To minimize or avoid impacts to Canada lynx, the GSFO would apply the following measures:

- Prior to vegetation treatments, map lynx habitat within areas in which treatments are proposed to occur. Identify potential denning and foraging habitat, and topographic features that may be important for lynx movement (major ridge systems, prominent saddles, and riparian corridors).
- Design vegetation treatments in lynx habitat to approximate historical landscape patterns and disturbance processes.
- Avoid the construction of permanent firebreaks on ridges or saddles in lynx habitat.
- Where possible, keep linear openings out of mapped potential habitat and away from key habitat components, such as denning areas.
- When planning vegetation treatments, minimize the creation of linear openings (fire lines, access routes, and escape routes) that could result in permanent travel ways for competitors and humans.
- Obliterate any linear openings constructed within lynx habitat in order to deter future uses by humans and competitive species.
- Design burn prescriptions to regenerate or create snowshoe hare habitat (e.g., regeneration of aspen and lodgepole pine).
- Ensure that no more than 30% of lynx habitat within a Lynx Analysis Unit (LAU, as defined in Ruediger et al. 2000) would be in an unsuitable condition at any time.
- If deemed necessary, defer livestock grazing following vegetation treatments to ensure the re-establishment of key plant species. Bureau of Land Management personnel should use resource goals and objectives to determine the need for this restriction and the length of deferment on a case by case basis.
- Give particular consideration to amounts of denning habitat, condition of summer and winter foraging habitat, as well as habitat linkages, to ensure that that treatments do not negatively impact lynx. If there is less than 10% lynx habitat in an LAU, defer vegetation treatments that would delay development of denning habitat structure. Protect habitat connectivity within and between LAUs.
- Do not apply any herbicide by aerial methods directly over forested subalpine spruce-fir habitats.
- Do not use 2,4-D in lynx habitat; do not aerially spray or broadcast spray 2,4-D within 0.25 mile of lynx habitat.
- Where feasible, avoid use of the following herbicides in lynx habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr.

- Do not aerially spray or broadcast spray clopyralid, diuron, glyphosate, hexazinone, picloram, or triclopyr in lynx habitat, or in areas adjacent to lynx habitat under conditions when spray drift onto the habitat is likely.

- If broadcast spraying bromacil, diquat, imazapyr, or metsulfuron methyl in or near lynx habitat, apply at the typical, rather than the maximum, application rate.

- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in lynx habitat, utilize the typical, rather than the maximum, application rate.

In addition, the GSFO would develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

Conservation Measures – Mexican Spotted Owl

To minimize or avoid impacts to Mexican Spotted Owl, the GSFO would apply the following measures:

- Survey for Mexican spotted owls (and their nests or roosts) in occupied or suitable habitat before developing a treatment plan.

- Avoid treatment activities within 0.5 mile of known or suspected nest sites or roost sites during the period February 1 to April 31.

- Protect and retain the structural components of known or suspected nest sites during treatments; evaluate each nest site prior to treatment and protect it in the most appropriate manner.

- Do not conduct treatments that alter forest structure in old-growth stands.

- Do not use 2,4-D in Mexican spotted owl habitats; do not aerially spray or broadcast spray 2,4-D within 0.25 mile Mexican spotted owl habitat.

- Where feasible, avoid use of the following herbicides in Mexican spotted owl habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr.

- Do not broadcast spray or aerially spray clopyralid, diuron, glyphosate, hexazinone, picloram, or triclopyr in Mexican spotted owl habitat, or in areas adjacent to Mexican spotted owl habitat under conditions when spray drift onto the habitat is likely.

- If broadcast spraying bromacil, diquat, imazapyr, or metsulfuron methyl in or adjacent to Mexican spotted owl habitat, apply at the typical, rather than the maximum application rate.

- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation Mexican spotted owl habitat, utilize the typical, rather than the maximum application rate.

In addition, the GSFO would develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

Conservation Measures –Bald Eagle

To minimize or avoid impacts to the bald eagle, the GSFO would apply the following measures:

- Conduct surveys prior to vegetation treatments within potential or suitable habitat.
- Avoid treatment activities within 0.5 mile of active nest sites or active roost sites.
- For any treatments that must occur within 1 mile of a winter roost during the roosting season, limit activities to the period from 9 a.m. to 3 p.m.
- Do not allow helicopter/aircraft activity within 1 mile of bald eagle nest sites or winter roost sites during the breeding or roosting period.
- Do not cut trees within 0.25 mile of any known nest trees.
- Do not use 2,4-D in bald eagle habitat; do not aerially spray or broadcast spray 2,4-D within 0.25 mile of bald eagle habitat.
- Where feasible, avoid use of the following herbicides in bald eagle habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr.
- Do not broadcast spray or aerially spray clopyralid, diuron, glyphosate, hexazinone, picloram, or triclopyr in bald eagle habitat, or in areas adjacent to bald eagle habitat under conditions when spray drift onto the habitat is likely.
- If broadcast spraying bromacil, diquat, imazapyr, or metsulfuron methyl in or adjacent to bald eagle habitat, apply at the typical, rather than the maximum application rate.
- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in bald eagle habitat, utilize the typical, rather than the maximum application rate.

In addition, the GSFO would develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

Conservation Measures – Western Yellow-billed Cuckoo

To minimize or avoid impacts to the western yellow-billed cuckoo, the GSFO would apply the following measures:

- Conduct surveys prior to vegetation treatments within potential or suitable habitat.
- Where surveys detect cuckoos, do not broadcast spray herbicides or use manual or domestic livestock methods.
- Do not conduct vegetation treatments within 0.5 mile (or farther if deemed necessary to prevent smoke from inundating the nest area) of known nest sites or unsurveyed suitable habitat during the breeding season (as determined by a qualified wildlife biologist).
- Adjust spatial and temporal scales of treatments so not all suitable habitat is affected in a year.

- Following treatments replant or reseed treated areas with native species, if needed.

- Closely follow all application instructions and use restrictions on herbicide labels; in wetland habitats use only those herbicides that are approved for use in wetlands.

- Do not use 2,4-D in yellow-billed cuckoo habitats; do not aerially spray or broadcast spray 2,4-D within 0.25 mile of yellow-billed cuckoo habitat.

- Where feasible, avoid use of the following herbicides in yellow-billed cuckoo habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr.

- Do not broadcast spray or aerially spray clopyralid, diquat, diuron, glyphosate, hexazinone, picloram, or triclopyr in yellow-billed cuckoo habitat, or in areas adjacent to yellow-billed cuckoo habitat under conditions when spray drift onto the habitat is likely.

- If broadcast spraying imazapyr or metsulfuron methyl in or adjacent to yellow-billed cuckoo, apply at the typical, rather than the maximum application rate.

- If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in yellow-billed cuckoo habitat, utilize the typical, rather than the maximum application rate.

In addition, the GSFO will develop and implement additional conservation measures, as necessary, during project-level analysis at the project level.

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APPENDIX H

Currently Permitted Grazing Allotments Administered by the GSFO

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Currently Permitted Grazing Allotments Administered by the GSFO

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
ALBERTSON	8653	507689	1934	186	100	C	52	5/1	5/31
ALBERTSON	8653	507679	1934	186	100	C	33	6/1	10/1
ALKALI CREEK	8214	507713	1136	132	100	C	52	6/1	8/15
ALKALI CREEK COMMON	8130	507593	2895	84	100	C	93	5/1	6/15
ALKALI CREEK COMMON	8130	507549	2895	84	100	C	40	5/1	6/15
ALKALI GULCH	8131	507586	1183	160	100	S	0	3/16	5/15
ALKALI GULCH	8131	507586	1183	160	100	S	0	12/17	2/15
ANTELOPE CREEK	8661	507684	3821	323	100	C	107	5/1	7/31
BADLANDS	8318	507640	645	75	100	C	30	6/1	8/15
BAMBI	8669	507675	2071	115	100	C	112	10/1	10/25
BAMBI	8669	507675	2071	115	100	C	112	6/25	6/30
BARR	8109	507541	85	4	100	C	4	5/25	6/25
BATTLEMENT CRK COM	8124	507593	2550	222	100	C	5	6/16	10/15
BATTLEMENT CRK COM	8124	507597	2550	222	100	C	53	5/1	6/15
BATTLEMENT CRK COM	8124	507593	2550	222	100	C	100	5/10	6/15
BEARWALLOW & JOLLEY	8208	507562	2747	625	36	C	272	9/28	10/31
BEARWALLOW & JOLLEY	8208	507562	2747	625	36	C	272	5/15	7/14
BEAVER CREEK	8113	507550	462	41	11	C	73	5/12	10/14
BEAVER MAMM	8104	500157	4144	632	100	C	45	5/15	10/15
BEAVER MAMM	8104	500001	4144	632	100	C	79	5/15	10/15
BELLYACHE	8734	507583	533	18	9	C	100	5/10	7/9
BENTON	8654	507696	1499	162	100	C	114	5/20	7/1
BLACK MOUNTAIN	8662	507685	947	109	100	C	13	6/1	9/30
BLOWOUT AMP	8643	507512	010	535	100	S	1000	10/	11/30
BLOWOUT AMP	8643	507512	010	535	100	S	1000	5/8	6/15
BOCCO MTN	8730	507583	3967	290	100	S	1700	5/16	5/31
BOCCO MTN	8730	507583	3967	290	100	S	1690	9/1	9/10
BOILER CREEK	8210	507562	2492	144	100	C	96	6/1	7/15
BOWEN ISOLATED TRACT	18004	501964	198	38	5	C	0	6/16	9/30
BRUSH CREEK	8503	507628	108	9	73	C	22	6/1	6/15
BRUSH CRK COMMON	18012	507623	3850	320	100	C	314	5/21	6/
BULL GULCH COMMON	8625	500219	10847	642	100	C	41	7/1	8/31
BULL GULCH COMMON	8625	500219	10847	642	100	Y	90	7/1	8/31
BULL GULCH COMMON	8625	500219	10847	642	100	C	80	7/26	10/1
BULL GULCH COMMON	8625	507603	10847	642	100	C	100	5/1	6/30
BWJ FOREST	8229	507562	363	40	27	C	105	7/15	8/26
CABIN GULCH	8731	507583	3240	340	100	S	10	5/15	6/3
CABIN GULCH	8731	507583	3240	340	100	S	10	10/10	11/1
CALLAHAN MTN COM	8919	507512	1631	98	59	C	44	5/16	6/15
CALLAHAN MTN COM	8919	501855	1631	98	100	S	1000	11/	11/30

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
CANTLEY HOMESTEAD	8402	507618	331	17	100	C	50	6/21	6/30
CANYON CREEK	8228	507667	728	51	100	Y	48	8/1	9/15
CANYON CREEK	8207	507586	1396	146	39	C	20	7/16	9/15
CANYON CREEK	8207	507586	1396	146	39	S	1000	6/16	7/10
CANYON CREEK	8207	507586	1396	146	39	S	1000	9/6	9/30
CASTLE IND	8609	500015	1263	170	100	C	144	5/6	6/11
CATAMOUNT COMMON	8619	500015	6656	1085	100	C	196	8/1	10/15
CATAMOUNT COMMON	8619	507507	6656	1085	100	C	126	6/12	10/15
CATTLE CREEK DRIVE	8302	507546	642	181	50	C	0	7/8	8/31
CEDAR MTN	18006	507623	10361	383	100	C	79	10/25	12/25
CEDAR MTN	18006	507623	10361	383	100	C	218	5/16	6/15
CERISE	8340	507539	682	108	70	C	38	6/1	10/1
CLOUGH-ALBER	18909	507542	5323	1090	80	S	1000	6/20	10/1
CLOUGH-ALBER	18909	507621	5323	1090	100	C	134	6/16	10/15
COPPER SPUR	8668	507692	3464	211	100	C	43	5/19	10/15
CORYELL	8307	507570	73	19	19	C	600	6/1	6/5
COTTONWOOD	8301	507546	202	85	3	C	750	6/16	9/30
COTTONWOOD CRK ETC.	8506	507512	5274	312	60	S	1000	5/10	5/30
COTTONWOOD CRK ETC.	8506	507512	5274	312	60	S	1000	11/2	11/29
COTTONWOOD CRK ETC.	8506	507512	5274	312	60	S	750	5/10	6/15
COTTONWOOD CREEK	8508	507661	824	80	23	C	65	5/1	10/10
COTTONWOOD GULCH	8924	507624	9605	401	86	C	180	5/11	6/5
COUEY 1	8115	507544	147	4	100	C	2	10/16	11/15
COUEY 1	8115	507544	147	4	100	C	2	5/1	5/31
COUEY 2	8118	507544	87	18	5	C	87	6/20	10/19
CRAWFORD &KERLEE	8916	507529	775	10	25	C	20	5/1	6/15
CROWN	8335	500227	2557	294	100	C	94	6/16	9/18
CROWN COMMON	8334	507600	2066	344	100	C	38	5/16	6/25
CROWN COMMON	8334	500216	2066	344	100	C	10	5/16	6/15
CROWN COMMON	8334	500027	2066	344	100	C	30	5/16	6/25
CROWN COMMON	8334	507611	2066	344	100	C	69	5/16	6/25
CROWN COMMON	8334	507538	2066	344	100	C	110	5/16	6/25
CROWN IND	8337	507526	1620	235	100	Y	62	5/15	6/27
CROWN IND	8337	507526	1620	235	100	C	100	5/15	6/27
CRYSTAL RIVER	8342	507546	3962	380	83	C	0	5/15	6/30
CRYSTAL RIVER	8342	507546	3962	380	83	C	146	9/16	10/15
DEAN GULCH	8107	507514	1039	126	100	C	28	6/16	10/31
DEER PEN	8616	507515	7962	900	100	C	449	5/1	6/30
DELANEY	8216	507548	388	60	50	C	34	6/15	9/30
DERBY RIDGE	8618	507669	366	40	33	C	20	6/1	9/30
DIAMOND FLATS	8323	507592	1700	504	100	C	10	10/1	10/15

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
DIAMOND FLATS	8323	507518	1700	504	100	C	101	5/16	6/30
DIAMOND FLATS	8323	507518	1700	504	100	C	66	5/16	6/30
DOAK	18005	507544	404	83	16	C	85	6/1	10/18
DODO	18025	507552	2175	18	69	C	25	5/15	6/15
DOMANTLE	8733	507583	154	65	12	S	2700	6/1	6/15
DOMANTLE	8733	507583	154	65	12	S	2700	10/1	10/15
DOODLEBUG	8905	507693	947	54	100	C	53	5/16	6/15
DOYAL	8315	507554	83	10	100	C	10	5/16	6/15
DRIVEWAY COMMON	8338	507538	156	93	100	C	7	5/16	6/25
DRIVEWAY COMMON	8338	507600	156	93	100	C	45	6/24	6/25
DRIVEWAY COMMON	8338	507611	156	93	100	C	36	5/16	6/25
DRIVEWAY COMMON	8338	507538	156	93	100	C	20	5/16	6/25
DRIVEWAY COMMON	8308	507570	992	300	100	C	600	6/24	7/8
DRIVEWAY-THREE MILE	8324	507518	779	110	32	C	168	7/1	8/31
DRY CK PETE & BILL	8125	507593	7271	372	100	C	118	10/1	10/31
DRY CK PETE & BILL	8125	507564	7271	372	3	C	21	10/1	10/31
DRY CK PETE & BILL	8125	507593	7271	372	3	C	118	5/1	6/15
DRY CK PETE & BILL	8125	507564	7271	372	100	C	36	5/1	6/15
DRY HOLLOW RES GULCH	8127	507625	6916	714	100	C	90	6/1	6/15
DRY HOLLOW RES GULCH	8127	507662	6916	714	100	C	10	6/1	6/30
DRY HOLLOW RES GULCH	8127	507544	6916	714	100	C	140	6/1	6/15
DRY HOLLOW RES GULCH	8127	507641	6916	714	90	C	315	6/1	6/15
DRY HOLLOW RES GULCH	8127	507530	6916	714	100	C	73	6/1	6/15
DRY HOLLOW RES GULCH	8127	507544	6916	714	100	C	57	6/16	10/15
DRY HOLLOW RES GULCH	8127	507580	6916	714	100	C	285	6/1	6/15
DRY HOLLOW RES GULCH	8127	507712	6916	714	100	C	195	6/1	6/15
DRY PARK	8352	507546	766	90	18	C	110	6/1	7/10
DRY PARK	8352	507546	766	90	18	C	110	9/15	10/15
E SUNNYSIDE	8610	507651	87	20	43	Y	100	6/1	6/13
E. HARDSCRABBLE	8502	500031	8018	879	100	C	581	5/6	6/20
EAST CASTLE	8601	507583	9479	2316	100	S	2120	6/1	11/15
EAST DIVIDE COMMON	8105	507625	13779	2362	100	C	80	6/1	6/30
EAST DIVIDE COMMON	8105	507625	13779	2362	100	C	80	10/1	10/15
EAST DIVIDE COMMON	8105	507670	13779	2362	100	C	235	10/1	10/15
EAST DIVIDE COMMON	8105	507670	13779	2362	100	C	369	6/1	6/30
EAST DIVIDE COMMON	8105	507614	13779	2362	100	C	369	10/1	10/15
EAST DIVIDE COMMON	8105	507614	13779	2362	100	C	236	6/1	6/30
EAST FORK COMMON	18910	501855	8461	2540	100	C	173	6/16	10/15
EAST FORK COMMON	18910	507676	8461	2540	100	C	44	6/16	10/15
EAST FORK COMMON	18910	507601	8461	2540	100	C	12	6/16	10/15
EAST FORK COMMON	18910	507593	8461	2540	100	C	95	6/16	10/15

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
EAST FORK COMMON	18910	507671	8461	2540	100	C	112	6/16	10/15
EAST FORK COMMON	18910	507610	8461	2540	100	C	86	6/16	10/15
EAST FORK COMMON	18910	507621	8461	2540	100	C	112	6/16	10/15
EBY CRK	8638	507540	1780	112	100	C	100	5/24	6/26
EGERIA PARK	8650	500016	167	25	100	C	25	6/1	6/30
ELK CREEK	8663	507687	2348	73	100	C	25	8/4	8/27
ELK CREEK	8663	507687	2348	73	100	C	25	6/1	8/3
ELK PARK COMMON	18032	507623	2678	204	100	C	0	5/16	6/15
FALK	8723	500031	71	9	100	C	16	5/15	5/31
FENDER	8329	500265	906	67	100	C	100	5/1	5/20
FENDER IND	8339	500265	566	65	100	C	54	5/21	7/1
GATES	8656	507678	164	13	100	C	13	6/1	6/30
GOULD	8306	507570	253	101	100	C	600	6/6	6/13
GOVERNMENT CRK COM	18039	507587	7567	362	100	S	1500	2/2	2/15
GOVERNMENT CRK COM	18039	507693	7567	362	100	C	218	5/16	6/15
GOVERNMENT CRK ISO	18023	500186	80	4	12	C	50	5/15	5/24
GOVERNMENT CRK ISO	18023	500186	80	4	12	C	50	10/1	10/10
GRAHAM	18014	507704	01	26	100	C	7	6/16	10/7
GRASS MESA	8112	507561	996	98	15	C	40	7/1	8/15
GRASS MESA	8112	507561	996	98	100	C	32	5/15	6/30
GREENHORN	8641	500015	11237	860	100	Y	95	5/8	6/23
GREENHORN	8641	507716	11237	860	100	C	140	5/8	6/25
GREENHORN	8641	500015	11237	860	100	C	9	6/26	9/15
GREENHORN	8641	507716	11237	860	100	C	95	5/8	6/23
HACK CREEK	8632	507502	5105	531	100	C	100	7/14	9/27
HACK CREEK	8632	507697	5105	531	100	Y	95	7/6	9/14
HACK CREEK	8632	507502	5105	531	100	C	30	7/12	9/14
HAFF RANCH	8317	507582	1374	572	100	C	230	6/5	7/1
HAFF RANCH	8317	507582	1374	572	100	C	230	10/1	10/15
HARRIS GULCH	18013	507647	2238	561	90	C	165	6/15	8/31
HARRIS GULCH	18013	507534	2238	561	90	C	78	6/15	8/31
HARRIS PARK	8209	507527	2643	159	41	C	205	6/1	7/15
HAYDEN	8015	507534	167	24	100	C	6	6/15	8/31
HAYDEN	8015	507647	167	24	100	C	3	6/15	8/31
HELLS HOLE	8735	507583	527	34	24	C	28	5/16	10/15
HOAGLUND	8123	507581	301	17	85	C	10	6/1	7/31
HOGBACK COMMON	18026	502901	1977	350	100	C	37	5/15	6/24
HOGBACK COMMON	18026	507631	1977	350	100	C	63	5/15	6/4
HOGBACK COMMON	18026	502901	1977	350	100	S	300	6/15	7/15
HOGBACK COMMON	18026	502901	1977	350	100	S	950	5/15	6/14
HOPKINS	8312	507582	240	30	28	Y	38	7/16	10/10

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
HORN	8659	507681	2167	249	100	C	41	5/1	10/31
HORSE CREEK	8631	507697	10026	302	100	C	100	5/1	7/13
HORSE CREEK	8631	507697	10026	302	100	C	100	9/28	10/15
HORSE MTN	18018	507623	4208	620	100	C	277	5/15	6/21
HORSE MTN	18018	507623	4208	620	100	C	50	10/25	12/20
HORSE MTN.	8719	507726	286	44	8	C	110	6/1	10/15
HUBBARD MESA	18903	507531	6760	362	100	C	60	5/16	6/15
HUBBARD MESA	18903	507587	6760	362	50	S	1500	4/1	5/31
JACKSON	18008	507532	322	31	100	C	20	6/16	7/31
JACKSON GULCH	18046	507614	1837	150	100	C	150	5/16	6/14
JEWELL	18036	500144	479	9	100	C	9	4/15	5/15
JQS COMMON	18908	500228	10457	3170	100	C	114	6/16	9/30
JQS COMMON	18908	500087	10457	3170	100	C	159	6/16	9/30
JQS COMMON	18908	507607	10457	3170	100	S	10	6/16	9/30
JQS COMMON	18908	507632	10457	3170	100	C	387	6/16	9/30
KAMM MESA	8101	500092	748	56	4	C	1230	5/10	6/9
KELLY GULCH	8921	500161	1677	72	59	S	580	10/20	11/20
KING MOUNTAIN	8666	507690	3990	149	11	C	330	6/10	10/10
KISSEL	18003	507631	967	44	100	C	70	6/1	6/19
LIGHT	8331	507599	1020	131	37	H	8	5/7	10/30
LIGHT	8331	507599	1020	131	37	C	50	5/20	9/30
LOOKOUT MTN	8313	507714	3322	315	35	S	900	5/5	6/30
LOOKOUT MTN	8313	507714	3322	315	35	S	1400	9/25	11/20
LOWER COFFEE POT	8649	507512	12703	594	80	S	600	9/24	10/5
LOWER COFFEE POT	8649	507512	12703	594	100	S	810	9/24	11/2
LOWER COFFEE POT	8649	507512	12703	594	5	S	810	9/24	11/2
LOWER COFFEE POT	8649	507512	12703	594	100	S	810	5/10	5/30
LOWER COFFEE POT	8649	507512	12703	594	25	S	1000	5/10	6/10
LOWER COFFEE POT	8649	507512	12703	594	80	S	600	5/10	6/15
LOWER COFFEE POT	8649	507512	12703	594	5	S	810	5/31	6/15
LOWER COFFEE POT	8649	507512	12703	594	25	S	1000	10/1	10/28
LUARK	8672	507686	823	84	100	C	15	10/1	10/14
LUARK	8672	507686	823	84	45	C	128	5/20	6/25
LUARK	8672	507686	823	84	100	C	15	5/7	5/20
LUNDGREN-HOGBACK	18017	507623	957	121	100	C	65	10/25	12/
MAGPIE CREEK	18901	507531	2083	56	23	C	60	6/16	10/17
MAHAFFEY SUMMER	8913	507624	1908	509	38	C	400	7/6	10/15
MCBRIDE	8354	507505	649	131	17	C	150	6/1	10/10
MCKEEN CREEK	8636	507718	368	105	100	C	260	10/1	10/12
MIDDLE MAMM COM	8128	507544	1232	168	100	C	29	6/1	6/30
MIDDLE MAMM COM	8128	507712	1232	168	100	C	28	6/1	6/30

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
MIDDLE MAMM COM	8128	507641	1232	168	100	C	112	6/3	6/30
MIDDLE RIFLE	18011	507623	1467	60	54	C	22	5/16	10/15
MONIGER RIDGE 1	8644	507718	388	34	7	C	490	6/1	6/30
MONIGER RIDGE 2	8646	507642	375	27	30	C	20	5/16	9/30
MOONEY	8635	500142	224	30	30	C	25	5/16	9/15
MORROW	28019	507606	717	36	100	C	18	8/1	9/30
MT. SOPRIS	8344	507618	862	34	12	C	183	5/25	6/23
MT. SOPRIS	8344	507715	862	34	12	C	102	5/25	6/23
N THOMPSON CRK COM	8348	507715	3260	398	50	C	217	10/10	10/16
N THOMPSON CRK COM	8348	507547	3260	398	50	C	330	6/1	6/15
N THOMPSON CRK COM	8348	507547	3260	398	50	C	92	6/1	6/15
N THOMPSON CRK COM	8348	507592	3260	398	50	C	120	10/10	10/16
N THOMPSON CRK COM	8348	507611	3260	398	50	C	268	10/10	10/15
N THOMPSON CRK COM	8348	507592	3260	398	50	C	155	10/10	10/15
N THOMPSON CRK COM	8348	500227	3260	398	50	C	90	10/10	10/16
N THOMPSON CRK COM	8348	507658	3260	398	50	C	268	6/1	6/15
N THOMPSON CRK COM	8348	507658	3260	398	50	C	155	6/1	6/15
N THOMPSON CRK COM	8348	507618	3260	398	50	C	92	10/10	10/16
N THOMPSON CRK COM	8348	500227	3260	398	50	C	330	10/10	10/16
N THOMPSON CRK COM	8348	507611	3260	398	50	C	90	6/1	6/15
N. BELLYACHE	8712	507615	2755	180	100	C	180	5/16	6/15
NEWCOMER	8617	507515	87	4	60	C	6	5/15	6/14
NORTH KING MTN	8604	507724	4108	575	100	Y	330	7/20	8/15
NORTH KING MTN	8604	507724	4108	575	100	Y	330	6/15	7/10
OATES	8103	507509	1203	38	100	S	125	5/1	6/15
OLD MOUNTAIN	8914	501988	1309	270	100	C	175	7/15	8/30
ONION RIDGE	8647	507706	7435	476	100	C	245	9/29	10/1
ONION RIDGE	8647	507706	7435	476	100	C	245	5/16	7/10
PARADISE CREEK	8212	507586	2572	0	50	S	1000	10/1	10/31
PARADISE CREEK	8212	507586	2572	0	50	S	1000	5/16	6/15
PINEY	7577	507616	648	41	15	S	800	9/18	10/18
PINEY	7577	507616	648	41	15	S	600	5/15	6/15
PINEY CREEK	8701	507616	250	45	50	C	120	6/20	6/25
PINEY CREEK	8701	507616	250	45	50	S	500	6/15	6/20
PINEY CREEK	8701	507616	250	45	50	S	500	9/20	9/25
PINEY CREEK	8701	507616	250	45	50	C	120	9/25	9/30
PISKEY	8606	507507	10630	430	94	C	179	5/15	7/31
PITMAN	8117	507620	1134	140	80	C	10	11/1	11/30
PITMAN	8117	507620	1134	140	80	C	20	6/16	10/31
PITMAN	8117	507620	1134	140	80	C	50	5/1	6/15
POLE CREEK & COTTONWOOD	8126	507717	952	115	100	C	115	5/16	6/15

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
PORCUPINE COMMON	8119	507609	1928	344	100	C	15	5/7	9/30
PORCUPINE COMMON	8119	507632	1928	344	84	C	195	5/16	6/15
PORCUPINE COMMON	8119	507632	1928	344	84	C	11	6/16	9/30
PORCUPINE COMMON	8119	500001	1928	344	84	C	70	10/1	10/15
PORCUPINE COMMON	8119	507632	1928	344	100	C	10	5/10	9/10
POTATO BILL	8347	507655	244	16	19	C	42	8/16	10/15
PRECTEL	8311	507570	77	24	30	C	600	6/20	6/23
PRETTI-ROBERTS	18029	507622	1838	394	100	S	800	1/1	2/15
PRETTI-ROBERTS	18029	507629	1838	394	100	C	150	5/16	6/15
PRINCE CREEK	8341	507655	2133	337	98	C	0	5/16	6/28
RED CANYON 1	8349	500236	601	90	100	C	41	6/1	6/16
RED CANYON 1	8349	500236	601	90	100	C	41	10/10	10/15
RED DIRT	8626	507502	2949	50	100	Y	90	12/1	12/5
RED DIRT	8626	507502	2949	50	100	Y	66	5/28	6/12
RED HILL COMMON	8507	507672	12467	628	100	C	179	5/10	6/24
RED HILL COMMON	8507	507672	12467	628	100	C	100	5/10	6/24
RED HILL COMMON	8507	507566	12467	628	100	C	25	5/6	6/20
RED HILL COMMON	8507	507522	12467	628	1	C	30	7/5	7/15
RED HILL COMMON	8507	507522	12467	628	100	C	43	5/10	6/24
RED HILL COMMON	8507	507672	12467	628	100	C	69	5/10	6/24
RED HILL COMMON	8507	507661	12467	628	1	C	75	4/1	4/17
RED HILL COMMON	8507	507672	12467	628	1	C	120	10/5	10/15
RED MOUNTAIN	18028	507631	969	44	100	C	82	5/26	6/10
REES	18907	507508	30	400	37	C	416	10/15	11/30
REES	18907	507508	30	400	37	C	416	5/1	6/1
RILEY GULCH COMMON	8920	507529	1359	124	100	C	76	5/1	6/15
RILEY GULCH COMMON	8920	507653	1359	124	100	C	26	5/12	6/15
RIVER COMMON	8615	507502	3885	38	100	C	25	5/1	5/31
RIVER COMMON	8615	507501	3885	38	100	C	13	5/1	5/31
RIVER-CATAMOUNT	8605	507515	1453	75	100	C	50	5/1	6/15
ROBERTS	8027	507629	135	22	88	S	120	12/1	1/1
RYDEN	18024	507631	1390	88	78	C	75	5/1	6/15
S MCKEEN CREEK	8637	507718	41	8	5	C	260	10/1	10/12
SALT CREEK FOREST	8722	500031	741	29	100	C	23	6/16	7/23
SALT CREEK-BELLYACHE	8721	500031	4369	252	100	C	50	10/16	10/22
SALT CREEK-BELLYACHE	8721	500031	4369	252	100	C	456	6/1	6/16
SCOTT	8106	507638	978	120	100	C	103	5/15	6/13
SCUTTER GULCH	18037	507694	447	16	50	S	300	5/1	5/16
SHIDELER	8111	507712	159	14	100	C	4	10/1	11/15
SHIDELER	8111	507641	159	14	100	C	4	10/1	11/15
SHIDELER IND	8116	507641	87	8	100	C	4	5/16	6/15

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
SHIDELER IND	8116	507712	87	8	100	C	4	5/16	6/15
SIMPSON & NICHOLS	18022	507654	475	43	24	C	38	5/20	10/10
SKEEN	8227	507638	160	25	7	C	140	8/16	10/31
SMITH 1	8108	507563	254	98	17	C	118	5/15	10/10
SMITH GULCH	8922	507586	2374	237	100	S	970	3/1	3/21
SMITH GULCH	8922	507586	2374	237	100	S	970	2/13	2/28
SPRING CREEK	8614	507603	5007	152	100	C	151	5/7	5/22
SPRING CREEK	8614	507603	5007	152	100	C	151	10/1	10/14
SPRING CREEK	8614	507603	5007	152	100	H	5	5/7	5/22
SPRUCE GULCH COM	8121	507632	1715	158	38	C	196	5/16	6/30
SPRUCE GULCH COM	8121	507516	1715	158	38	C	25	10/1	10/30
SPRUCE GULCH COM	8121	507632	1715	158	80	C	14	5/15	9/30
STARKEY GULCH	8917	507653	247	5	12	C	42	5/1	5/31
STATE BRIDGE	8706	507616	5903	487	100	S	1160	5/15	6/14
STATE BRIDGE	8706	507616	5903	487	100	S	1160	9/15	10/14
STATE BRIDGE	8706	507616	5903	487	100	C	21	5/15	6/14
STRUBI A NICK	8665	507689	204	30	100	C	10	7/1	9/30
SUNNYSIDE	8613	507501	669	25	25	C	100	5/1	5/31
SUNNYSIDE IND	8611	507515	1848	100	100	C	136	5/10	5/31
SUTEY	8320	500251	715	55	100	C	40	6/1	6/30
SUTEY	8320	500251	715	55	100	H	3	6/1	9/30
SW RIFLE CREEK	18016	507647	1282	371	100	C	45	5/16	6/14
SW RIFLE CREEK	18016	507534	1282	371	100	C	108	5/16	6/14
THOMAS	8346	507711	997	80	20	Y	195	5/16	7/10
THOMAS	8346	507711	997	80	20	C	40	10/10	11/10
TRAIL GULCH	8642	507603	13194	326	100	C	120	5/7	7/26
UPPER COTTONWOOD	8639	500015	1125	214	100	C	28	5/8	6/23
UPPER COTTONWOOD	8639	500015	1125	214	100	C	38	5/8	6/25
UPPER COTTONWOOD	8639	507716	1125	214	100	C	5	6/26	9/15
UPPER COTTONWOOD	8639	507716	1125	214	100	Y	28	5/8	6/23
UPPER GARFIELD COM	8222	507713	4560	1495	100	C	163	6/1	10/10
UPPER GARFIELD COM	8222	507619	4560	1495	100	C	17	6/1	10/10
UPPER JACK SPRING	8645	507706	77	50	100	C	16	7/1	10/1
UPPER PLACE	8304	507546	41	15	3	C	0	8/1	10/15
UPPER WALLACE COM	8129	507593	2189	160	100	C	121	6/1	6/15
UPPER WALLACE COM	8129	507593	2189	160	100	C	40	9/28	10/2
UPPER WALLACE COM	8129	507556	2189	160	100	C	22	4/15	6/15
UPPER WALLACE COM	8129	507556	2189	160	100	C	22	9/1	10/18
UTE CREEK	8707	507589	3106	216	18	S	1900	5/11	6/25
UTE CREEK	8707	507589	3106	216	18	H	5	10/1	11/20
UTE CREEK	8707	507589	3106	216	18	S	1900	10/1	11/

Allotment Name	Allotment Number	Auth. Number	BLM Acres	BLM AUMs	%PL	Livestock Species	Livestock Number	Date On	Date Off
UTE CREEK	8707	507589	3106	216	18	H	5	5/11	6/25
VASTEN HOMESTEAD COMMON	8336	507538	718	243	100	C	38	6/26	10/5
VASTEN HOMESTEAD COMMON	8336	500216	718	243	100	C	20	6/16	10/10
VASTEN HOMESTEAD COMMON	8336	500027	718	243	100	C	10	6/16	10/10
W BASALT MTN	8316	507558	1783	316	100	C	260	5/26	6/20
W BASALT MTN	8316	507558	1783	316	100	C	260	10/16	10/18
W HARDSCRABBLE COM	8504	507672	16300	1157	100	C	395	5/16	6/30
W HARDSCRABBLE COM	8504	507672	16300	1157	100	C	10	10/16	10/31
W HARDSCRABBLE COM	8504	507566	16300	1157	100	C	10	10/16	10/31
W HARDSCRABBLE COM	8504	507566	16300	1157	100	C	10	10/16	10/30
W HARDSCRABBLE COM	8504	507522	16300	1157	100	C	100	5/16	6/30
W HARDSCRABBLE COM	8504	507522	16300	1157	100	C	128	5/1	6/15
W SUNNYSIDE	8612	507651	399	24	83	C	20	5/25	6/14
W SUNNYSIDE	8612	507651	399	24	83	C	100	10/12	10/15
WATTS	18021	507665	840	183	45	S	800	9/15	11/1
WATTS	18021	507665	840	183	45	S	800	6/1	7/1
WEAVER	18009	502902	6335	300	100	S	900	10/2	10/9
WEAVER	18009	502902	6335	300	100	S	875	5/10	6/22
WEBSTER PARK	18902	507542	7822	700	100	C	100	4/20	5/25
WEBSTER PARK	18902	507542	7822	700	100	C	5	7/1	10/1
WEST CASTLE	8620	507515	4524	522	100	C	0	8/1	8/31
WEST CASTLE	8620	507515	4524	522	100	C	0	7/1	7/31
WHEELER GULCH	8918	507653	550	8	100	C	4	4/16	5/31
WHEELOCK IND LARGE	8607	507663	30	43	8	C	79	11/1	2/28
WHEELOCK IND LARGE	8607	507663	30	43	8	C	10	11/16	1/15
WHITMAN	8102	501971	845	63	100	C	60	5/1	5/31
WILLOW CREEK	8629	507502	3316	212	100	C	30	9/15	10/10
WILLOW CREEK	8629	507502	3316	212	100	Y	95	6/1	7/5
WILLOW CREEK	8629	507502	3316	212	100	Y	95	9/15	10/10
WITTWER	8038	507673	80	4	100	C	4	5/1	5/31
WOLCOTT	8702	507616	3293	487	100	S	1160	9/15	10/14
WOLCOTT	8702	507616	3293	487	100	C	21	5/15	6/14
WOLCOTT	8702	507616	3293	487	100	S	1160	5/15	6/14
WOLCOTT ISOLATED TR	8710	507590	136	40	100	C	45	9/20	10/1
WOLCOTT ISOLATED TR	8710	507590	136	40	100	C	45	6/25	7/9

AUM = Animal Unit Month or the amount of forage required to sustain one cow and calf for one month.
%PL = Percent Public Land, determined by amount of AUM's allocated to private land within the allotment.
C = Cattle, S = Sheep, H = Horses, Y = Yearling Cattle

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APPENDIX I

Federal and Colorado State Water Quality Standards for BLM-Approved Herbicides

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Federal and State Water Quality Standards and Other Information for Approved Herbicides

Pesticides [c]	State (µg/L)[a]		Federal [b]						
	Water Supply [d]	Water + Fish Ingestion [e]	MCL µg/L	NOAEL mg/kg/ day)[f]	LHA µg/L	Acute Oral LD_{50} (rat) mg/kg	48-hr LD_{50} (rainbow trout) mg/L	Eye Irritation	Aerobic Soil Half-life (days)
2, 4-D	70	--	70	5	70	370	1-100 (cutthroat trout)[g]	Severe	10
Bromacil	--	--	--	10	90	4000	56 to 75	Slight	275
Chlorsulfuron	--	--	--	25	--	2300 (F), 3100 (M)	ND	Slight	40
Clopyralid	--	--	--	75	--	4300	ND	ND	ND
Dicamba	210	170	--	3	200	757 (F), 1707 (M)	35	Severe	7 to 28
Diflufenzopyr	--	--	--	30	--	> 1800	ND	Moderate	ND
Diquat	15 to 20	--	20	0.22	15[h]	220	11.2	Severe	> 1000
Diuron	--	--	--	1	10	1017 (F), 3750 (M)	4.3-42 (fish in general)	Slight	ND
Fluridone	--	--	--	10	--	> 10,000	7.7 (96-hr)	Moderate	90 (saturated soil)
Glyphosate	700	--	700	2	700	5600	8.3 (Roundup®); 38 (glyphosate)	Slight	1 to 174
Hexazinone	--	--	--	10	210	1690	320 (96-hr)	Severe	30 to 180
Imazapic	--	--	--	350 (NOEL)	--	> 5000	ND	ND	ND
Imazapyr	--	--	--	1472 (NOEL)	--	> 5000	ND	None	ND
Metsulfuron methyl	--	--	--	125	--	> 5000	> 150 (96-hr)	Moderate	14 to 180
Picloram	490	--	500	20	500	8200	19.3 (96-hr)	Moderate	60 to 120
Sulfometuron methyl	--	--	--	20	--	> 5000	> 12.5	Slight	30 to 56
Tebuthiuron	--	--	--	7	500	387 (F), 477 (M)	144	Slight	> 365
Triclopyr	--	--	--	5	--	630 (F), 729 (M)	117	Severe	30 to 90

Notes:

(a) Chronic (long-term) consumption levels. Since Colorado state water quality standards have not been established for aquatic species of concern, Federal standards apply.

(b) Data taken from manufacturers' Material Safety Data Sheets; the EPA; various state departments charged with environmental protection; EXTOXNET multi-University pesticide database; and the Pesticide Action Network.

(c) Pesticides in italics have not yet been approved for use on BLM land, but are under consideration.

(d) State water quality standards apply to both surface water and groundwater. No State standards for soil.

(e) Applies to all Class 1 or Class 2 aquatic life segments classified for water supply. The Class 2 segments are those with fish of a catchable size that are commonly consumed.

(f) Determined through chronic feeding/oncogenicity studies in rats

(g) Effective concentration depends on pesticide formulation.

(h) California State public health-protective concentration

(i) Sheep and cattle are especially susceptible to poisoning by simazine. Doses >500 mg/kg have been fatal in sheep.

mg/L = milligrams per liter = parts per million (ppm); µg/L = micrograms per liter = parts per billion = ppb

MCL = Maximum contaminant limit

NOAEL = No observed adverse effect level; NOEL = No observed effects level

LHA = Lifetime health advisory level

LD_{50} = dosage lethal to 50% of the tested animal population within 2 to 4 hours

Half-life = the time required for half of a compound to break down

ND = no data available

APPENDIX J

Public Comments and Responses

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Public Comments on Proposed IWM Plan and BLM Responses

Colorado Department of Agriculture – Submitted by Kelly Uhing, State Weed Coordinator, via email on March 31, 2009.

1. **Comment – Page 3**: *Mediterranean sage in Glenwood Canyon: Garfield County Weed Manager Steve Anthony is working on eradication of this infestation. Is this near any BLM-owned property?*

   Response: Yes. The Mediterranean sage in Glenwood Canyon does occur on a small area of BLM land.

2. **Comment – Page 3**: *Yellow starthistle near East Divide Creek: Can I get confirmation this season that it is or is not YST [yellow starthistle]? The CDA [Colorado Department of Agriculture] is keeping detailed records on all YST infestations in Colorado and would be interested in confirmation of this patch.*

   ***Response*:** The site has been confirmed by the GSFO Ecologist, Carla DeYoung. Two yellow starthistle plants were apparently found in 1996 by the range technician at the time. The range technician portions of the two plants to Carla for identification. Both plants were manually removed from the site, and the site was monitored during the next two growing seasons. No other plants were found. The GSFO has plotted the location of the two plants on a map and will revisit the historic occurrence during summer 2009 to confirm that no yellow starthistles are present. BLM will inform CDA of its findings at the yellow starthistle site this summer and of any control measures implemented.

3. **Comment – Page 4**: *The Colorado Noxious Weed Act was passed into law in 1990, not 1996 as indicated in the [draft] IWM plan. Please add reference to the "Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act" (8 CCR 1206-2). These Rules contain statewide management plans for all List A species (eradication) and 16/39 List B species.*

   Response: We have made the requested change and included the additional reference.

4. **Comment – Page 8**: *Regarding the following text under* 2.2.7 Monitoring*: "…and if the objective of eradication is achieved, monitoring would be discontinued for that site." According to the Rules at 3.4B, "Once all mature plants are eliminated, appropriate efforts must be made to detect and eliminate new plants arising from seed, reproductive propagule, or root stock for the duration of the seed longevity for the particular species." Eradication sites should be monitored for the potential life of the seed to ensure that new plants have not germinated.*

   Response: Thank you for pointing this out. We have incorporated the suggested wording.

5. **Comment – Page 11**: *Under* Chemical Control*: "The pesticide applicator must keep these records for 10 years according to State law."*

   Response: BLM has made this change.

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APPENDIX K

U.S. Fish and Wildlife Service Concurrence with the Biological Assessment

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO:
ES/CO: BLM/GSFO
TAILS 65413-2009-I-0059

June 19, 2009

Memorandum

To: Supervisory Natural Resource Specialist, Bureau of Land Management, Glenwood Springs Field Office, Glenwood Springs, Colorado

From: Acting Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado

Subject: Revised Biological Assessment for Programmatic Integrated Weed Management Plan

This responds to your memo and revised biological assessment (BA), which was received in our office on May 26, 2009, regarding the Integrated Weed Management (IWM) Plan for the Bureau of Land management (BLM) Glenwood Springs Field Office (GSFO) and its effects on the *Sclerocactus glaucus* (Colorado hookless cactus), *Physaria obcordata* (Dudley Bluffs twinpod), *Spiranthes diluvialis* (Ute ladies'-tresses orchid), Canada lynx (*Lynx canadensis*), greenback cutthroat trout (*Oncorhynchus clarkii stomias*), Colorado pikeminnow (*Ptychocheilus lucius*) and its critical habitat, razorback sucker (*Xyrauchen texanus*) and its critical habitat, bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*). The IWM Plan would guide weed management on the approximately 568,000 acres of BLM-administered public lands in the GSFO area. This area includes portions of Eagle, Garfield, Mesa, Pitkin, and Routt Counties in west-central Colorado.

Because you determined that the proposed action would not affect the Mexican spotted owl (*Strix occidentalis lucida*), Endangered Species Act (ESA) consultation and concurrence are not necessary for this species. The BA prepared and submitted for this project addressed several candidate species: *Penstemon debilis* (Parachute penstemon), *Phacelia submutica* (De Beque phacelia), and the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). Because these species could become listed as threatened or endangered in the future, they have been addressed in the BA. However, because they are not listed at this time, section 7 consultation is not necessary for these species. The bald eagle (*Haliaeetus leucocephalus*) was also addressed in the BA due to an ongoing need for its protection and monitoring. However, because this species has recently been delisted, section 7 consultation is not necessary for this species.

The framework for an IWM Plan was established by the BLM in a recent regional-scale programmatic environmental report (PER) and programmatic environmental impact statement (PEIS). The PER, titled *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report* (BLM 2007a), describes the environmental impacts of

using non-herbicide vegetation treatment methods on public lands. The PEIS, titled *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b), identifies impacts to the natural and human environment associated with herbicide use. The PER and PEIS provide broad descriptions of resources, analyses of environmental impacts, and BLM-wide decisions on herbicide use and other tools for the management of noxious and invasive weeds. They also provide a source of information to which local-scale analyses can be tiered—including the programmatic IWM Plan prepared by the BLM GSFO to guide weed treatment planning and implementation at the field office level (BLM 2009a).

A final BA was prepared for the proposed use of herbicides to treat vegetation on BLM lands in 17 western states (BLM 2007c) and the BLM requested concurrence that this action is not likely to adversely affect proposed or listed endangered or threatened species or proposed or designated critical habitat. The U.S. Fish and Wildlife Service (Service) responded with a memorandum containing section 7 consultation guidance and concurrence that the proposed action, along with all of its conservation measures, is not likely to adversely affect any threatened or endangered species under its jurisdiction (USFWS 2006). The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NFMS) responded separately with a letter of non-concurrence for the species that may be affected under its jurisdiction.

The proposed GSFO IWM Plan includes the basic components of prevention, education, coordination and cooperation, inventory and mapping, revegetation, and monitoring in addition to weed treatments. Weed treatments would consist of manual, biological, and/or chemical control techniques. The total area of weed treatment under the proposed action would not exceed 5,000 acres per year. Up to 4,000 of those acres may be treated aerially with herbicides. The focus for aerial treatments would be large infestations of cheatgrass and other weeds following fire.

Manual control involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Biological control involves the intentional use of domestic animals, insects, nematodes, mites, or pathogens (agents such as bacteria or fungi) that weaken or destroy vegetation. The use of domestic livestock to control weeds requires "prescribed grazing" in which the kind of animals, and the amount and duration of grazing are designed to control a particular weed species while minimizing impacts to perennial native vegetation.

Chemical control involves the use of herbicides to kill or suppress target plants and chemicals applied with the herbicides that improve their efficacy ("adjuvants"). Herbicides may be sprayed manually for small infestations by spraying from a backpack unit or spray bottle or wiping (wicking) the herbicide directly onto a plant's foliar tissue. This is most effective for small infestations, areas inaccessible by vehicle, or areas where minimizing potential impacts to non-target plants is desired. Larger weed infestations with good accessibility can be treated by sprayers mounted on ATVs or trucks. Oil and gas pads, pipeline corridors, and roadsides can be effectively treated in this manner. Herbicides could also be applied aerially with helicopters or fixed-wing aircraft for large infestations of weeds in areas where it's not economically and/or physically feasible to treat on the ground (e.g., areas burned in wildfires, cheatgrass treatments, wildlife habitat treatments).

The proposed IWM Plan includes potential use of any of the 18 herbicide active ingredients approved in the PEIS: 2,4-D, bromacil, chlorsulfuron, clopyralid, dicamba, diflufenzopyr, diquat, diuron, fluridone, glyphosate, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, tebuthiuron, and triclopyr. The proposed IWM Plan incorporates best management practices (BMPs) for preventing weed infestations (Appendix A), standard operating procedures (SOPs) to reduce unwanted impacts from herbicide use (Appendix B), and conservation measures (CMs) to minimize impacts specifically to candidate, proposed, or listed, Threatened or Endangered species when implementing weed treatments (Appendix C). See the biological assessment for more project description detail (BLM 2009b).

Threatened and Endangered Fish

The primary concern for the Colorado pikeminnow, bonytail, humpback chub, razorback sucker, and greenback cutthroat trout comes from incidental exposure to herbicides. Fish could be exposed to herbicides in three primary ways: absorption through the skin from the surrounding water, uptake through the gills during respiration, and uptake through the digestive system during consumption of prey from contaminated water. Herbicides could enter waters occupied by listed fish from aerial drift, surface runoff, and/or an accidental spill. Alteration of endangered fish critical habitat could also occur through the removal of unwanted vegetation.

We concur with your determination that the IWM Plan is not likely to adversely affect any of these five listed fish species based on the SOPs and CMs outlined in the biological assessment (BLM 2009b) and, in part, on the proximity of the fish to lands to be treated under the IWM Plan. Some of more relevant details include:

1. Within the GSFO boundary, cutthroat trout of the greenback lineage are only known to occur in Cache Creek. Cache Creek does not flow through any BLM land, nor does the BLM manage any subsurface minerals that underlie Cache Creek. No BLM land, or private land with federal minerals, drains into Cache Creek. Therefore, weed management activities under the IWM Plan are not expected to affect the greenback cutthroat trout found in Cache Creek (the White River National Forest surrounds the upper reach of Cache Creek, but weed management and other surface activities there would be determined by the Forest Service, including oil and gas drilling permits which are issued by the BLM on Forest Service lands).

2. No Colorado pikeminnow, bonytail, humpback chub, or razorback sucker are currently known to reside within the boundary of the GSFO. They are all found in varying locations downstream within the Colorado River; herbicide concentrations transported to river reaches occupied by any of these fish would have become very diluted before reaching them. However, it is important to note that fish passage was completed for the Price-Stubb Dam just above the town of Palisade last year. Fish can now pass above this structure, which had been a barrier to upstream movement since 1911. Earlier this spring, one Colorado pikeminnow was found upstream from the Price-Stubb Dam. Other endangered fish will likely begin to move upriver and eventually occupy historic habitat in the Colorado River within the GSFO.

3. Only herbicides approved for use in aquatic systems would be used when treating weeds in riparian areas, 100-year floodplains, or critical habitat designated for listed fish species.

4. To minimize the risk of chronic effects on the long-lived Colorado pikeminnow, bonytail, humpback chub, and razorback sucker, the herbicide diuron would not be used within 0.5 miles of the Colorado, Eagle, and Roaring Fork Rivers. Diuron is the only BLM-approved herbicide with a tendency to bioaccumulate, characterized as low to moderate bioaccumulation.

5. To minimize spills near water, herbicides would not be allowed to be stored or mixed within riparian areas, nor would post-application cleaning be allowed within riparian areas. Additionally, within 150 feet of wetlands or riparian areas, the following activities would not be allowed: fuel/refuel equipment, store fuel, or perform equipment maintenance (all fueling and fuel storage areas, as well as service landings would be located outside protected riparian areas).

6. Only manual methods or spot application (including hand spraying) of herbicides would be used for weed treatments in occupied, critical, or suitable habitat for threatened and endangered fish (i.e., no aerial spraying or ground broadcast spraying).

7. Herbicides would not be sprayed within 100 feet of open water when wind speeds exceed 5 miles-per-hour.

8. Spraying would not be allowed in upland habitats within 0.5 miles of aquatic habitat when the potential exists for runoff from the treated area to enter the aquatic habitat.

9. The use of herbicides and adjuvants of greatest concern to fish (e.g., diquat, diuron, R-11, POEA, etc.) would be subject to buffers and restrictions which would prevent or minimize their entry into water.

10. Weeds are the target of the IWM Plan, rather than native vegetation. Ultimately, we would expect any weed control within the 100-year floodplain of the Colorado River to enhance endangered fish critical habitat.

11. All other measures contained in the SOPs and CMs in the BA would provide additional protection (BLM 2009b).

12. Any weed treatment within critical habitat designated for endangered fish would undergo site-specific ESA section 7 consultation.

Canada Lynx

Canada lynx primarily occupy spruce-fir forests and riparian areas found at higher elevations. These habitats are somewhat limited in supply on BLM lands within the GSFO, although there are areas of lynx habitat contiguous with spruce-fir forests on the White River National Forest

(WRNF). These habitats have been incorporated into the lynx analysis units designated by the WRNF. Lynx habitat is not typically where weed treatments would generally occur within the GSFO, at least not on a large scale, except perhaps for a weed infestation following a fire. Spruce-fir stands themselves would not be targeted or treated, nor would native willows along mountain streams—only weed infestations. No aerial spraying or ground broadcast spraying of weeds would be allowed within lynx habitat, only manual removal methods or hand spraying of weeds would be allowed.

Human activity associated with the control of weed patches within lynx habitat might cause lynx to temporarily avoid an area, but we would not expect these activities to adversely affect lynx. Herbicide used on weeds within the home range of a lynx could potentially be ingested by lynx prey (hares, squirrels, rodents, etc.) if they eat vegetation that has been freshly sprayed. However, it is unlikely that lynx would be adversely affected by indirect exposure to herbicides as a result of feeding on prey that have ingested or dermally contacted sprayed vegetation. This is due to the following: a lack of bioaccumulation of the BLM-approved herbicides in the tissues of terrestrial wildlife species, aerial and broadcast spraying would not be allowed in occupied or suitable lynx habitat, the very low and infrequent exposure rates likely to result from the proposed IWM Plan, and the generally low toxicity to vertebrates from most all of the herbicides allowed under the IWM Plan. Because the herbicide 2,4-D has a slightly higher toxicity to vertebrates than most of the other BLM-approved herbicides, its use would be prohibited within lynx habitat and it would not be aerially or broadcast sprayed within ¼ mile of lynx habitat. Ultimately we expect that weed removal would tend to increase the habitat value for lynx.

Given the information and conservation measures discussed above, and the additional CMs and SOPs outlined in the BA (BLM 2009b), we concur with your determination that the IWM Plan may affect, but is not likely to adversely affect the Canada lynx.

Threatened Plants

The primary concerns for sensitive plant species include direct mortality or injury caused by: contact by herbicide; humans, ATVs or trucks conducting control measures; grazing and other biological control agents; revegetation efforts. Additionally, indirect effects could include changes in species composition, and losses of pollinator habitat; as well as beneficial effects such as removing competing undesirable vegetation.

In order to minimize the potential impacts, several conservation measures are included in the BA. The following conservation measures will be applied to all projects.

- Herbicide treatments will not be conducted in areas where threatened, endangered, proposed or candidate (TEPC) plant species may be subject to direct spray by herbicides during treatments.
- Suitable buffer zones will be established between treatment sites and populations (confirmed or suspected) of TEPC plant species to avoid negative effects from aerial drift, runoff, or wind erosion during and following treatments.

- Applicators will be required to review, understand, and conform to the "Environmental Hazards" section on herbicide labels (this section warns of known pesticide risks and provides practical ways to avoid harm to organisms or the environment).
- Applicators will be required to follow all instructions and SOPs to avoid spills and direct spraying into aquatic habitats that support TEPC plant species.
- Applicators will be required to follow all SOPs for avoiding herbicide treatments during weather conditions that could increase the likelihood of aerial drift or surface runoff into non-target areas.
- *Spiranthes diluvialis* is considered a terrestrial species, therefore the larger buffer distances for herbicide for terrestrial TEPC plants would apply to any projects in proximity to *Spiranthes diluvialis* or its habitat.
- SOPs and Conservation Measures included in Appendix B and C will be applied.
- No treatments would be planned in any habitat known or reasonably likely to support TEPC plants until a survey has been conducted to determine the presence or absence and location of such plants. Once these data are available, and if GSFO continues to desire weed treatments within or near TEPC habitat (e.g., to reduce the potential for spreading to other areas or to reduce competition with the TEPC or other special status species), consultation with the Service will be initiated under section 7 of the ESA. Conservations measures specified during the consultation will be applied to avoid or minimize impacts.

Based on all of the information and conservation measures discussed above, and all of the additional CMs and SOPs outlined in the BA (BLM 2009b), we concur with your determination that the IWM Plan may affect, but is not likely to adversely affect *Spiranthes diluvialis*, *Sclerocactus glaucus*, or *Physaria obcordata.*

Site-specific consultation will take place for any individual weed control project that may affect a listed species as specified in the BA (BLM 2009b, p. 14). Although we have concurred with your determination that the IWM Plan is not likely to adversely affect any listed species, it is possible that unforeseen circumstances of a given future project may lead to the need to conduct formal consultation for that project. If new information becomes available, new species are listed, or should there be any material changes to the project and its anticipated impact that may affect any endangered or threatened species in a manner or to an extent not considered in the proposed action, section 7 consultation should be reinitiated for IWM Plan.

If the Service can be of further assistance, please contact Creed Clayton at (970) 947-5219 or Collin Ewing at (970) 243-2778, extension 18.

CEwing:BLM-GSFO WeedManagementPlanCL.doc:061909

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BLM. 2007b. Final programmatic vegetation treatments using herbicides on BLM lands in 17 western states programmatic environmental impact statement (PEIS). Reno, Nevada.

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BLM. 2009a. Integrated weed management plan and programmatic environmental assessment. DOI-BLMCO-N040-2009-0078-EA. Glenwood Springs Field Office, Colorado.

BLM. 2009b. Biological Assessment for the Programmatic Integrated Weed Management Plan for the Bureau of Land Management, Glenwood Springs Field Office; Parts of Eagle, Garfield, Mesa, Pitkin, and Routt Counties, Colorado. May 1, 2009 (Revised May 20, 2009).

U.S. Fish and Wildlife Service. 2006. Draft vegetation treatments using herbicides on BLM lands in 17 western state programmatic EIS. Memorandum to Assistant Director – Renewable Resources and Planning, Bureau of Land Management, from Chief – Branch of Consultation and HCPs (Washington D.C). Dated September 1, 2006.