Integrated Weed Management Plan

DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

DOI-BLM-NV-C000-2015-0003-EA

U.S. Department of the Interior
Bureau of Land Management
Carson City District Office
5665 Morgan Mill Road
Carson City, Nevada 89701
775-885-6000

May 2015

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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1.0 INTRODUCTION/PURPOSE AND NEED

1.1 Introduction

The Bureau of Land Management (BLM) Carson City District (CCD) has prepared this Integrated Weed Management Plan (IWMP) and draft programmatic environmental assessment (EA) to address potential environmental consequences associated with the control and/or eradication of noxious and invasive weeds, and to identify potential resource protection measures that would mitigate potential adverse impacts.

Invasive plants are defined in Executive Order 13112 as "non-native plants whose introduction does or is likely to cause economic or environmental harm or harm to human health." Invasive plants are compromising the ability to manage public lands for a healthy native ecosystem. Invasive plants can create a host of environmental and other effects, most of which are harmful to native ecosystem processes, including: displacement of native plants; reduction in functionality of habitat and forage for wildlife and livestock; increased potential for soil erosion and reduced water quality; alteration of physical and biological properties of soil; loss of long-term riparian area function; loss of habitat for culturally significant plants; high economic cost of controlling noxious and invasive weeds; and increased cost of keeping recreational sites free of noxious and invasive weed species.

The CCD manages approximately 4.8 million acres of public land in western Nevada and eastern California. This includes portions of Washoe, Carson City, Storey, Lyon, Mineral, Churchill, Nye and Douglas counties in Nevada, and Alpine, Plumas and Lassen counties in California. The CCD has two field offices that administer these public lands, the Sierra Front Field Office, and the Stillwater Field Office (Figure 1). There are approximately 4.2 million acres of non-BLM-managed lands within the CCD (private, other State or federal agency etc.). CCD treatments would also occur in those Herd Management Areas (HMA) and grazing allotments that are partially within CCD and other BLM district(s), where the CCD is the lead BLM district (which includes portions of Pershing and Lander counties, Nevada) (Figure 11).

A list of chemicals proposed for use under the Proposed Action are found in Attachment 1 and adjuvants proposed for use are found in Attachment 2. A list of noxious weeds published by the California Department of Food and Agriculture (CDFA) are found in Attachment 3, and by the Nevada Department of Agriculture (NDA) are found in Attachment 4.

1.2 Purpose and Need

The purpose of the Proposed Action is to treat current and foreseeable future infestations of noxious and invasive weeds to promote land health within the CCD. This would be accomplished utilizing the treatment methods approved in the 2007 Record of Decision (ROD) for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement*. The mechanical, manual, biological, chemical and prescribed fire treatments of noxious and invasive weeds are needed as these plants can reduce native plant diversity, reduce wildlife habitat and quality, alter the fire regime and can deplete soil moisture and nutrient levels.

1.3 Scoping and Issue Identification

On April 28, 2014 this project was reviewed by the BLM's interdisciplinary team. Issues that were discussed during this meeting included:

- How would site-specific treatments be addressed under the National Historic Preservation Act (NHPA)?
- How would compliance under the Endangered Species Act (ESA) be completed when site-specific locations are identified for treatment?

Based on this meeting, the BLM determined which resources would require analysis as a part of this draft programmatic EA (see Section 3.0).

Additional meetings with the BLM's interdisciplinary team were held on January 26 and February 9, 2015.

On January 15 and 21, 2015 the BLM sent consultation initiation letters to all tribes that have affiliation with public lands in the CCD including: the Bridgeport Indian Colony; Fallon Paiute-Shoshone Tribe; Lovelock Indian Colony; Pyramid Lake Paiute Tribe; Reno-Sparks Indian Colony; Susanville Indian Rancheria; Walker River Paiute Tribe; Washoe Tribe of Nevada and California; Yerington Paiute Tribe; and Yomba Shoshone Tribe.

1.4 Land Use Plan Conformance Statement

The Proposed Action described below is in conformance with the Carson City Field Office Consolidated Resource Management Plan (CRMP) (BLM 2001):

On page LSG-1:

- "Maintain or improve the condition of the public rangelands to enhance productivity for all rangeland and watershed values;"

On page LSG-8:

- "Application of herbicides…would be in accordance with procedures established in Bureau Manual 9222…to ensure non-impairment of other than target species." and

On page WLD-2:

- "Maintain and improve wildlife habitat, including riparian/stream habitats…"
- "Maintain or improve the habitat condition of meadow and aquatic areas."
- "Maintain or improve the condition of the public rangelands so as to enhance productivity for all rangeland values (including wildlife)."

1.5 Relationships to Statutes, Regulations, Manuals and Other Plans

The Proposed Action and No Action Alternative would be in conformance, to the maximum extent possible, with the following federal, State, BLM regulations and related plans:

- Carson-Foley Act (PL 90-583) (1968);
- National Environmental Policy Act (1969);
- National Historic Preservation Act (1966);
- Federal Land Policy and Management Act (1976);
- Federal Insecticide, Fungicide and Rodenticide Act (PL 93-629) (1947), as amended (1972);
- Federal Noxious Weed Act (1974), as amended (1990);
- Plant Protection Act (2000);
- BLM Manual 9011 – Chemical Pest Control;
- BLM Manual 9014 – Use of Biological Control Agents of Pests on Public Lands;
- BLM Manual 9015 – Integrated Weed Management;
- BLM Manual 6330 – Management of BLM Wilderness Study Areas;
- BLM Manual 8400 – Visual Resource Management;
- Management of Undesirable Plants on Federal Lands (2002) (7 U.S. Code 2814);
- Noxious Weed Control Act (2004);
- Executive Order #12112, Invasive Species;
- Executive Order #13112, National Invasive Species Council;
- Memorandum of Understanding between U.S.-DOI-BLM and U.S.-Department of Agriculture-Animal & Plant Health Inspection Service (2003);
- Nevada Revised Statute - Chapter 555 - Control of Insects, Pests, and Noxious Weeds;
- Nevada Revised Statute - Chapter 586 - Pesticide Registration.

The ROD for the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (PEIS)* (BLM 2007) analyzed the direct, indirect and cumulative impacts to various resources from vegetation treatments. The PEIS analyzed impacts of herbicide use and the active ingredients in the herbicides that have been approved for use on BLM-managed lands. The PEIS updated Standard Operating Procedures (SOPs) for the use of each chemical and provides enhanced mitigation measures for each resource (Appendix A). This draft programmatic EA is tiered to the ROD of that PEIS document.

1.6 Decision to be Made

This draft programmatic EA does not authorize site-specific treatments. It provides a comprehensive weed treatment framework and analysis for the CCD. After the conclusion of the 45-day public comment period and incorporation of relevant substantive revisions, the BLM would publish a final EA. If the range of potential impacts are determined to be "less than significant" (40 CFR 1508.27), the BLM would then publish a Finding of No Significant Impact (FONSI).

The BLM would use the following procedures to authorize site-specific treatments:

1. Conduct on-going monitoring to identify locations of weed infestations;
2. Prepare a pesticide[1] use proposal or ensure one has been completed (Attachment 5);

[1] Pesticides include: insecticides, rodenticides, fungicides, herbicides, and other "pest" control materials.

3. Apply for a non-agricultural permit when using chemical within California, if on the California Restricted Materials list (Attachment 6);
4. Complete any required compliance under the NHPA, including tribal consultation;
5. Complete any required compliance under the ESA;
6. Document whether this analysis is sufficient for the site-specific treatments (in a Determination of NEPA Adequacy [DNA] or other appropriate environmental analysis and ensure land use plan conformance); and
7. Issue a Decision Record.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The CCD proposes to use this IWMP for the prevention, management and control of new or established infestations of noxious and invasive weeds on public lands. Through this IWMP, the BLM would be able to consider a broad range of methods to treat noxious and invasive weeds in the CCD. Often multiple methods are necessary for successful eradication. For example, the application of herbicides would be more effective when done alongside with education and prevention measures that lessen the opportunities for future infestations. Below are the elements of this proposed IWMP:

2.1.1 Education

The educational component of this IWMP follows the *Partners Against Weeds* action plan (BLM 1996). The CCD would encourage the participation of BLM employees in training that would include identification of noxious and invasive weeds, the biology of weeds, procedures to report infestations, and minimizing employee activities that could prevent the spread of noxious and invasive weeds.

To increase the general public's awareness of noxious and invasive weeds, the CCD would conduct outreach activities through assisting county governments and other organizations in the publication and distribution of brochures and other types of educational media on the identification of, and prevention of the spread of noxious and invasive weeds.

2.1.2 Prevention

To prevent the spread of noxious and invasive weeds, the CCD would incorporate various best management practices (BMPs) into project planning and design, whether the project is proposed internally or submitted to the BLM by an external applicant. Measures that may prevent the spread of noxious and invasive weeds include, but are not limited to the following:

Project Planning

- Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds;
- Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning;
- Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes;
- Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations;
- Pre-treat high-risk sites for weed establishment and spread before implementing projects;
- Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks; and
- Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.

Project Development

- Minimize soil disturbance to the extent practical, consistent with project objectives;

- Avoid creating soil conditions that promote weed germination and establishment;
- To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives;
- Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely;
- Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material;
- Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material;
- Survey the area where material from treated weed-infested sources is used for at least three years after project completion to ensure that any weeds transported to the site are promptly detected and controlled;
- Prevent weed establishment by not driving through weed-infested areas;
- Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent spread within the project area;
- Avoid acquiring water for dust abatement where access to the water is through weed-infested sites;
- Identify sites where equipment can be cleaned. Clean equipment before entering public lands;
- Clean all equipment before leaving the project site if operating in areas infested with weeds;
- Inspect and treat weeds that establish at equipment cleaning sites;
- Ensure that rental equipment is free of weed seed; and
- Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.

Revegetation

- Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans;
- Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation;
- To prevent conditions favoring weed establishment, re-establish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques;
- Maintain stockpiled, uninfested material in a weed-free condition;
- Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary;

- Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings);
- Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules;
- Inspect and document all limited term ground-disturbing operations in weed infested areas for at least three growing seasons following completion of the project;
- Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available;
- Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines); and
- Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail right-of-ways (ROW), and other areas of disturbed soils (BLM 2007).

2.1.3 Coordination

The CCD 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 the efforts to develop assistance 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; and
- Seek opportunities to develop new partnerships.

2.1.4 Inventory/Prioritization of Treatments

Information on the presence, location and distribution of noxious and invasive weeds is a key first step to all subsequent management efforts. Once located, noxious and invasive weeds would be mapped in GIS. Mapping provides information about the extent of the infestation, transport vectors, and the effectiveness of the control methods. Over the long-term, mapping can provide historical data for the epicenter of an infestation, rate and direction of spread. Treatment priorities would be based the following factors including, but not limited to:

- Biology of the weed species;
- Degree and acreage of infestation;
- Resource values in the treatment unit (sensitive species habitat, riparian areas, proximity to adjacent landowners, project-partner efforts);
- Restoration potential; and
- BLM funding and personnel resources.

2.1.5 Timeframe of Treatments

The analysis within this draft programmatic EA would support treatments of noxious and invasive weeds within the CCD as long as the analysis remains valid (no circumstances exist that

would warrant new analysis). As described in Section 1.6, as a result of on-going monitoring, treatment units would be identified and site-specific authorization(s) would occur. Treatment of small units may be completed in a few days, whereas treatments of larger units, or treatments involving aerial application of herbicides or prescribed fire, may be completed over several weeks. The timing of noxious and invasive weed treatments would be species specific, with most treatments taking place between the months of April to October.

2.1.6 Size of Treatment Units

The size of treatment units would vary depending on the degree of infestation and opportunity for the spread of weeds. Most treatment units would likely be less than one-acre. Aerial spraying or prescribed fire to control or eradicate cheatgrass may involve several hundred acres in a treatment unit.

2.1.7 Standard Operating Procedures

SOPs are measures the CCD would follow when proposing noxious and invasive weed treatments. Other environmental protection measures associated with treatments include: mitigation; BMPs; post-treatment monitoring efforts; and project maintenance.

The following points outline the basic administrative analysis performed by the CCD prior to implementing a treatment project. A more thorough, resource specific analysis of BLM Vegetation Management SOPs can be found in Appendix B of the FEIS and Appendix A of this draft programmatic EA. Key SOPs include the following:

- Conduct a site survey prior to treatment in a proposed area documenting areas of concern including waterways, Wilderness Study Areas (WSAs), private property, cultural sites or the presence of BLM sensitive species/habitat;
- Conduct a query of the United States Fish and Wildlife Service's (USFWS) Information Planning and Conservation (IPaC) database and use updated information from the Nevada Department of Wildlife (NDOW) and Nevada National Heritage Program to assist in determining the presence of threatened, endangered, candidate, and sensitive species/habitat in the proposed treatment area;
- Contact the California Department of Fish and Wildlife, query the California Natural Diversity Database, or the California Native Plant Society for information regarding the presence of threatened, endangered, candidate and sensitive species/habitat in the proposed treatment area;
- Consider which, or combination of, treatment method(s) is most suitable for the proposed treatment. Determine the efficacy of a product on a target weed species through manufacturer, government, scientific and user testimony;
- If chemical control is selected, ensure the product is labeled for the targeted weed and/or project site; consider the rate of application and weigh product labeling instructions and restrictions against site-specific variables;
- Release biological control agents permitted by APHIS following State and BLM protocols;
- Complete any cultural clearance and ESA compliance, if required;
- Consider economic feasibility and environmental limitations when analyzing or scheduling a control project;

- Contact tribal governments and private land owners/managers, though written notice or by phone, with property in the vicinity of the proposed treatment area;
- Conduct pesticide handling training and risk management analysis for applicators prior to project implementation;
- Verify control projects are conducted or supervised by federal and/or State certified pesticide applicators;
- Maintain and frequently update all appropriate product labels and Material Safety Data Sheets (MSDS);
- Use GPS/GIS technology to map and estimate size of infestation and treatment area;
- Evaluate the success of post-treatment and post-restoration efforts; and
- Enter all information into NISIMS.

2.1.8 Mechanical Treatments

Mechanical treatment involves the use of vehicles such as wheeled tractors, crawler-type tractors, or specially designed vehicles with attached implements designed to cut, uproot, or chop existing vegetation. The selection of a particular mechanical method is based on the characteristics of the vegetation, seedbed preparation and revegetation needs, topography and terrain, soil characteristics, climatic conditions, and an analysis of the improvement cost compared to the expected productivity. Mechanical methods that may be used by the BLM include root plowing, tilling and drill seeding, mowing, roller chopping and cutting, blading, grubbing, and feller-bunching. As new technologies or techniques are developed, they could be used if their impacts are similar to or less than those associated with the methods listed below.

Tilling involves the use of angled disks (disk tilling) or pointed metal-toothed implements (chisel plowing) to uproot, chop, and mulch vegetation. This technique is best used in situations where complete removal of vegetation or thinning is desired, and in conjunction with seeding operations. Tilling leaves mulched vegetation near the soil surface, which encourages the growth of newly planted seeds. Tilling is usually done with a brushland plow, a single axle with an arrangement of angle disks that covers about 10-foot swaths. An offset disk plow, which consists of multiple rows of disks set at different angles to each other, is pulled by a crawler-type tractor or a large rubber tire tractor. Chisel plowing can be used to break up soils such as hardpan.

Often, drill seeding is conducted along with tilling. The seed drills, which consist of a series of furrow openers, seed metering devices, seed hoppers, and seed covering devices, are either towed by or mounted on a tractor. The seed drill opens a furrow in the seedbed, deposits a measured amount of seed into the furrow, and closes the furrow to cover the seed.

Mowing tools, such as rotary mowers or straight-edged cutter bar mowers, can be used to cut herbaceous and woody vegetation above the ground surface. Mowing is often done along highway ROW to reduce fire hazards, improve visibility, prevent snow buildup, or improve the appearance of the area. Mowing is also used in sagebrush habitats to create a mosaic of uneven aged stands and enhance wildlife habitat. Weeds are rarely eliminated by mowing, and an area may have to be mowed repeatedly for the treatment to be effective. However, the use of a “wet blade,” in which an herbicide flows along the mower blade and is applied directly to the cut surface of the treated plant, has greatly improved the control of some species. In addition,

chipping equipment can be used to cut and chip vegetation.

Roller chopping tools are heavy bladed drums that cut and crush vegetation up to five inches in diameter with a rolling action. The drums are pulled by crawler-type tractors, farm tractors, or a special type of self-propelled vehicle designed for forested areas or range improvement projects.

During blading, a crawler type tractor blade shears small brush at ground level. The topsoil can be scraped with the brush and piled into windrows during this operation. Blading use is limited to areas where degradation to the soil is acceptable, such as along ROWs or in borrow ditches.

Grubbing is done with a crawler-type tractor and a brush or root rake attachment. The rake attachment consists of a standard dozer blade adapted with a row of curved teeth projecting forward at the blade base. Brush is uprooted and roots are combed from the soil by placing the base of the blade below the soil surface. Grubbing greatly disturbs perennial grasses, so grubbed areas are usually reseeded to prevent extensive runoff and erosion.

Mechanical methods are effective for removing thick stands of vegetation. Some mechanical equipment can also mulch or lop and scatter vegetation debris, so debris disposal is taken care of while the vegetation is removed. Mechanical methods are appropriate where a high level of control over vegetation removal is needed, such as in sensitive wildlife habitats or near homesites, and are often used instead of prescribed fire or herbicide treatments for vegetation control in the wildland urban interface (BLM 2007)

2.1.9 Manual Treatments

Manual treatment involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Treatments include cutting noxious and invasive weeds above the 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 competitive growth.

Hand tools used in manual treatments include the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of cutting edge and grubbing hoe), pulaski (combination of axe and grubbing hoe), brush hook, and hand clippers. Power tools such as chainsaws and power brush saws are also used, particularly for thick-stemmed plants.

Manual treatments, such as handpulling and hoeing, are most effective where the weed infestation is limited and soil types allow for complete removal of the plant material. Additionally, pulling works well for annual and biennial plants, shallow-rooted plant species that do not resprout from residual roots, and plants growing in sandy or gravelly soils. Repeated treatments are often necessary due to soil disturbance and residual weed seeds in the seed bank.

Manual techniques can be used in many areas and usually with minimal environmental impacts. Although they have limited value for weed control over a large area, manual techniques can be highly selective. Manual treatment can be used in sensitive habitats such as riparian areas, areas where burning or herbicide application would not be appropriate, and areas that are inaccessible to ground vehicles (BLM 2007).

2.1.10 Biological Treatments

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

Domestic animals, such as cattle, sheep, or goats, control the top-growth of certain noxious and invasive weeds which can help to weaken the plants and reduce the reproduction potential. The animals benefit by using the weeds as a food source and, after a brief adjustment period, can consume 50 percent or more of their daily diet of the weed, depending on the animal species.

Cattle primarily eat grass, but also eat some shrubs and forbs. Sheep consume many forbs, as well as grasses and shrubs, but tend not to graze an area uniformly. Goats typically eat large quantities of woody vegetation as well as forbs, and tend to eat a greater variety of plants than sheep. Goats and sheep are effective control agents for leafy spurge, Russian knapweed, toadflax, other weed species, and some types of shrubs.

The use of livestock grazing to help control noxious and invasive weeds involves more than just authorizing grazing for the area to be treated. A general grazing authorization would only rarely provide significant control of undesirable vegetation. The use of livestock to control undesirable vegetation requires "prescribed grazing." In prescribed grazing, the kind of animals and amount and duration of grazing are specifically designed to help control a particular species of plant while minimizing the impacts on perennial native vegetation that is needed to help reduce the likelihood of reinvasion by undesirable plant species.

In order for prescribed grazing to be effective, the right combination of animals, stocking rates, timing, and rest must be used. Grazing by domestic animals would occur when the target species is palatable and when feeding on the plants can damage them or reduce viable seeds. Additionally, grazing would be restricted during critical growth stages of desirable competing species. When noxious and invasive weeds are present, there must be adequate rest following the treatment to allow the non-target species to recover.

Whenever the use of livestock to control noxious and invasive weeds is being considered, the needs of the domestic animals as well as the other multiple use objectives for the area must be considered. A herder, fencing, or a mineral block may be required to keep the animals within the desired area. Many weed species are less palatable than desired vegetation, so the animals may overgraze desired vegetation rather than the weeds. Additionally, some weeds may be toxic to certain livestock and not to others, which will influence the management option selected.

Caution would be used whenever grazing or any other vegetation control is prescribed near riparian areas, in steep topography, or in areas with highly erodible soils. Weed seeds may still be viable after passing through the digestive tract of animals, so the animals would not be moved to weed-free areas until ample time has passed for all seeds to pass through their systems. Seeds can also travel on the animals' fur.

Plant-eating insects, nematodes, mites, or pathogens affect plants directly, by destroying vital plant tissues and functions, and indirectly, by increasing stress on the plant, which may reduce its ability to compete with other plants. Often, several biological control agents are used together to reduce noxious and invasive weeds density to an acceptable level (BLM 2007).

Once a biological control agent becomes established, it can reproduce and increase its numbers and continue to affect the target organism. Agents are also often fairly mobile and can seek out new host plants (Rees et al. 1995, 1996). However, it may take as many as 15 to 20 years for the agents to establish themselves and bring about the desired level of control. Treatments involving biological control agents are most suitable for large sites where the target plant is well established and very competitive with native species. It is unlikely that biological control agents will eradicate a pest plant, because as populations of the host plant decrease, populations of the agent will also decline.

Biological control agents, with the exception of certain microorganisms, are exempt from regulation by the Environmental Protection Agency (EPA). Biological control agents are permitted for release by the USDA Animal Plant Health Inspection Service (APHIS). The California Department of Pesticide Regulation maintains a list of biological control agents available for release California (Attachment 7). The State of Nevada does not maintain a list of available biological control agents. The BLM permits the release of biological control agents in accordance with BLM Manual 9014 – Use of Biological Control Agents of Pests on Public Lands.

2.1.11 Chemical Treatments

The Proposed Action would expand the range of approved herbicides available to BLM managers by including new herbicides approved in the PEIS. These would provide the CCD with more tools for effective noxious and invasive weeds treatment. The CCD would also use new active ingredients that are developed in the future if: 1) they are registered by the EPA for use on one or more land types (e.g., rangeland, aquatic, etc.) managed by the CCD; 2) the BLM determines that the benefits of use on public lands outweigh the risks to human health and the environment; and 3) they meet evaluation criteria to ensure that the decision to use the active ingredient is supported by scientific evaluation and NEPA analysis.

Herbicides would be used to control and eliminate new areas of noxious and invasive weeds spread and to contain the spread of existing infestations. Chemical methods include the use of backpack sprayers, ATV mounted power sprayer, truck mounted power sprayer, or helicopter or fixed-wing aircraft. The chemicals would either be in liquid or granular form. Another chemical treatment method would be the wiping or brushing of herbicides onto invasive plant species that have been cut with chainsaws (as in salt cedar), other hand tools, or with brush roller type equipment. Herbicide injectors are used to inject herbicide into the soil, roots/rhizomes and/or tree trunks. The injections may involve single or multiple injections.

Chemicals can be used alone or in tank mixtures. If two or more different chemicals of the formulations are approved as a tank mixture on one or more of the labels, or have written recommendations for a tank mixture from a University, College of Agriculture, Cooperative

Extension Service or the State Department of Agriculture, then it is permissible to tank mix these chemicals for a spray program. As part of the proposed action, monitoring of application may be done by adding dye to the tank mix. The dye is approved for use with herbicide and would help obtain a uniform coverage. This dye is water soluble, breaks down in sunlight, and washes away easily with water. Using dye would reduce the chance of under and over application and would help detect and manage drift. Use of dye would also reduce the risk to non-target species as a result of over application of herbicide and assure treatment of target species.

Chemical treatment involves the application of herbicides (chemical compounds), via a variety of application methods, at certain plant growth stages to kill noxious and invasive weed species. Depending on the type of herbicide selected, they can be used for noxious and invasive weed control or complete eradication and may be used in combination with other control treatments. The use of new or updated chemicals approved in the future would entail additional NEPA analysis. Selection of an herbicide for site-specific application would depend on its chemical effectiveness on a particular noxious or invasive weed species, habitat types present, proximity to water, and presence or absence of sensitive plant, wildlife, and fish species. Herbicides are most effective on pure stands of a single noxious or invasive weed plant where desirable and non-target plants are scarce or absent. Herbicides are also effective for rhizomatous noxious and invasive weed plant species that are unpalatable to livestock, require repeated cutting or pulling for control, or are located in remote areas where pulling and cutting are not feasible.

Application methods that would be used under the Proposed Action would include spraying from backpack, horse, ATV, UTV, truck, helicopter or fixed wing aircraft. Aerial herbicide application would be considered for use on a project by project basis as needed. All vehicles, personnel, and equipment would be cleaned of seed and root fragments before leaving infested areas to prevent spread.

All application rates, procedures, and restrictions would be within label rates and according to direction in the PEIS. Application rates depend on the target pest, time of year, and soil texture. Herbicide labels and MSDS are available at a county agriculture department, farm advisor's office, the CDFA District Office, or the CCD.

To address concerns regarding herbicide drift, the BLM prohibits the aerial application of dicamba+diflufenzopyr, hexazinone+sulfometuron methyl, imazapyr+ sulfometuron methyl+metsulfuron methyl, sulfometuron methyl, sulfometuron methyl+chlorsulfuron, and sulfometuron methyl+metsulfuron methyl. Aerial applications of diquat would also be avoided in riparian areas and wetlands, as would the use of tebuthiuron in traditional use areas. To address potential risks associated with the adjuvant polyoxyethyleneamine (POEA), the BLM would avoid using POEA in aquatic environments, and either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians and other aquatic organisms. In addition to the SOPs that are protective of resources/values in the CCD, restrictions would be applied to public lands that are within all threatened, endangered, candidate, and BLM sensitive species habitat. Any invasive plant spraying in riparian zones would be selective hand spraying only, reducing the potential for impacts to non-target plant species.

All personnel including, county, State, private contractors and federal employees applying restricted use herbicides would be a Certified Pesticide Applicator or be under the direct supervision of one.

All herbicides proposed for use are registered by the EPA and the California Department of Pesticide Regulation for use on pasture, non-crop, forestland, aquatic areas, and rangeland. All applicators are required to have training in conformance with State laws and regulations. All applicators would follow herbicide label instructions. California maintains a list of pesticides deemed to have a higher potential to cause harm to public health, farm workers, domestic animals, honeybees, the environment, wildlife, or agricultural crops. These pesticides are listed as California Restricted Materials (Attachment 6). With certain exceptions, restricted materials may be purchased and used only when granted a permit (agricultural or non-agricultural) issued by the county agricultural commissioner. Labels and MSDS can be found online at:
http://www.dbiservices.com/alenza/page1.asp
http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=
http://oaspub.epa.gov/pestlabl/ppls.home.

Labels can also be obtained at the CCD, at the local Agricultural Commissioner's Office, or at a University of California Extension Office.

2.1.12 Prescribed Fire Treatments

The use of prescribed fire under the Proposed Action would be limited to situations when fire would be implemented in conjunction with other weed treatment activities. In some situations, prescribed fire alone can encourage the germination and establishment of weeds. Burning may be used prior to other treatments to remove vegetation that reduces the effectiveness of various treatments, including herbicide applications. For example, in 2012, the BLM completed a fuels treatment project that included the use of prescribed fire prior to the application of imazapic to control the spread of cheatgrass. The objective of the project was to create a 1,659 acre fire resistant strip of vegetation along 10 miles of dirt road in Churchill County, Nevada. Herbicide application was followed up by seeding of native and non-native species such as forage kochia (*Kochia prostrata*), Siberian wheatgrass (*Agropyron fragile*), fourwing saltbrush (*Atriplex canescens*), Sandberg's bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Elymus elymoides*) (BLM 2011). The prescribed fire was initiated using hand-held drip torches and herbicides were applied using tractors and UTV's with tank sprayers.

All use of prescribed fire would support land and resource management plans. Treatments are implemented in accordance with the BLM's Prescribed Fire Management Policy. The Fire Management Plan (FMP) serves as the program strategy document for prescribed fire activities. The FMP captures and quantifies the overall fuels management program needs of the CCD. The FMP identifies how prescribed fire strategies would be used to meet the overall land management goals identified in land use plans.

The Prescribed Fire Plan is the contract between a line officer and burn boss to conduct a burn safely to achieve predetermined objectives. Prescribed fire projects must be implemented in compliance with the written plan.

Several factors are considered when designing a burn plan and implementing a prescribed burn. These factors include weather conditions, vegetation types and density, slope, fuel moisture content, time of year, risks to dwellings and property, alternative treatment methods, and potential impacts on air quality, land use, cultural resources, and threatened and endangered species. Hand-held tools, such as drip torches, propane torches, diesel flame-throwers, and flares, may be used to start a prescribed fire.

2.1.13 Revegetation of Treated Sites

Under the Proposed Action, areas treated for noxious and invasive weeds may require restoration with appropriate plant materials to reduce reinvasion of noxious and invasive weeds and reduce soil erosion. Similarly, areas that have been burned may need restoration to prevent the establishment of noxious and invasive weed populations. Re-vegetation would meet one or more of the following conditions:

1) areas extensively treated with herbicides;
2) soils that are highly susceptible to soil erosion;
3) areas with high density of noxious and invasive weeds, particularly cheatgrass;
4) soils where invasive plants may readily invade and become established; or
5) areas that contain important wildlife habitat.

Based upon site-specific conditions, re-vegetation may include seed-bed preparation (such as discing) and seed/seedling plantings. Rangeland drill, hydro-, and broadcast seeding may be used for re-vegetation of desirable plant species, especially on larger areas. For greater success of broadcast seeding, tools that may also be used include a cultipacker, chain, or other mechanism to incorporate the seeds into the soil. Seeding would be metered and distributed either by broadcasting on the soil surface or by placing seed into the soil at a predetermined depth. Plant materials used for re-vegetation would be selected to best meet the resource objectives and may include both native and introduced species. Planting of seedlings would be done when it is desirable to establish species quickly and to stabilize soils or restore wildlife habitat. This method is usually limited to bare root or containerized stock shrubs/trees. The disturbance associated with hand planting consists of the area within a 2 to 3-inch radius of the plant. Planting tools include planting bars, hodads, and augers. If hand planting is done the second growing season after an noxious or invasive weed treatment, a 2 × 2-foot clearing of vegetation for each seedling planted site may be required.

The use of non-native species for restoration may be considered when one or more of the following criteria are met:

- Suitable native species are not available;
- The natural biological diversity of the proposed management area would not be diminished;
- The use of non-native species is needed due to site-specific conditions/needs such as the presence of invasive species, hostile soil conditions (e.g., priority habitat or salinity), and the use of green stripping is needed in response to wildfire;
- Non-native species can be confined within the proposed management area; or

- Analysis of ecological site inventory information indicates that a site would not support reestablishment of a species that historically was part of the natural environment.

2.1.14 Monitoring

Post-treatment monitoring would be based on whether the treatment objective was the containment, control or suppression, or eradication of noxious and invasive species present. For example, if the objective was eradication, post-treatment monitoring would focus on a visual inspection of the treatment area for the presence or absence of the noxious or invasive weed species. This treatment would be considered successful when the target species is absent from its former location. Treatments designed to contain, control or suppress would be based on quantitative inspection (i.e. a reduction in percent cover or size of infestation of the noxious or invasive weed). If monitoring demonstrates that a treatment has not been effective, corrective actions (such as retreatment with the same or different method, or combination of methods) would be identified and implemented to enhance the level of success.

2.2 No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would continue to conduct weed treatments based on the 2008 EA. That EA identified 200-300 sites of weed infestations on 400-750 acres of public lands for treatment. The EA also described that additional areas would be treated. The 2008 EA analyzed mechanical and chemical treatments, but did not analyze biological treatments and use of prescribed fire.

Since 2008 the number of noxious weed species present in the CCD, and the number of BLM-approved herbicides have increased. Resource conditions in the CCD have also changed, including the designation of new BLM sensitive species, and the listing of new threatened or endangered species. Under the No Action Alternative, the CCD could continue to conduct weed treatments based on those herbicides approved for use in 2008.

2.3 Alternatives Considered but Eliminated From Detailed Analysis

Use of Chemicals Only.

The CCD would only authorize the treatment of noxious and invasive weeds using herbicides and would not authorize treatments using any other form of treatment method. This alternative is inconsistent with BLM policy and manual direction, including Integrated Pest Management Policy (DOI 2007). Therefore this alternative has not been analyzed further in this draft programmatic EA.

No Use of Chemicals.

The CCD would not control noxious and invasive weeds using herbicides on BLM-managed lands, which would be a missed opportunity to work with community partners. Community partners or Community Weed Management Areas (CWMAs) perform much of the weed abatement work on private lands bordering BLM-managed lands. This is important in curtailing the spread of noxious and invasive weeds from private to public lands. The use of herbicides allows CWMAs to be productive in these critical areas. The CCD would only conduct treatments of noxious and invasive weeds using mechanical, manual, biological or prescribed fire methods. This alternative is not consistent with DOI Manual 517, directing the BLM to use an integrated pest management approach to managing and treating vegetation. The use of

herbicides is an effective and integral method when used or combined with other treatment methods. Therefore this alternative has not been analyzed further in this draft programmatic EA.

3.0 AFFECTED ENVIRONMENT

This chapter identifies and describes the current condition and trend of elements or resources in the human environment which may be affected by the Proposed Action or No Action Alternative. The Affected Environment is the same for all alternatives.

General Setting

The CCD is primarily located in the Central Basin and Range eco region, which encompasses a total of 120,000 square miles (EPA 2012). The CCD includes a portion of northwestern Nevada and a small portion of California.

The Central Basin and Range encompasses large areas of Nevada and Utah and extends into California and Idaho. It lies to the immediate east of the Sierra Nevada, to the north of the Mojave Basin and Range, to the west of the Wasatch/Uinta Mountains, and south of the Northern Basin and Range eco regions.

The CCD has a wide range of minimum and maximum monthly temperatures with 15 to 50°F (degrees Fahrenheit) in the winter months and 40 to the mid-90s°F in the summer months. Annual average total precipitation ranges from 5 to 10 inches, about 70 percent of the annual total typically falls between November and April. Occasional summer thunderstorms can cause flash flooding and debris flows. Within the CCD, elevation gain between the basin and range is typically 5,000 to 7,000 feet. Wind conditions reflect the elevation change and temperature gradient between basin and range. Predominately westerly winds disperse air pollution; i.e. wildland and prescribed fires from California and Washoe County's poor air quality, over the Great Basin.

The Central Basin and Range eco region is internally drained and is characterized by a mosaic of dry basins, scattered low and high mountains, and salt flats. It has a hotter and drier climate, more shrub land, and more mountain ranges than the Northern Basin and Range eco region to the north. Between the Sierra Nevada to the west and Wasatch Range to the east, more than 300 long, narrow, roughly parallel mountain ranges are separated by broad elongated valleys. Basins are generally covered by sagebrush (*Artemisia sp.*) or saltbush-greasewood (*Atriplex canescens/Sarcobatus vermiculatus*) vegetation. Cool season grasses are less common than in other eco regions. The Central Basin and Range eco region is not as hot as the Mojave Basin and Range eco region to the south and it has a greater percent of land that is grazed. Small areas of wetland habitats including perennial streams, wet meadows, springs, and seeps are scattered throughout the CCD.

Supplemental Authorities

Appendix 1 of BLM's NEPA Handbook (H-1790-1) identifies supplemental authorities that are subject to requirements specified by statute or executive order and must be considered in all BLM environmental documents (BLM 2008). Table 1 lists the Supplemental Authorities and their status in the CCD. Supplemental authorities that may be affected by the Proposed Action and No Action Alternative are further described in this draft programmatic EA.

Table 1. Supplemental Authorities*.

Resource	Present Yes/No	Affected Yes/No	Rationale
Air Quality	Y	Y	Carried Forward for Analysis.
Areas of Critical Environmental Concern	Y	Y	Carried Forward for Analysis.
Cultural Resources	Y	Y	Carried Forward for Analysis.
Environmental Justice	Y	N	Disproportionally low-income or disadvantaged populations with the CCD would not be affected by the Proposed Action or No Action Alternative.
Farm Lands (prime or unique)	Y	N	Prime or unique farm lands occur within the CCD, however none are designated on BLM-managed lands.
Floodplains	Y	N	Resource Not Affected by the Proposed Action or No Action Alternative. Treatments included in the Proposed Action would not affect the functionality of floodplains. See Vegetation and Soils for affects to these components to a floodplain.
Invasive Plant Species and Noxious Weeds	Y	Y	Carried Forward for Analysis.
Migratory Birds	Y	Y	Carried Forward for Analysis.
Native American Religious Concerns	Y	Y	Carried Forward for Analysis.
Threatened or Endangered Species	Y	Y	Carried Forward for Analysis.
Wastes, Hazardous or Solid	Y	N	There is a low potential for accidental spillage of chemicals. Best management practices would be implemented when handling chemicals.
Water Quality (Surface/Ground)	Y	Y	Carried Forward for Analysis.
Wetlands/Riparian Zones	Y	Y	Carried Forward for Analysis.
Wild and Scenic Rivers	N		Resource Not Present.
Wilderness/WSA	Y	Y	Carried Forward for Analysis.

**See H-1790-1 (January 2008) Appendix 1 Supplemental Authorities to be Considered.*
Supplemental Authorities determined to be Not Present or Present/Not Affected need not be carried forward or discussed further in the document.
Supplemental Authorities determined to be Present/May Be Affected may be carried forward in the document.

Resources or Uses Other Than Supplemental Authorities

BLM specialists have evaluated the potential impact of the Proposed Action or No Action Alternative on these resources and documented their findings Table 2. Resources or uses that may be affected by the Proposed Action or No Action Alternative are further described in this draft programmatic EA (BLM 2008).

Table 2. Resources or Uses Other Than Supplemental Authorities.

Resource or Issue**	Present Yes/No	Affected Yes/No	Rationale
BLM Sensitive Species (animals)	Y	Y	Carried Forward for Analysis.
BLM Sensitive Species (plants)	Y	Y	Carried Forward for Analysis.
Fire Management	Y	N	The use of prescribed fire as a treatment method is described as a part of the Proposed Action and its potential effects on resources. The use of prescribed fire or to allow for wildland fire as a tool to meet other resource objectives, such as restoration of a natural fire regime etc., was not considered because it would not be consistent with the purpose and need.
Forest Resources	Y	Y	Carried Forward for Analysis. See Vegetation section.
General Wildlife	Y	Y	Carried Forward for Analysis.
Global Climate Change	Y	N	There is a public and scientific debate about human-caused contributions to global climate change. No methodology currently exists to correlate greenhouse gas emissions (GHG) from the Proposed Action or No Action Alternative, and to what extent these contributions would contribute to global climate change.
Greenhouse Gas Emissions	Y	Y	Carried Forward for Analysis. See Air Quality section.
Human Health and Safety	Y	Y	Carried Forward for Analysis.
Land Use Authorization	Y	N	Land and realty authorizations such as ROWs are present throughout the CCD, however, implementation of the Proposed Action would have no effect on existing or proposed authorizations.
Lands with Wilderness Characteristics	Y	Y	Carried Forward for Analysis.
Livestock Grazing	Y	Y	Carried Forward for Analysis.
Minerals	Y	N	Mineral activities such as exploration are present throughout the CCD, however, implementation of the Proposed Action would have no effect on these activities.
Paleontological	Y	N	Paleontological resources are present in portions of the CCD, best management practices would be implemented when treatment units are identified where paleontological resources may be present.
Recreation	Y	N	Recreational activities occur throughout the CCD. Best management practices would be implemented during treatments where there is intensive recreational use.
Socioeconomics	Y	N	Resource Not Affected by the Proposed Action or No Action Alternative.
Soils	Y	Y	Carried Forward for Analysis.
Travel Management	Y	N	Resource Not Affected by the Proposed Action or No Action Alternative.
Vegetation	Y	Y	Carried Forward for Analysis.
Visual Resources	Y	Y	Carried Forward for Analysis.
Wild Horses and Burros	Y	Y	Carried Forward for Analysis.

***Resources or uses determined to be Not Present or Present/Not Affected need not be carried forward or discussed further in the document.*
Resources or uses determined to be Present/May Be Affected may be carried forward in the document.

Resources Considered for Analysis
The following resources are or may be present in the CCD and may be affected by the Proposed Action or No Action Alternative.

3.1.1 Noxious and Invasive Weeds

"Invasive species" include plants able to establish on a site where they were not present in the original plant composition, and are of particular concern following a disturbance. Invasive species aggressively outcompete native species within a community and often alter the physical and biotic components enough to deteriorate the entire ecological community. They are often exotic species that do not have naturally occurring, local predators. Invasive species make efficient use of natural resources difficult and may interfere with management objectives for that site.

"Noxious weeds" are a subset of invasive species, specified by federal or State laws as being especially undesirable, troublesome, or difficult to control. Noxious weeds can grow and spread in places where it interferes with the growth and production of desired species. Indicators of noxious and invasive weed conditions include acres affected by grazing, wildland fire, and infestation of noxious and invasive weeds. Indicators of noxious and invasive weed conditions include the extent and density of occurrence. The diversity of noxious and invasive weeds may indicate the effectiveness of current management efforts or may reflect new pressures on the land. Indicators of potential infestation areas include significant site disturbance, such as wildfire, road construction, and overgrazing. Many noxious and invasive weeds are aggressive early successional species that colonize recently disturbed sites. Human-caused disturbances are generally responsible for most weed infestations.

Within the CCD, there are numerous areas infested with noxious weeds in patches of varying sizes and weed densities. Currently, the aggregate acreage of all known noxious weeds is approximately 300 acres. As not all noxious weeds have been mapped, the total acreage is undoubtedly larger. Current surveying and mapping of noxious weeds is ongoing within the CCD.

Table 3 lists the noxious and invasive weeds found in the CCD. Noxious weeds are often found in places where the native plant community has been degraded and where there is sufficient soil moisture. Consequently, noxious weeds are not found in widespread contiguous areas throughout the CCD, but instead typically found in large and small patches, primarily in riparian areas, ephemeral drainages, playa lake margins, burned areas, and along roadsides.

Table 3. Noxious and Invasive Weeds Known to Occur in the CCD.

Common Name	Scientific Name
African rue	*Peganum harmala*
Canada thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Dalmatian toadflax	*Linaria dalmatica*
Diffuse knapweed	*Centaurea diffusa*
Hoary cress	*Cardaria draba*

Common Name	Scientific Name
Mediterranean sage	*Salvia aethiopis*
Medusahead	*Taeniatherum caput-medusae*
Musk thistle	*Carduus nutans*
Perennial pepperweed/ tall whitetop	*Lepidium latifolium*
Poison hemlock	*Conium maculatum*
Puncturevine	*Tribulus terrestris*
Purple loosestrife	*Lythrum salicaria*
Russian knapweed	*Acroptilon repens*
Scotch thistle	*Onopordum ancanthium*
Spotted knapweed	*Centaurea stoebe ssp. mincranthos*
Tamarisk	*Tamarix sp.*
Yellow star thistle	*Centaurea solstitialis*

Source: BLM 2014

Attachments 3 and 4 provide the complete lists of noxious and invasive weeds found in Nevada and California respectively. Below is a brief description of each noxious and invasive weeds known to occur in the CCD.

African rue is a weed that has a woody, branched taproot with creeping roots. This perennial plant reproduces by seeds and roots. All plant parts are poisonous to livestock and humans. This weed grows best in dry disturbed areas, and often infests roadsides, washes. This weed is known to occur in Lyon, Churchill and Mineral counties, Nevada.

Canada thistle is a perennial weed that has a deep, extensive creeping root system. This weed reproduces by both roots and seeds. Often found in patches or colonies due to the spreading root system. Grows best in moist areas; also found in pastures. This weed is known to occur in all CCD counties.

Dalmatian toadflax is a perennial weed that reproduces by seed and roots. It has a creeping root system. This weed grows best in dry, well drained soils, often in rangelands and roadsides. This weed is known to occur in Douglas, Storey and Washoe counties, Nevada. Mechanical and manual control is ineffective.

Hoary cress is a perennial weed that grows best in disturbed, alkaline soils. This weed reproduces through roots and seed. Hoary cress is known to occur in all CCD counties.

Mediterranean sage has a stout, deep taproot. This biennial weed reproduces by seed, dried plants detach and "tumble" which disperses their seeds. This weed is known to occur in Washoe County, Nevada.

Medusahead is an annual weed that reproduces by seed. It is unpalatable to grazing animals. This weed grows best in clay soils, often in rangelands and is known to occur in Churchill, Douglas, Storey and Washoe counties, Nevada.

Musk thistle is a biennial weed that has a deep, fleshy taproot and reproduces by seed, and often infests roadsides. This weed is known to occur in Lyon, Churchill, Washoe and Storey counties, Nevada.

Perennial pepperweed/tall whitetop is a perennial weed that has a creeping root system and can be found in moist areas and pastures. This weed reproduces by roots and seed. This weed occurs in all CCD counties.

Poison hemlock is a biennial weed that has a thick, deep taproot. It reproduces by seed and is highly toxic to animals and humans when consumed. This weed occurs in all CCD counties.

Puncturevine is an annual weed that reproduces by seed. Spines on its fruit can cause injury to grazing animals and humans and also puncture tires. It grows best in dry, sandy soils and often infests roads. This weed is known to occur in all CCD counties.

Purple loosestrife is a perennial weed that reproduces by seed and stem fragments. This weed has a taproot with some spreading roots. This weed grows best in wet areas, often near springs and waterways. It is known to occur in Carson City, Churchill, Douglas, Storey and Washoe counties, Nevada.

Russian knapweed is a perennial weed that has a creeping root system. It reproduces by roots and seed. This weed causes a chewing disease in grazing animals. This weed is known to occur in all CCD counties. Mechanical and manual treatments are often not effective.

Scotch thistle is a biennial weed that reproduces by seed and can form dense stands that are difficult to penetrate. This weed has a fleshy taproot and often infests roadsides. This weed occurs in all CCD counties.

Spotted knapweed reproduces by seed and lateral roots. It has a deep, stout taproot and is known to occur in Carson City, Douglas, Lyon and Washoe counties, Nevada.

Tamarisk or salt cedar is a perennial weed that reproduces by seed, roots and stem fragments. Mechanical and manual treatment is often ineffective unless accompanied by application of an herbicide. Often found along the edges of waterways and springs in all CCD counties.

Yellow star-thistle is an annual that reproduces by seed and can have a long tap root. This weed often infests rangeland and roadsides. This weed is known to occur in Carson City, Douglas, Lyon, Mineral, Storey and Washoe counties, Nevada (NDA 2015).

Cheatgrass is one of the most invasive annual grasses in the CCD. According to existing data, over 58,724 acres of cheatgrass are present on BLM-managed lands (BLM 2014). These are lands that had cheatgrass as a component of the vegetation prior to disturbance, and post-disturbance the native species had minimal numbers, or were otherwise unable to compete, making the invasive annual grass the dominant vegetation on-site.

3.1.2 Vegetation

Vegetation provides an enormous variety of functions in an ecosystem, and also provides for a variety of human and animal uses. Vegetation stabilizes soils, prevents erosion, reduces carbon dioxide, releases oxygen, increases species diversity, and provides habitat and food for animals and resources for human use (Prevey et al. 2010; Connelly et al. 2004). A vegetative community is the basic unit of vegetation that allows for the representation of an assemblage of ecologically interrelated vegetative species (Daubenmire 1968).

The CCD is primarily located in the Central Basin and Range ecoregion, which encompasses 120,000 square miles (BLM 2012). The Central Basin and Range ecoregion is internally drained and is characterized by north-south trending mountain ranges that are separated by broad xeric basins, valleys, and salt flats. Elevations range from 3,350 feet to more than 13,120 feet. There is a significant rain shadow effect from the Sierra Nevada Mountains to the east and the Rocky Mountains to the west that create an arid climate throughout the ecoregion.

Based on SynthMap GIS data (Peterson 2008), which uses the Southwest Regional Gap Analysis Project land cover descriptions, the CCD can be grouped into vegetation communities (Figure 2). These communities represent different vegetation and habitat types and potentials. Table 4 depicts the estimated acreage within the CCD for each vegetation community.

Table 4. Primary Vegetation Communities in the CCD.

Community	Acres of BLM-managed land
Sagebrush	1,234,300
Intermountain Cold Desert Scrub	2,604,200
Forests/Woodlands	692,800
Annual Grassland/Invasive Species	58,600
Other Types (see BLM 2014)	211,200

Source: BLM 2014

<u>Sagebrush</u>

There are several different types of sagebrush systems throughout the CCD. Elevation, amount of precipitation, and type of soil are all important factors on the species present. Although some other types are present throughout this vegetative community, the predominant species assemblages are detailed below.

Great Basin Xeric Mixed Sagebrush Shrubland—This system occurs on dry flats and plains, alluvial fans, rolling hills, rocky hillslopes, and saddles, usually at lower elevations between 3,200 and 8,500 feet. These sites are dry, with vegetation dominated by black sagebrush (*Artemisia nova*) and low sagebrush (*Artemisia arbuscula*); these sites may also have rabbitbrush (*Chrysothamnus* sp.), shadscale (*Atriplex confertifolia*), Mormon tea (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), greasewood (*Sarcobatus vermiculatus*), and horsebrush (*Tetradymia* spp.) as shrub components. The grass and forb component is often sparse and is composed of perennial bunchgrasses such as Indian ricegrass (*Achnatherum hymenoides*), Thurber's needlegrass (*Achnatherum thurberianum*), squirreltail (*Elymus elymoides*), and Sandberg's bluegrass.

Inter-mountain Basins Big Sagebrush Steppe—This is widespread throughout the Great Basin. This system is found at slightly higher elevations, and the soils are typically deep and non-saline, sometimes with a microphytic crust. The shrub-steppe is dominated by perennial grasses and forbs, with basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), Wyoming big sagebrush (*Artemisia tridentata spp. wyomingensis*), and bitterbrush (*Purshia tridentata*) dominating or co-dominating the shrub component. Other shrub species often present include shadscale, rabbitbrush, and horsebrush. The native perennial grasses associated with this system include: Indian ricegrass, Idaho fescue (*Festuca idahoensis*), prairie junegrass (*Koeleria macrantha*), Sandberg's bluegrass and bluebunch wheatgrass (*Pseudoroegneria spicata*).

Inter-Mountain Basins Big Sagebrush Shrubland—This system occurs in broad basins between mountain ranges, usually between 4,900 and 7,500 feet in elevation. The soils are typically deep and well-drained. These shrublands are co-dominated by Basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) and Wyoming big sagebrush (*Artemisia tridentata* spp. *tridentata*). There is often a scattered juniper component (*Juniperus* spp.), as well as greasewood, Atriplex species (*Atriplex* spp.), rabbitbrush, and bitterbrush (*Purshia tridentata*). The grass component is usually about 25 percent or less of the vegetative cover, and species include: Indian ricegrass, needle and thread grass (*Hesperostipa comata*), Idaho fescue, Basin wildrye (*Leymus cinerus*), Sandberg's bluegrass, and bluebunch wheatgrass.

<u>Intermountain Cold Desert Scrub</u>
Several different species assemblages are included in the Intermountain Cold Desert Scrub vegetative community; however, the most common are detailed below.

Inter-Mountain Basins Semi-Desert Shrub-Steppe—This system occurs at lower elevation on alluvial fans and flats with moderate to deep soils. This system is dominated by grasses, with an open shrub layer. The most typical grasses include Indian ricegrass, needle and thread grass, and Sandberg's bluegrass. Shrubs present include fourwing saltbush (*Atriplex canescens*), rabbitbrush, Mormon tea, and winterfat (*Krascheninnikovia lanata*). Although big sagebrush may be present, it would not be a dominant component of this system. This system is open and spotty, with uneven distribution of vegetation.

Inter-Mountain Basins Mixed Salt Desert Scrub—This system is extensive and is found in saline basins, alluvial slopes, and plains. This system experiences very low amounts of annual precipitation and has very open canopies. Shrub species often present include an Atriplex component, such as shadscale or fourwing saltbush (*Atriplex canescens*). Other shrubs present include Wyoming big sagebrush, rabbitbrush, Mormon tea, spiny hopsage (*Grayia spinosa*), and winterfat. The herbaceous layer varies greatly, being quite sparse in some areas and fairly dense in other areas. Grasses commonly include: Indian ricegrass, thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*), western wheatgrass (*Pascopyrum smithii*), and Sandberg's bluegrass.

Inter-Mountain Basins Greasewood Flat—This system occurs on stream terraces and flats or may form rings around more sparsely vegetated playas. The soils are typically saline, with a shallow water table and intermittent flooding. Although these sites dry out during the growing season, the water table remains high enough to maintain vegetation despite the salt accumulations. The shrub canopy is often open to moderately dense, with such shrubs as:

greasewood, fourwing saltbush, shadscale, and winterfat. The grass component includes alkali sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata*), and some amount of basin wildrye (*Leymus cinereus*).

Forests and Woodlands

There are eight distinct forest and woodland types within the CCD**.** The pinyon-juniper woodland community type is a mixture of singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) with some pure stands of pinyon and juniper occurring in limited amounts.

Mountain mahogany stands are typically located on rocky, coarse textured soils and occur as either pure stands of curl-leaf mountain mahogany (*Cercocarpus ledifolius*) or transitional stands that are mixed with pine and juniper trees. Even less is known on the current condition of mountain mahogany stands. The groves are seemingly quite old, evidenced by the fact that the trees are fairly large, and this is a slow growing species. Regeneration is limited and as such senescence is occurring in older groves, which diminishes the browse potential of these stands. Often the trees lack leaves to the level that browse species can reach.

The three-needled pine type is dominated by a mixture of Jeffrey pine (*Pinus jeffreyi*) and ponderosa pine (*Pinus ponderosa*) or a combination of the two. This community type is found on xeric montane to subalpine regions of the Great Basin and Sierra Nevada. They tend to have a semi-open canopy leaving room for associates incense cedar (*Calocedrus decurrens*), western juniper (*Juniperus occidentalis* ssp. *australis*), singleleaf pinyon, and white fir (*Abies concolor* ssp. *Iowiana*), as well as common sage steppe shrubs and bunchgrasses.

The riparian deciduous community type is the most dispersed forest and woodland type with stands occurring in all the major mountain ranges within the CCD. These stands are generally found where there is surface water or a shallow water table. Dominant trees include quaking aspen (*Populus tremuloides*) and black poplar (*Populus balsamifera* ssp. *trichocarpa*) at higher elevations, and Fremont cottonwood (*Populus fremontii*) and pacific willow (*Salix lasiandra*) at lower elevations. There are quaking aspen stands that occupy non-riparian sites but the majority of these stands are found in areas that have more available water than upland forests. Riparian deciduous and aspen-dominated stands are a mix of densities and age classes throughout the CCD. Many of these stands are experiencing impacts from wildlife, wild horses, and livestock browsing, insects, disease, and conifer encroachment. The older stands are also showing age-related declines, such as diminished live crown ratios, higher susceptibility to insects and disease, and individual stem death.

The soft pine type is dominated by western white pine (*Pinus monticola*) and sugar pine (*Pinus lambertiana*) and grows in association with lodgepole pine (*Pinus contorta* var. *murrayana*) and Jeffrey pine.

Dominant tree species in the mixed conifer type include Jeffrey pine, white fir, incense cedar, and to a lesser extent western juniper and singleleaf pinyon. The pure fir type is comprised of nearly pure stands of white fir with dense canopies and almost no understory. The limber pine type occupies rocky mountaintop sites exposed to windy conditions and is dominated by a sparse

overstory of limber pine (*Pinus flexillis*) with a sparse understory of xeric shrubs or cushion plants. Poor growing conditions preclude other trees from inhabiting this zone.

Annual Grasslands

Approximately 101,633 acres of the CCD has been converted to annual grassland comprised of invasive non-native species. As native species lose dominance in the ecosystem, invasive species such as cheatgrass (*Bromus tectorum*), are provided an avenue to gain dominance in the system (Prevey et al. 2010). Cheatgrass then provides a fine fuel with great horizontal continuity that creates different fire behavior than native fuels would. Cheatgrass germinates early in the season, before the majority of native perennials have come out of dormancy. Cheatgrass often becomes established in the understory of a Sagebrush or Intermountain Cold Desert Scrub system and then gains dominance once a disturbance, such as fire, temporarily eliminates the native overstory competition (BLM 2014).

3.1.3 Wetlands/Riparian Zones

Nevada has the most known springs of any State in the U.S., with over 4,000 mapped. The springs are quite diverse in amount of water produced, and perennial or seasonal amounts of water. Overall, riparian systems are about four percent of the CCD, but provide a much greater percentage of the desirable resources for livestock, wild horses, wildlife, and recreationists.

Riparian and wetland areas adjacent to surface waters are the most productive and important ecosystems on the CCD. These areas play an integral role in restoring and maintaining the chemical, physical and biological integrity of water resources. Riparian and wetland habitats have a greater diversity of plant and animal species than adjoining areas. Healthy riparian and wetland areas have the potential for multi-canopy vegetation layers with trees, shrubs, grasses, forbs, sedges and rushes and are valuable habitat for a wide variety of wildlife species. Healthy systems also filter and purify water, reduce sediment loads, enhance soil stability, provide micro-climatic moderation and contribute to ground water recharge and base flow. They stabilize water supplies, ameliorating both floods and droughts. Wetlands provide multiple uses, such as biodiversity conservation, fish production, migrating bird habitat, water purification, and erosion control.

The Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland system occurs in mountain ranges throughout the CCD mostly between 4,000 and 7,000 feet in elevation. There is a wide variety of plant associations, depending on the system's elevation, stream gradient, floodplain width and overall system dynamics. The dominant trees usually include species such as white fir, water birch (*Betula occidentalis*), Fremont cottonwood, and Douglas fir (*Pseudotsuga menziesii*). The shrub component is ordinarily comprised of silver sagebrush (*A. cana*), dogwood (*Cornus sericea*), narrowleaf willow (*S. exigua*), and Lemmon's willow (*S. lemmonii*). There is potential for a prolific and diverse herbaceous component. Rushes (*Juncus ssp.*) and sedges (*Carex ssp.*) are often dominant in the herbaceous layer, but perennial grasses and mesic forbs are also commonly found. Common perennial grasses and mesic forbs include tufted hairgrass (*Deschampsia caespitosa*), slender wheatgrass (*Elymus trachycaulus*), Rocky mountain iris (*Iris missouriensis*), false lily of the valley (*Maianthemum stellatum*), or Fendler's meadow-rue (*Thalictrum fendleri*) (BLM 2014).

3.1.4 Water Quality (Ground & Surface)

Surface Water. The interstate surface waters of the Truckee, Carson, and Walker Rivers are within the CCD. These rivers are displayed in Figure 3. The Truckee River begins at the outlet of Lake Tahoe, flows through the Sierra Nevada Mountains into Nevada, through Reno, and along the northern end of the Carson Range. At Derby Dam the Truckee River is diverted into two sections. The Truckee River turns north, flowing along the east side of the Pah Rah Range and empties into Pyramid Lake, and the Truckee Canal continues east and flows through Fernley and then turns south and empties into Lahontan Reservoir. The lower reach east of Reno is fish habitat for the Cui-ui and Lahontan cutthroat trout; these native fish species are listed as endangered and threatened, respectively. The Truckee River Basin is approximately 3,120 square miles, with less than 20 percent managed by the BLM. To the south, the Carson River rises in two forks in the Sierra Nevada; the East Fork begins in Alpine County southeast of Markleeville, and the West Fork begins near Carson Pass. After these forks join in Nevada, the Carson River flows northeast until it is impounded by the Lahontan Dam. From there water continues out into the Carson Sink. The Carson River Basin is approximately 3,990 square miles, with approximately 35 percent managed by the BLM.

The Walker River forms in Lyon County, south of Yerington by the confluence of the East Walker and West Walker Rivers. It initially runs north but then turns southeast along the east side of the Wassuk Range. Most of the flow is used for irrigation, leaving very little to enter Walker Lake. The Walker River Basin is approximately 3,130 square miles, with approximately 40 percent managed by the BLM.

Streams. The streams in the CCD originate in the higher elevation mountains and flow to the lower elevation valleys, lakes, wetlands, and playas. Most surface runoff is from snowmelt or rainfall at the higher elevations, producing peak discharges in the spring or summer. Year-to-year variability in precipitation influences stream flow both in quantity and in duration. Water scarcity has led to increased water storage, water diversions, and groundwater withdrawal for irrigation. These projects have significantly altered natural flow regimes, which has changed habitat conditions, channel stability, and timing of sediment and organic material transport. Throughout the CCD, stream flows have been altered by management activities, such as water impoundments, water withdrawal, road construction, and agricultural activities.

Surface Water Quality. The Environmental Protection Agency (EPA) has delegated authority to implement the Federal Water Pollution Control Act of 1972 and amendments (Clean Water Act of 1977) to the Nevada Division of Environmental Protection (NDEP) and to the California Department of Water Resources (CDWR). Federal land management agencies are designated by the State to assist in Clean Water Act (CWA) implementation on public lands. As a designated management agency, the BLM must:

1. implement and enforce natural resource management programs for the protection of water quality on federal lands under its jurisdiction;
2. protect and maintain water quality where it meets or exceeds applicable State and Tribal water standards;
3. monitor activities to assure that they meet standards and report the results to the State of Nevada and to the State of California were applicable; and

4. meet periodically to recertify water quality best management practices.

Water quality, as defined by the Clean Water Act (CWA) includes all the physical, biological, and chemical characteristics that affect existing and designated beneficial uses. The State of Nevada is required to identify which beneficial uses a water body currently supports or could support in the future. The primary beneficial uses of surface water are domestic water supply, fish habitat, irrigation, livestock watering, wildlife and hunting, fishing, water contact recreation, and aesthetic quality. The rivers and a few streams in the CCD support one or more of these State-designated beneficial uses.

Groundwater. There are 14 Hydrographic Regions in Nevada. The three major water basins within the CCD are the Truckee, Carson, and Walker River Basins. The most significant groundwater sources in the CCD are found in unconsolidated sediments and volcanic rocks beneath valley floors. These volcanic rocks and saturated sediments under alluvial fans and the valley floor transmit and store large volumes of groundwater into the most important aquifers in the CCD and contain shallow, intermediate, deep, and basalt aquifers. Geothermal aquifers are an important renewable resource and are located throughout the CCD (Maurer et. al. 1996).

Groundwater is particularly valuable in the CCD because of the limited surface water. Regional groundwater gradients and aquifer systems have not been extensively studied. Groundwater data are limited and are based on isolated studies and well logs.

Springs and seeps occur in areas where water from aquifers reaches the surface. Some springs begin in stream channels. Others flow into small ponds or marshy areas that drain into channels. Some springs and seeps form their own channels that reach flowing streams, but most lose their surface flow to evaporation or recharge the alluvial fill. Springs have been disturbed by management activities, such as livestock or wild horse grazing and watering, recreation use, and road construction. This affects the amount of water available.

When groundwater daylights at the surface, the water becomes a spring or surface water source. In the natural state, water quality at the source reflects the contact rock mineralogy. Water quality standards for upland springs and seeps are not clearly defined by the NDEP or CDWR. The BLM has general guidance from Standards and Guidelines under FLPMA, and State law (under the CWA) but there are no specific quantitative standards that apply to upland springs and seeps. For example, if a spring forms a pool but never discharges into a water body that is subject to the Commerce Clause, then theoretically, the CWA does not apply any more than a domestic bathtub that has no drain connecting it to a sewer system. The NDEP interpretation on spring water quality differs; NDEP views the potential of a million year flood flushing afore mentioned spring pool downstream and being subject to State water quality standards. NDEP does not consider springs as surface water and therefore there are no water quality standards for them. Only if a spring flows into a surface water with standards, then the State standards apply.

3.1.5 General Wildlife

Based on the Southwest Regional Gap Analysis Project, the NDOW's Wildlife Action Plan (NDOW 2013) characterized Nevada's vegetative land cover into eight broad ecological system groups and linked those with key habitat types, which are further refined into ecological systems

characterized by plant communities or associations (USGS 2005). The primary key habitat types found in the CCD are Intermountain Cold Desert Scrub, Lower Montane Woodlands, Sagebrush, Springs and Springbrooks. Other key habitats are sparsely distributed in small acreages throughout the CCD and include; Aspen Woodland, Barren Landscapes, Cliffs and Canyon, Desert Playas and Ephemeral Pools, Grasslands and Meadows, Intermountain Rivers and Streams, Sand Dunes, and Badlands.

Vegetation communities vary based on precipitation, elevation, topography, slope, aspect, geology, soils, and other environmental variables. Habitat type is further distinguished by site-specific attributes such as vegetation cover, composition, and structure. Vegetation community composition and distribution across the CCD are described in detail in Section 3.1.2, Vegetation.

Wildlife is generally not found in great densities within the intermountain cold desert scrub key habitat, which encompasses about 41 percent of the CCD. Lizards are the most diverse and abundant assemblage of species and serve as prey for various raptors and medium sized mammals. This key habitat supports pronghorn (*Antilocapra americana*), winter range for mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*), and birds such as horned larks (*Eremophila alpestris*) and Swainson's hawks (*Buteo swainsoni*). Also, many species move between cold desert scrub and sagebrush habitats for various life requirements such as foraging and nesting. For instance, kit fox (*Vulpes macrotis*) use the sandy soils for denning in cold desert scrub habitat but also forage for prey in sagebrush plant communities.

The sagebrush key habitat encompasses approximately 33 percent of BLM-managed lands and provides important habitat for mule deer, sage-grouse (*Centrocercus urophasianus*), and other sagebrush dependent species such as the sage sparrow (*Artemisiospiza belli*) and Brewer's sparrow (*Spizella breweri*). Many sagebrush-dependent species are also dependent upon the Lower Montane Woodlands key habitat for some life requisites, which supports bats, big game, small game, ravens, and a variety of songbirds. It also provides thermal cover for ungulates during harsh winter storms. This key habitat makes up around 14 percent of BLM-managed lands.

The Cliffs and Canyons key habitat supports nesting swallows (*Petrochelidon spp.*), swifts (*Apodidae spp.*), golden eagles (*Aquila chrysaetos*), and prairie falcons (*Falco mexicanus*), along with many other bird species. These areas also provide important cover for large mammals such as bighorn sheep, mountain lions, and bobcats, and for small mammals such as ground squirrels, rabbits, and marmots. Numerous bat species roost, hibernate, and reproduce in rock crevices, caves, and mines across the CCD.

Nevada has the most known springs of any state in the U.S. with over 4,000 mapped within the springs and springbrooks key habitat (NDOW 2013). They vary greatly in temperature and flow and are extremely important in maintaining Nevada's wildlife diversity. Springbrooks are areas of flowing water linked to the spring source. Even small springs and/or flows can support important endemic gastropods and other aquatic invertebrates as well as a diverse plant community including various species of forbs, sedges, and rushes (NDOW 2013). While the actual amount of riparian/spring habitat is small in Nevada (less than five percent), about 80 percent of all vertebrate species require this habitat (NDOW 2013). Consequently, maintaining health and resiliency in this key habitat is especially critical for wildlife.

Stream aquatic habitats within the Intermountain Rivers and Streams key habitat are highly variable and are subdivided into montane and sub-montane aquatic habitats. Depending on the vegetation structure, various species of birds, fish, raptors, amphibians, and aquatic invertebrates can be supported. The actual miles of this habitat in the CCD is short. Nonetheless, healthy riparian corridors are crucial to many species in Nevada and are the hub of species diversity on the larger landscape. Several perennial creeks within the CCD are designated by NDOW as fishable streams and support non-native rainbow trout (*Oncorhynchus mykiss*), non-native brook trout (*Salvelinus fontinalis*) and non-native brown trout (*Salmo trutta*).

Big Game.
Big game species in the CCD include black bear (*Ursus americanus*), mule deer, pronghorn, Rocky Mountain elk (part of Desatoya Mountains only), and two subspecies of bighorn sheep (*Ovis spp.*).

Table 5. Big Game Species Distribution in the CCD.

Species	Distribution on CCD lands (in acres)	Primary Key Habitat(s)
Black bear	984,800	Intermountain Rivers and Streams, Lakes and Reservoirs, Sierra Confer Forests and Woodlands
California bighorn sheep	103,400	Cliffs and Canyons
Desert bighorn sheep	1,025,600	Cliffs and Canyons
Mule deer	1,747,000	Sagebrush and Lower Montane Woodland
Pronghorn	3,316,200	Sagebrush and Cold Desert Scrub
Rocky Mountain Elk (winter range)	7,200	Grasslands

Source: BLM 2014

Birds.
Waterfowl. Streams, rivers, reservoirs, ponds, playas, canals, and associated riparian vegetation provide habitat for waterfowl and shorebirds. Most of this habitat is not administered by the BLM, but the CCD has cumulative responsibility to protect these habitats. Canada goose (*Branta canadensis*), northern shoveler (*Anas clypeata*), ruddy duck (*Oxyura jamaicensis*), redhead (*Aythya americana*), American coot (*Fulica americana*), green-winged teal (*Anas crecca*), northern pintail (*Anas acuta*), and gadwall (*Anas strepera*) are a few of the more common game waterfowl species found in the area. Great blue herons (*Ardea herodias*), egrets, white-faced ibis (*Plegadis chihi*), and other wading and shorebirds typically occur along major rivers, valleys, and irrigated fields, as well as some playas where permanent water sources exist or in years when water is maintained. When playas contain water for extended periods of time, lush vegetation can grow in addition to producing many aquatic invertebrates that provide forage for shorebirds, waterfowl, and small water birds. For instance, Dixie Meadows Salt Marsh and other cold springs provide the playa with a permanent water source. Therefore, numbers and abundance of species in any given year is less variable here than for playas without a permanent water source.

Upland Game Birds. The quality of upland game bird habitat depends on the availability of mixed shrubby and herbaceous vegetation for nesting, brood rearing, foraging, and thermal cover. Riparian habitat plays an important role as a source of food, water, and cover for most

upland birds. Chukar partridges (*Alectoris chukar*), a non-native species, are the most broadly distributed across the CCD while California and mountain quail *(Callipepla californica* and *Oreortyx pictus*, respectively), wild turkey, and blue grouse (*Dendragapus obscurus*) have more limited distribution. Mourning doves (*Zenaida macroura*) also occupy a variety of habitats across the CCD.

Raptors. Raptors in the CCD include eagles, falcons, hawks, and owls. Golden eagles, red-tailed (*Buteo jamaicensis*), ferruginous (*Buteo regalis*), Swainson's, and Cooper's hawks (*Buteo swainsoni*), peregrine (*Falco peregrinus*) and prairie falcons, and American kestrel (*Falco sparverius*) are the most common diurnal species observed, while the nocturnal great horned owl (*Bubo virginianus*) occupies a variety of habitats in the CCD. Cliffs, rocky outcrops, and large trees provide suitable nesting habitat for many of these species.

3.1.6 Migratory Birds

Common migratory birds in the CDDO include common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), Virginia warbler (*Oreothlypis virginiae*), mountain bluebird (*Sialia currucoides*), green-tailed towhee (*Pipilo chlorurus*), sage sparrow, horned lark, black-throated sparrow (*Amphispiza bilineata*), western scrub-jay (*Aphelocoma californica*), pinyon jay (*Gymnorhinus cyanocephalus*), bushtit (*Psaltriparus minimus*), and Brewer's sparrow. Table 6 lists Birds of Conservation Concern and Game Birds Below Desired Condition that may be present or their habitat may be present in the CCD. This list is based on the USFWS Birds of Conservation Concern 2008 List for Bird Conservation Regions 9 and 15 (USFWS 2008).

Table 6. Migratory Birds That May be Present or Their Habitat May be Present in the CCD.

Common Name	Scientific Name	USFWS Birds of Conservation Concern BCR* 9 (Great Basin)	BCR 15 (Sierra Nevada)	GBBDC
Bald eagle (b)	*Haliaeetus leucocephalus*	X	X	
Band-tailed pigeon	*Columba fasciata*			X
Black swift	*Cypseloides niger*	X	X	
Brewer's sparrow	*Spizella breweri*	X		
Calliope hummingbird	*Selasphorus calliope*	X	X	
Cassin's finch	*Haemorhous cassinii*		X	
Eared grebe (nb)	*Podiceps nigricollis*	X		
Ferruginous hawk	*Buteo regalis*	X		
Flammulated owl	*Otus flammeolus*	X	X	
Golden eagle	*Aquila chrysaetos*	X		
Green-tailed towhee	*Pipilo chlorurus*	X		
Lesser scaup	*Aythya affinis*			X
Lewis's woodpecker	*Melanerpes lewis*	X	X	
Loggerhead shrike	*Lanius ludovicianus*	X		
Long-billed curlew	*Numenius americanus*	X		
Marbled godwit (nb)	*Limosa fedoa*	X		
Mourning dove	*Zenaida macroura*			X
Northern pintail	*Anas acuta*			X
Olive-sided flycatcher	*Contopus cooperi*		X	
Peregrine falcon (b)	*Falco peregrinus*	X	X	
Pinyon jay	*Gymnorhinus cyanocephalus*	X		

Common Name	Scientific Name	USFWS Birds of Conservation Concern BCR* 9 (Great Basin)	BCR 15 (Sierra Nevada)	GBBDC
Redhead	*Ay. americana*			X
Sage sparrow	*Artermisiospiza belli*	X		
Sage thrasher	*Oreoscoptes montanus*	X		
Snowy plover (c)	*Charadrius nivosus*	X		
Spotted owl (c)	*Strix occidentalis*		X	
Tricolored blackbird	*Agelaius tricolor*	X		
Virginia's warbler	*Oreothlypis virginiae*	X		
White-headed woodpecker	*Picoides albolarvatus*	X		
Williamson's sapsucker	*Sphyrapicus thyroideus*	X	X	
Willow flycatcher (c)	*Empidonax traillii*	X	X	
Wood duck	*Aix sponsa*			X

*BCR – Bird Conservation Regions; (b) ESA delisted (c) non-listed subspecies or population of TES, (nb) non-breeding in this BCR.
Source: BLM 2014

3.1.7 BLM Sensitive Species

The BLM manages, by policy, special status species, which are species listed or proposed for listing under the Endangered Species Act (ESA) together with species designated as Bureau sensitive by BLM State Directors (BLM 2008a). The objectives of the BLM special status species policy are: 1) to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed; and 2) to initiate proactive conservation measure that reduce or eliminate threats to sensitive species to minimize the likelihood of and need for listing under the ESA. In 2011 the Nevada list of BLM Sensitive Species was revised (BLM 2011a).

3.1.7.1 Plants

Table 7 lists the sensitive plant species within the CCD. A brief description of each plant species is provided in Appendix B.

Table 7. Sensitive Plant Species That May be Present or Their Habitat May be Present in the CCD.

Common Name	Scientific Name
Altered andesite buckwheat	*Eriogonum robustum*
Altered andesite popcorn flower	*Plagiobothrys glomeratus*
Ames milkvetch	*Astragalus pulsiferae var. pulsiferae*
Beatley buckwheat	*Eriogonum rosense var. beatleyae*
Bodie Hills rockcress	*Boechera bodiensis*
Brodie Hills draba	*Cusickiella quadricostata*
Churchill Narrows buckwheat	*Eriogonum diatomaceum*
Eastwood milkweed	*Asclepias eastwoodiana*
Lahontan beardtongue	*Penstemon palmeri var. macranthus*
Lavin milkvetch	*Astragalus oophorus var. lavinii*
Margaret rushy milkvetch	*Astragalus convallarius var. margaretiae*

Common Name	Scientific Name
Masonic Mountain jewelflower	*Streptanthus oliganthus*
Mono County phacelia	*Phacelia monoensis*
Nevada dune beardtongue	*Penstemon arenarius*
Oryctes	*Oryctes nevadensis*
Pine Nut Mountains mousetails	*Ivesia pityocharis*
Playa phacelia	*Phacelia inundata*
Sagebrush pygmyleaf	*Loeflingia squarrosa ssp. Artemisiarum*
Sand cholla	*Grusonia pulchella*
Shevock bristlemoss	*Orthotrichum shevockii*
Sierra Valley mousetails	*Ivesia aperta var. aperta*
Sodaville milkvetch	*Astragalus lentiginosus var. sesquimetralis*
Steamboat buckwheat	*Eriogonum ovalifolium var. williamsiae*
Tiehm blazingstar	*Mentzelia tiehmii*
Tiehm peppercress	*Stroganowia tiehmii*
Tonopah milkvetch	*Astragalus pseudiodanthus*
Washoe pine	*Pinus ponderosa ssp. washoensis*
Wassuk beardtongue	*Penstemon rubicundus*
Williams combleaf	*Polyctenium williamsiae*
Windloving buckwheat	*Eriogonum anemophilum*

Source: BLM 2014

3.1.7.2 Animals

The primary key habitat types that support BLM sensitive animal species found in the CCD are Intermountain Cold Desert Scrub, Lower Montane Woodlands, Sagebrush, and Springs and Springbrooks.

Table 8 lists the BLM Nevada sensitive animal species that may be present or their habitat may be present in the CCD.

Table 8. Sensitive Animal Species That May be Present or Their Habitat May be Present in the CCD.

	Common Name	Scientific Name
Mammals	Pallid bat	*Antrozous pallidus*
	Pygmy rabbit	*Brachylagus idahoensis*
	Townsend's big-eared bat	*Corynorhinus townsendii*
	Big brown bat	*Eptesicus fuscus*
	Spotted bat	*Euderma maculatum*
	Silver-haired bat	*Lasionycteris noctivagans*
	Western red bat	*Lasiurus blossevillii*
	Hoary bat	*Lasiurus cinereus*
	Dark kangaroo mouse	*Microdipodops megacephalus*
	Pale kangaroo mouse	*Microdipodops pallidus*
	California myotis	*Myotis californicus*
	Western small-footed myotis	*Myotis ciliolabrum*

	Common Name	Scientific Name
	Long-eared myotis	*Myotis evotis*
	Little brown myotis	*Myotis lucifugus*
	Fringed myotis	*Myotis thysanodes*
	Long-legged myotis	*Myotis volans*
	Yuma myotis	*Myotis yumanensis*
	Pika	*Ochotona princeps*
	Bighorn sheep	*Ovis canadensis*
	Western pipistrelle	*Pipistrellus heperus*
	Brazilian free-tailed bat	*Tadarida braziliensis*
Birds	Northern goshawk	*Accipiter gentilis*
	Golden eagle	*Aquila chrysaetos*
	Western burrowing owl	*Athene cunicularia*
	Ferruginous hawk	*Buteo regalis*
	Swainson's hawk	*Buteo swainsoni*
	Greater sage-grouse	*Centrocercus urophasianus*
	Snowy plover	*Charadrius alexandrinus*
	Peregrine falcon	*Falco peregrinus*
	Pinyon jay	*Gymnorhinus cyanocephalus*
	Bald eagle	*Haliaeetus leucocephalus*
	Loggerhead shrike	*Lanius ludovicianus*
	Lewis's woodpecker	*Melanerpes lewis*
	Sage thrasher	*Oreoscoptes montanus*
	Brewer's sparrow	*Spizella breweri*
Reptiles	Shasta alligator lizard	*Elgaria coerulea shastaensis*
Amphibians	Dixie Valley toad	*Bufo boreas sp.*
	Mountain yellow-legged frog*	*Rana muscosa*
	Northern leopard frog	*Rana pipiens*
Fish	Wall Canyon sucker	*Catostomus sp 1*
Molluscs	Ovate Cain Spring pyrg	*Pyrgulopsis pictilis*
	Wongs pyrg	*Pyrgulopsis wongi*
Insects	Hardy's aegialian scarab	*Aegialia hardyi*
	Bee	*Anthophora sp. nov. 1*
	Sand Mountain aphodius scarab	*Aphodius sp. 3*
	Click beetle	*Cardiophorus sp. nov.*
	Sand Mountain pygmy scarab beetle	*Coenonycha pygmaea*
	Early blue	*Euphilotes enoptes primavera*
	Sand Mountain blue	*Euphilotes pallescens arenamontana*
	Bee	*Hesperapis sp. nov. 2*
	Mono Basin skipper	*Hesperia uncas giulianii*
	Bee	*Perdita haigi*
	Bee	*Perdita sp. nov. 3*
	Great Basin small blue	*Philotiella speciosa septentrionalis*
	Carson Valley silverspot	*Speyeria Nokomis carsonensis*

* Since the Nevada list of BLM sensitive species was released in 2011, the mountain yellow-legged Frog is now recognized as the Sierra Nevada yellow-legged frog (see Table 10 in Section 3.1.8.2).
Source: BLM 2014

Sage-grouse are a sagebrush-obligate species, requiring large, intact, interconnected expanses of sagebrush for nesting, brooding, fall and winter cover and forage. Sage-grouse are ground-nesters and their key habitat components include adequate understory cover of tall grasses and

medium-height shrubs for nesting, abundant forbs and insects for brood rearing, and availability of herbaceous riparian species for late growing-season foraging. Courtship displays are conducted on leks, which are open sites, often surrounded by denser sagebrush cover, used year after year. Lekking periods for greater sage-grouse generally occurs between early March and mid-May.

Within the CCD, there are greater sage-grouse and the Bi-State DPS of greater sage-grouse (hereafter referred to as Bi-State sage-grouse). Approximately 134,114 acres of "priority" and 412,096 acres of "general" habitats for greater sage-grouse occur on CCD lands (Figure 4). Bi-state habitat has also been proposed in the *Greater Sage-Grouse Bi-State Distinct Population Segment Forest Plan Amendment, Final Environmental Impact Statement* (Figure 4) (Figure 2-1 *in* USFS 2015). Approximately 153,398 acres of proposed DPS habitat occurs on CCD lands (Figure 4). A final decision on this designation of DPS habitat would not be made until the BLM issues a Record of Decision for this plan amendment.

According to Hagen et al. (2007), ideal greater sage-grouse nesting and brood-rearing habitat contains taller sagebrush (greater than 20 inches) with 15 to 25 percent canopy cover, at least 10 percent forb cover, and greater than 15 percent grass cover (Hagen et al. 2007). Also, Sveum et al. (1998) observed higher nesting success for structures placed in sagebrush steppe habitat with grasses taller than 7.1 inches due to decreased predation than in sagebrush steppe areas with lower grasses. In nesting habitat with high raven populations, however, Coates and Delehanty (2010) suggest that sagebrush cover from 20 to 30 percent with total shrub cover greater than or equal to 40 percent is the most ideal at preventing ravens from predating on greater sage-grouse nests. As the summer progresses, hens with broods relocate to wet meadows and riparian areas abundant with forbs and grasses that are near sagebrush (Connelly et al. 2004).

Snow depth determines the areas available to greater sage-grouse during the winter. In general, ideal winter habitat contains tall, vigorous sagebrush that extends above the snow and exhibits sufficient canopy coverage (Connelly et al. 2004).

3.1.8 Threatened & Endangered Species

The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. Under the ESA, a species may be listed as either endangered or threatened.

3.1.8.1 Plants

There are two federally-listed plant species that occur in the CCD. A brief description of each species is described below Table 9.

Table 9. Federally-Listed Plant Species Present in the CCD.

Common Name	Scientific Name	Designation	Critical Habitat
Steamboat buckwheat	*Eriogonum ovalifolium var. williamsiae*	Endangered	No
Webber's ivesia	*Ivesia webberi*	Threatened	Yes

Source: BLM 2014

The *Steamboat buckwheat* was listed as endangered on the ESA in 1986. Natural occurrence of this plant is limited to the area of Steamboat Hot Springs in Washoe County. It grows in young, shallow, poorly developed, light-colored soils. This plant is often found in association with

shadscale saltbush, greasewood, and rubber rabbitbrush. It is dependent on wetland margin areas. The Steamboat buckwheat is located in the Steamboat Hot Springs Geyser Basin ACEC.

The *Webber's ivesia* was listed as threatened on the ESA in 2014 and critical habitat was designated in four locations in the CCD. In Nevada, one occurrence is north of Reno, one occurrence is in Washoe County near the California border, and one occurrence is in Douglas County. In California, one occurrence is in Plumas County near the Nevada border. This plant has very specific soil requirements including a shallow shrink-swell clay soil with a gravel surface layer over volcanic, generally andesitic bedrock, on mid-elevation benches and flats (BLM 2014). There are approximately 242 acres of designated critical habitat in the CCD.

3.1.8.2 Animals

There are seven federally-listed animal species that occur in the CCD. A brief description of each species is described below Table 10.

Table 10. Federally-Listed Animal Species Present in the CCD.

Common Name	Scientific Name	Designation	Critical Habitat
Carson wandering skipper	*Pseudocopaeodes eunus obscurus*	Endangered	No
Cui-ui	*Chasmistes cujus*	Endangered	No
Hiko White River springfish	*Crenichthys baileyi grandis*	Endangered	No
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	Threatened	No
Railroad Valley springfish*	*Crenichthys nevadae*	Threatened	No
Sierra Nevada yellow-legged frog	*Rana sierra*	Endangered	No
Western yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Proposed

Source: Modified from BLM 2014
* not found on CCD lands.

The *Carson wandering skipper* (CWS) is a small butterfly in the subfamily *Hesperiinae* (grass skippers). The subspecies was federally listed as endangered on November 29, 2001. The Winnemucca Ranch Road site was designated as an ACEC in 2001 and was subsequently fenced for habitat protection. The CWS habitat is characterized as lowland grassland habitats on alkaline substrates. The occupied area is characterized by the presence of saltgrass and nectar sources in open areas near springs or water (USFWS 2007).

The *Cui-ui* is found in the CCD. Cui-ui is endemic to Pyramid Lake and spawning occurs in the Truckee River over gravel beds in relatively shallow water where flow is rapid. When low water levels disturb runs, spawning may occur at the river mouth. Spawning is unlikely to occur in Pyramid Lake because of extreme alkalinity and elevated salinity that preclude successful reproduction. Diet includes mainly bottom-oriented zooplankton and macroinvertebrates (Scoppettone 1991, Sigler 1987).

The *Hiko White River springfish* was introduced into Blue Link spring reservoir by the Nevada Department of Wildlife in 1984 to serve as a refuge population (USFWS 1998). However, this is not their type locality or native range. The fish live in a very small warm water reservoir. Many years ago, a mining operation punched into a warm water layer, tapping an underground water source that rose to the surface as a spring. Instead of capping the water, the small reservoir was built and the fish stocked. Filamentous algae are the most important food for this fish.

The *Lahontan cutthroat trout* is a subspecies of cutthroat trout (*Oncorhynchus clarkii*) and historically occupied large freshwater and alkaline lakes, small mountain streams and lakes, small tributary streams, and major rivers of the Lahontan Basin of northern Nevada, eastern California, and southern Oregon, including the Truckee, Carson, Walker, Susan, Humboldt, Quinn, Summit Lake/Black Rock Desert, and Coyote Lake watersheds. In the CCD, the Truckee, Carson, and Walker River watersheds, as well as several streams in the Desatoya Mountains in Churchill County support Lahontan cutthroat trout. They require relatively clear, cold waters to maintain viable populations. Lahontan cutthroat trout reproduce in the spring and are obligatory stream spawners, sometimes migrating large distances to find adequate spawning areas. Unlike most freshwater fish species, Lahontan cutthroat trout tolerate relatively high alkalinity and total dissolved solid levels found in some lake environments.

The *Railroad Valley springfish* was introduced outside of their historical range in private ponds at Sodaville and are thought to no longer exist. Habitat requirements are similar to the Hiko White River springfish.

Sierra Nevada yellow-legged frog. Since the Nevada list of BLM sensitive species was released in 2011, the mountain yellow-legged frog (Sierra Nevada DPS) is now recognized as the Sierra Nevada yellow-legged frog and is now an endangered species (24256, Vol. 79, No. 82). There are no Sierra Nevada yellow-legged frogs in Nevada; they occur in Alpine County, California on U.S. Forest Service land.

The *western yellow-billed cuckoo* is a long-distance neotropical migratory bird that requires large blocks of habitat along river corridors for breeding. It nests almost exclusively in low to moderate elevation riparian woodlands. Cottonwood and willow stands are often used for nesting. Their diet consists of insects, and to a lesser extent frogs, lizards, fruit and seeds. In the CCD, it occurs along the Carson River near the Lahontan Reservoir. On August 15, 2014, the USFWS issued a proposed rule in the *Federal Register* to designate critical habitat (PCH) (48548 Vol. 79 No. 158). Approximately 83 acres of PCH occurs within the CCD along the Carson River.

3.1.9 Soils

Many resources and resource uses depend upon suitable soils, indicating that soil attributes, conditions, and management are important to management decisions. Resources and resource uses dependent upon suitable soils include livestock grazing, wild horse and burro management, wildlife habitat designation, water quality, ROW authorizations, mineral entry, recreational uses, and travel management designations.

When making decisions based on soil-related hazards or limitations or when making management decisions that would likely affect soil resources, the CCD evaluates soil surveys available from the Natural Resource Conservation Service (NRCS). Through conducting soil surveys the NRCS has classified soils into map units using the boundaries of Major Land Resource Areas, which are geographically associated land resource units that share common characteristics related to the physiography, geology, climate, water resources, soils, biological resources, and land uses (NRCS 2009). Each soil map unit consists of an individual soil or a group of soils with similar soil formation. A soil map unit consists of soils that are grouped

together based off similar physical and chemical characteristics and an association with a particular kind of landform. Soil series are grouped together based on soil characteristics that are described through chemical and physical properties, range of elevation, climate, runoff capabilities, erosion hazards, associated native vegetation, wildlife habitat use, and suitability for community development.

Third-order soil surveys provided by the NRCS cover most of the CCD. These surveys indicate that there are over 7,000 different soil units within CCD, which is the result of varying climatic, vegetative, topographic, and geographic conditions. Key landscape characteristics in the CCD include dunes, playas, deflation basins, cavernous weathering, angular slopes (with and without coarse debris), arroyos, pediments, fans, and badlands. Badlands were formed by geomorphic processes predominately found in arid and semiarid systems (NDOW 2012b). Common processes on the landscape include desiccation, wind action, running water, mechanical weathering, and rapid mass movements.

The BLM manages uplands within the CCD. These areas tend to have steep slopes, high drainage densities, high relief, and high ruggedness, which increases erosion rates. When coupled with the climate patterns experienced in the CCD, which include an intense rainfall regime, these characteristics can lead to high sediment loads and run-off rates during storm events. The development of top soil is a slow process in the semi-arid environment of the CCD, and if washed away during a storm event can lead to denuded soils. Denuded soils are susceptible to erosion and headcutting. Headcutting in stream or spring/seep systems ultimately results in draining source water.

Soils in the CCD are classified by the NRCS as Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols. These are soil orders or groupings soils at the broadest level of classification. A majority of the soils in the CCD are Aridisols. Aridisols are characterized by a lack of water and/or accumulation of salts, and contain less organic matter than Mollisols. Due to the low organic matter accumulation in Aridisols, their ability to filter, store and process herbicides is limited to the mineral soil properties of the upper soil layers.

Aridisols are also highly susceptible to wind erosion if they become barren, as they have extremely high average (78 percent) sand content. Elsewhere, these soils exhibit moderate to low susceptibility to wind erosion if protected by vegetation. As with Mollisols, a clay layer may be present in some Aridisol soils. The clay layer indicates a much wetter climatic regime sometime in the past when these soils were formed. Clay layers provide a good binding and degradation mechanism to herbicides; however, they are found lower in the soil profile on these soil orders.

In some Mollisol soils, a clay layer is present, indicating sufficient moisture was present at some period to cause clay movement and accumulation. Clay content influences not only permeability rates, but also the movement and fate of herbicides through the soil profile.

Other soil orders present in the CCD include the geologically young, undeveloped to minimally developed Entisols and Inceptisols. These soils are found primarily on alluvial flats and low lake terraces and floodplains. Inceptisols and Entisols are highly susceptible to wind erosion, as are

the Aridisols throughout the CCD. This may be due to the higher average percent of silt that composes most of these soils. There are also some areas of Vertisols that are very heavily clay-laden. That may help bind herbicides but also has cracking and movement problems that may make herbicide application difficult.

Soil parameters, including average percentages for sand, silt, clay and organic matter contents, are the most informative for the determination of soil effects from soil disturbance, applications of chemicals, or use by machinery or animals, and are thus carried forward in the following analysis.

Invasive plant populations are located on all soil types previously described. It is well established that some invasive plants favor particular environments or specific soil types to germinate, grow, and reproduce (NRCS 2014). For example, Medusahead rye appears more commonly on shrink-swell clay soils, Canada thistle favors deep moist soils, and whitetop prefers soils with neutral to alkaline pH and disturbed sites including excessively grazed areas. Other species such as cheatgrass prefer a wide range of well-drained soil textures, but are not well adapted to saline, sodic, or poorly drained soil conditions (NRCS 2014). Documented and observed invasive plant sites on the CCD tend to support these data.

Biological crusts are a combination of bacteria, algae, mosses, and lichens. They have a complex distribution as each individual component may have different abilities to colonize and utilize a particular soil area. Distribution is a function of seven factors that interrelate with one another: elevation, soils and topography, disturbance, timing of precipitation, vascular plant community structure, ecological condition, and microhabitats (BLM 2001a). Vascular plant cover precludes their growth and total crust cover decreases with increased elevation. Crust cover is also highest when soil depth is shallow and soil texture is fine. Stable or embedded rocks near or at the soil surface can increase the percent crust cover by perching water and armoring the surface from physical disturbances.

Biological soil crusts are identified throughout the CCD. Also known as cryptogamic, cryptobiotic, microbiotic, or microphytic soil crusts, they are found on Aridisols, Mollisols, and Inceptisols. They do not appear on Entisol soils, as these soils tend to be too sandy or unstable for crust development. The most critical physical factor for biological soil crust establishment is the presence of fine-textured surface soils such as silts, silt loams, and non-shrink/swell clays (BLM 2001a). Other factors that determine biological soil crust presence and development include, but are not limited to dominant shrub type, herbaceous plant density and form, annual precipitation, historical fire return, and current ecological condition. The CCD is dominated by plant communities that have a high potential for biological soil crust cover. However, sites where vegetation structure has been modified due to noxious and invasive weeds would have reduced potential for biological crusts. The actual extent of biological soil crusts in the CCD has not mapped.

Biological soil crusts contribute to soil stabilization by reducing wind and water erosion of soil surfaces. Biological soil crusts play an important part in ecosystem processes, such as carbon and nitrogen fixation, soil-water evaporation, seed germination time, and seedling growth rates. In addition to holding soil in place and restricting the amount of erosion, biological soil crusts

also influence the type of material eroded from the soil. Laboratory studies showed that water erosion resulted in the erosion of mainly fine soil particles (silt and clay) from a sparsely covered crust surface, while the extensively covered surface lost only coarse sand Since most soil nutrients are bound onto the silts and clays, the loss of these fine particles represents a reduction in soil fertility and hence, productivity. Wind erosion would be expected to have similar erosional effects (BLM 2001a).

3.1.10 Livestock Grazing

For BLM-managed lands, the foremost authority that provides for grazing on public land is the Taylor Grazing Act. This act was passed on June 28, 1934, to protect public rangelands and their resources from degradation, to provide an orderly use to improve and develop public rangelands, and to stabilize the livestock industry. Following various homestead acts, the Taylor Grazing Act established a system for allotting grazing privileges. The FLPMA and the Public Rangeland Improvement Act of 1978 also provide authority for managing grazing on public rangelands.

Within the CCD, there are 93 allotments covering approximately 4,796,000 acres (Figure 6). The allotments vary in size from 120 to 512,449 acres of public lands. In 2011, 82 percent of the permits were for cattle, and sheep and horse grazing accounting for the remaining 18 percent of allotments. Appendix C provides information on the size of each allotment.

Grazing within the CCD occurs throughout the year, with much of the use concentrated during winter and spring months. Summer use allotments are commonly found at higher elevations, while winter use allotments are primarily located in lower elevations associated with an arid climate. The elevation and ecological site present on any given allotment plays a significant role in determining the grazing season and system most appropriate for that allotment. Higher-elevation sites are often more able to provide for summer grazing, while lower-elevation sites are often well suited for winter grazing (BLM 2014).

3.1.11 Wild Horses and Burros

Wild horse and burro management within BLM-managed lands of the CCD follows the Wild Free-Roaming Horses and Burros Act of 1971 (Public Law 92-195) and 43 CFR Part 4700 – Protection, Management and Control of Wild and Free-Roaming Horses and Burros.

The general management objectives for wild horses and burros are to protect, maintain, and control viable, healthy herds while retaining their free-roaming nature; provide adequate habitat through the principles of multiple use and environmental protection; maintain a thriving natural ecological balance with other resources; provide opportunities for the public to view wild horses and burros; and protect wild horses and burros from unauthorized capture, branding, harassment, or death.

There are 17 HMAs in the CCD supporting wild horses or burros, comprising approximately 1,367,685 million acres. The CCD has seven HMAs that extend beyond the CCD boundary and the CCD is the lead BLM district, for a total of 2,083,272 acres (Figure 5). A brief description for each HMA is provided in Appendix D.

3.1.12 Area of Critical Environmental Concern

An Area of Critical Environmental Concern (ACEC) is defined in the Federal Land Policy and Management Act (FLPMA) (Public Law 94-579, Section 103[a]) as an area on BLM-managed lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, geologic, paleontological, or scenic values, to fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards. There are six ACECs on approximately 21,800 acres of BLM-managed land in the CCD (Figure 7). A brief description for each ACEC is provided below.

The *Carson Wandering Skipper ACEC* is a 330-acre site approximately 25 miles north of the Reno-Sparks area along Winnemucca Ranch Road. The significance of this site revolves around the federally endangered Carson wandering skipper, a small butterfly that occupies grassland habitat on alkaline substrate in California and Nevada.

The *Incandescent Rocks ACEC* is a 1,072-acre site located in southern Washoe County approximately 25 miles north of the Reno-Sparks area and five miles west of Pyramid Lake. The significance of the site centers on the rhyolitic outcrops and ridges that are characterized by red, yellow, orange, and purple hues that appear to fluoresce or glow as light reflects off the walls.

The *Pah Rah High Basin (Dry Lakes) Petroglyph ACEC* is a 3,881-acre site north of Highway 80 East and approximately six miles northeast of Sparks, Nevada. The significance and relevance of this site is primarily cultural but also includes historical and scenic values. Evidence indicating the site was used by Native Americans for over 3,500 years includes petroglyphs, rock rings, stone artifacts, as well as seasonal and residential camps. This site is culturally significant to both the Washoe and Northern Paiute tribes.

The *Steamboat Hot Springs Geyser Basin ACEC* is a 80-acre site northeast of Washoe Lake and 0.5 mile west of Highway 395 between Carson City and Reno. The ACEC was established to protect and interpret the unique geyser field and related thermal features found at Steamboat Hot Springs. At one time, the geysers were considered to be the third most active geyser area in the U.S., but the formerly active geysers have reportedly become inactive resulting in the cessation of hot water flowing upon the surface. Steamboat Hot Springs also contains the federally endangered Steamboat buckwheat, and the BLM sensitive species altered andesite buckwheat. Both species are restricted to substrates derived from hot springs deposits in the Steamboat Hills.

The *Stewart Valley ACEC* is a 16,000-acre paleontological site in the east-central part of Mineral County. The site is situated within a basin formed by the uplifted fault-block system typical of the Basin and Range physiographic province. The ancient lake bed that was formed by the uplifting is filled with sediments from the Miocene age and includes fossil specimens of mammals, clams, snails, fish, insects, pollen, and leaves.

The *Virginia Range Williams Combleaf ACEC* is a 473-acre site northeast of Washoe Lake two miles east of Highway 395 between Carson City and Reno. This site was established for the Williams combleaf, a plant of the mustard family that is a BLM sensitive species. Essential habitat encompasses barren sandy or clay soils around the margins of seasonal pools or lakes (BLM 2014).

3.1.13 Wilderness Study Areas

In 1964, Congress passed the Wilderness Act, thereby establishing a national system of lands for the purpose of preserving a representative sample of ecosystems in a natural condition for the benefit of future generations. Until 1976, most land considered for, and designated as, wilderness was managed by the National Park Service and Forest Service. With the passage of the FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend BLM-managed lands under its administration that should be designated wilderness. Until Congress acts on the recommendations and either designates them as wilderness or releases them for other uses, these areas are managed according to BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012a) to preserve their wilderness values. Activities that would impair wilderness suitability are prohibited in WSAs.

There are six primary provisions in FLPMA with regard to management of WSAs:

- WSAs must be managed so as not to impair their suitability for preservation as wilderness;
- Grazing, mining, and mineral leasing uses that existed on October 21, 1976, may continue in the same manner and degree as on that date, even if this would impair wilderness suitability of the WSAs;
- WSAs may not be closed to appropriation under the mining laws to preserve their wilderness character;
- Valid existing rights must be recognized; and
- WSAs must be managed to prevent unnecessary or undue degradation.

BLM Manual 6330 includes the following guidance with regards to the control of non-native species:

- Non-native vegetation that interferes, or has the potential to interfere, with ecosystem processes or function (e.g. non-native annual grasses), or illegally cultivated plants (e.g. marijuana), may be controlled using the method or combination of methods known to be effective, while causing the least damage to non-target species. Reseeding or planting of native species may be done following weed treatment and fire or other natural disaster as needed where natural seeding is not adequate and to prevent non-native vegetation from becoming dominant; and
- The BLM will prohibit, to extent practicable and permitted by Federal law, the introduction of any non-native species into WSAs. Exception to this may be made for threatened or endangered species or the rare circumstances where the BLM determines that the benefits from an introduction of a non-native species clearly outweigh the potential harm – for example biological controls to eradicate non-native plants.

All treatments in WSAs would be consistent with pages 1-43 through 1-48 of BLM Manual 6330. Nine WSAs lie partially or completely within the CCD (Figure 8). A brief description of each WSA is provided in Appendix E.

3.1.14 Lands with Wilderness Characteristics

The authority to inventory BLM-managed lands for wilderness characteristics (LWC) is found in Sections 201 and 202 of FLPMA. An area with wilderness characteristics may also contain other values not necessary for the determination of wilderness character. These supplemental values including the following:

- *Size*: An area must be a roadless area of 5,000 acres of contiguous BLM-managed lands, or if less than 5,000 acres, must be contiguous with BLM-managed lands that have been formally determined to have wilderness or potential wilderness values.
- *Naturalness*: Lands and resources exhibit a high degree of naturalness when affected primarily by the forces of nature and where the imprint of human activity is substantially unnoticeable.
- *Outstanding Opportunities for Solitude or Primitive and Unconfined Types of Recreation:* Visitors may have outstanding opportunities for solitude or primitive and unconfined types of recreation when the sights, sounds, and evidence of other people are rare or infrequent where visitors can be isolated, alone, or secluded from others; where the use of an area is non-motorized, non-mechanical means; and where no or minimal recreation facilities are encountered.
- *Supplemental Values*: The area may contain ecological, geological, or other features of scientific, educational, scenic, or historical values.

Table 11 is the CCD list of identified LWC units that contain wilderness characteristics (Figure 9). A final determination of management actions for each LWC unit would be made as a part of the on-going land use plan revision.

Table 11. Units Inventoried for Wilderness Characteristics.

Unit Identifier	Acres with Wilderness Characteristics
NV-030-402	27,200
NV-030-405	29,100
NV-030-425	54,400
NV-030-430	49,200
NV-030-520	16,300
NV-030-517	39,800
NV-030-120, 116, 117	77,400
NV-030-104	19,100

Source: Modified from BLM 2014.

For more information see the *Report on Lands with Wilderness Characteristics* (BLM 2014b).

3.1.15 Cultural Resources

The CCD contains archaeological evidence of habitation and use for at least the past 11,000 years. For most of this vast period of time, the ancestors of today's Native American tribes occupied the area that is now the CCD. Only within the last 170 years have other cultures come to use this landscape, often in great numbers and for a variety of reasons. Whereas less than 10,000 people lived in the CCD in 1800, today's population totals more than 600,000. Throughout time, the range of human activities has been bound by the constraints of climate,

weather, geology, hydrology, landform, and the plants and animals that adapt to the local conditions.

At this time, the vast majority of the recorded cultural resources on the land administered by the CCD are archaeological sites. At present, less than 500,000 acres, about 10 percent, of the land administered by the CCD have been inventoried for cultural resources, although many older inventories do not meet modern standards. Cultural resources surveys have led to the documentation of approximately 9,000 prehistoric and historic archaeological sites. Only a few sites have been formally nominated for listing on the National Register of Historic Places (NRHP), but many more have met the eligibility criteria or have not been evaluated for inclusion in the NRHP.

Western Great Basin cultural resource sites are often exposed on eroded soils and geology that lack dense vegetation. Accretion of sediment is generally slow. Areas of exception, such as the floodplains of the perennial drainages and of the Truckee, Walker, and Carson rivers, are not typically public lands, but privately or tribally held. Therefore, as a result of desert climate conditions throughout the period of human use, prehistoric- and historic-era sites are typically visible on the surface. Because of their visibility, the distribution of known sites can be accurately gauged. Known site numbers, densities, and periods of use vary for historic-era and prehistoric sites, and the sites are unevenly distributed across the landscape.

Some regions are dominated by historical sites with remains that include collapsing and ruined buildings, structures, equipment and other artifacts and features that are visible on or above the present ground surface. These sites occur at and around the historic mines that are throughout the CCD. Between the initial boom of mining in the 1860s to the advent of automobiles, settlement generally occupied a similar location as the place searched for ore. Supporting towns, ranches, and agriculture followed a pattern that left cultural resource remains in specific valley landscapes and corridors. Therefore the vast majority of historic-era sites and historic properties are in and around areas of modern or abandoned towns, mines, and ranches (BLM 2013).

3.1.16 Native American Religious Concerns

The CCD manages public lands within the aboriginal territory of people identified based on commonality and differences in language and culture as Washoe, Northern Paiute, and Western Shoshone. Six tribal governments have reservations within the CCD and four additional tribes hold reservation lands beyond the CCD boundary. Each of the 10 groups is a federally recognized Indian Tribe. Each tribe, as well as the California Native American Heritage Commission and the Inter-Tribal Council of Nevada, maintains a general concern for protection of and access to areas of traditional and religious importance, and the welfare of plants, animals, air, landforms, and water on reservation and public lands. Table 12 includes the geographic area(s) that CCD utilizes for consulting with tribal leaders and staff, recognizing that each tribe's ancestral use area(s) may extend beyond the listed locations.

Table 12. Tribal Reservations Within and Near the CCD.

Tribe	Cultural Division(s)	General Location	CCD Geographic Area of Specific Concern
Bridgeport Paiute Indian Colony	Northern Paiute	Mono County, California (outside of CCD)	Southern Lyon and Western Mineral Counties
Fallon Paiute-Shoshone Tribe	Northern Paiute and Western Shoshone	Churchill County, Nevada	Northeastern Lyon and Western Churchill Counties
Lovelock Indian Colony	Northern Paiute	Pershing County, Nevada (outside of CCD)	Northern Churchill County
Pyramid Lake Paiute Tribe	Northern Paiute	Washoe, Storey and Lyon Counties, Nevada	Northern Storey and Northern Lyon Counties; Washoe County north of I-80
Reno-Sparks Indian Colony	Northern Paiute, Washoe, Western Shoshone and other Tribes	Washoe County, Nevada	Northern Storey County and Washoe County from Truckee Meadows north
Susanville Indian Rancheria	Northern Paiute, Washoe, Atsugewi, Achumawi and Maidu	Plumas County, California (outside of CCD)	Plumas, Lassen, and Sierra Counties (California); Washoe County west of Peterson Mountain and north of Fort Sage Mountains
Walker River Paiute Tribe	Northern Paiute	Churchill, Lyon, and Mineral Counties, Nevada	Eastern Lyon, Western Churchill, and Northern Mineral Counties
Washoe Tribe of Nevada and California	Washoe	Alpine County, California; Carson City and Douglas Counties, Nevada	Alpine, Plumas, Lassen, and Sierra Counties (California); Washoe County west of Virginia Mountains; Carson City and Storey Counties; Douglas and Lyon Counties west of the Pine Nut Mountain crest
Yerington Paiute Tribe	Northern Paiute	Lyon County, Nevada	Lyon, Southern Storey, and Eastern Douglas Counties
Yomba Shoshone Tribe	Western Shoshone	Nye County, Nevada (outside of CCD)	Eastern Churchill, Eastern Mineral, and Western Nye Counties

Source: BLM 2014

In the CRMP, "the view of Native Americans would be considered prior to BLM decisions or approvals that could result in changes in land use, physical changes to lands and resources, changes in access, or alienation of lands." This captures some of the intent of current laws, regulations and policies; it does not describe the means for identifying and managing traditional and sacred sites, or for obtaining and utilizing the perspective of tribal people.

Each tribe maintains interest in specific cultural and traditional resources, tribal access locations, and heritage properties. Tribal concerns within the CCD may include, but are not limited to, specific places on the landscape where spiritual and ceremonial events occur or have previously occurred, known and unknown burial and cemetery sites, pre-contact or historic-era cultural resources, hot springs and geysers, and localities with difficult–to-find or special plant, animal, or mineral resources.

All tribes in the CCD have interest in access to ranges that contain pinyon pine nut gathering locations. This includes the Pine Nut Mountains, Desatoya Range, Stillwater Range, Clan

Alpine Mountains, Wassuk Range, and Virginia Range, and ranges beyond the CCD. Due to the 3-5 year cycle of nut production, the tribal members go where there are pine nuts available, and specific locations that yield pine nuts one year would not be the location of use the following few years. Gathering includes both green and ripe cone harvesting. Some ranges, such as the Virginia and Flowery Ranges, have been used historically but changes to land status and fire management have reduced the potential for using these locations for pine nut gathering (BLM 2013).

3.1.17 Air Quality

Air quality and the emission of air pollutants are regulated under both federal and Nevada law. The federal Clean Air Act (CAA) requires the US Environmental Protection Agency (EPA) to identify national ambient air quality standards (NAAQS). The CAA also requires EPA to place selected areas within the United States into one of three classes, designed to limit the deterioration of air quality.

Nevada is one of the few states without their own Clean Air Act. Areas that are classified as non-attainment by the EPA are required to prepare and implement a State Implementation Plan (SIP) that identifies and quantifies sources of emissions and presents a comprehensive strategy to control and reduce locally generated emissions. The EPA has summarized Nevada's emission sources in a map based on 1996 principle pollutant data. The map highlights volatile organic compounds (VOC) and nitrogen oxides (NO_x) sources (http://www.epa.gov/air/emissions/where.htm).

Washoe County is non-attainment for Carbon Monoxide (CO). In 2008, the EPA approved Nevada's SIP intended to provide for attainment and maintenance of the carbon monoxide NAAQS and approved Nevada's request to re-designate the Truckee Meadows carbon monoxide non-attainment area to attainment.

Air quality within the region can be analyzed based on pollutant levels in the air; visibility across Nevada's expansive vistas; and pollutant deposition that affects soils, streams, and lakes. The CAA places restrictions on impacts on air quality and visibility within Class I and II areas. Class I areas consist of many national wildlife refuges and most national parks and designated wilderness that existed when legislation was enacted in 1977. Class II areas include most other western public lands. Little degradation of air quality is allowed in Class I areas; less stringent requirements apply to Class II areas. There are no Class I areas in the CCD; the nearest Class I areas are the north/south spine of the Sierra Nevada mountain range. The CCD receives minimal air pollution from California, except for wildfire smoke that can be intense for short periods of time. The jet stream or air flow patterns generally come from the south and west across the CCD and continue up and out into the Great Basin. It is common for Carson City and Reno to experience low visibility days from wildfires in Northern California, i.e. Yosemite National Park, El Dorado National Forest, or Tahoe National Forest.

CCD has no national parks and designated wilderness that existed when the Clean Air Act was enacted in 1977, nor are any Class I areas nearby for potential impacts on strict ambient air quality standards. In 2010, ambient air in Washoe County was in serious non-attainment for PM_{10} (large particulate matter), attainment for $PM_{2.5}$ (small particulate matter) and CO, and unclassifiable for O_3 (ozone), NO_2 (nitrogen dioxide), and Pb (lead). Sulfur dioxides (SO_2) were better than

national standards (Washoe County, Nevada Air Quality Trends [2001-2010], 2011). All other counties within the CCD are within attainment levels.

3.1.18 Human Health and Safety

People living in Washoe, Carson City, Storey, Lyon, Mineral, Churchill, Nye and Douglas counties in Nevada, and Alpine, Plumas and Lassen counties in California are exposed to a variety of risks common to the U.S. as a whole, including automobile accidents and other injuries; contaminants in the air, water, soil, and food; and risks from smoking, alcohol and various diseases. Risks to workers may differ from those facing the public, depending on the nature of a person's work. Some of these risks may be quantified, but a lack of data allows for only a qualitative description of certain risks.

Despite the difficulties in establishing correlations between work conditions and disease, only certain illnesses have been linked to occupational hazards in National and State-level studies. For example, asbestosis and lung cancer among insulation and shipyard workers has been linked to their exposure to asbestos (CDC 2014). Pneumoconiosis among coal miners has been correlated with the inhalation of coal dust. Occupational exposures to some metals, dusts, and trace elements, carbon monoxide, carbon disulfide, halogenated hydrocarbons, nitroglycerin, and nitrates can result in increased incidence of cardiovascular disease. Neurotoxic disorders can arise from exposure to a wide range of chemicals, including some pesticides. Dermatological conditions like contact dermatitis, infection, trauma, cancer, vitiligo, urticaria, and chloracne have a high occurrence in the agricultural, forestry, and fishing industries.

The five most common causes of death in the U.S., is heart disease, cancer, cerebrovascular disease (stroke), respiratory disease, and accidents.

Nationwide, the chance of developing some form of cancer during one's lifetime is estimated to be about one in three (CDC 2005). There are many causes of cancer development, including genetic, viral, and occupational exposure to carcinogens, environmental contaminants, and substances in food. In the U.S., one-third of all cancers are attributed to tobacco smoking. Work-related cancers are estimated to account for 4 percent to 20 percent of all malignancies. It is difficult to quantify the information because of the long time intervals between exposure and diagnosis, personal behavior patterns, job changes, and exposure to other carcinogens. The National Institute for Occupational Safety and Health has reported that approximately 20,000 cancer deaths and 40,000 new cases of cancer each year in the U.S. are attributable to occupational hazards. Millions of U.S. workers are exposed to substances that have tested as carcinogens in animal studies (CDC 2009).

Nationwide, cancer accounts for approximately 24 percent of all fatalities (CDC 2007). Generally, males have higher rates of cancer mortality than females, and African Americans have higher rates than Caucasians.

3.1.19 Visual Resources

Visual resources are the visible physical features on a landscape, such as land, water, vegetation, animals, and structures. Through its visual resource management (VRM) classification, the BLM ensures that the scenic values of public lands are considered before authorizing uses that

may result in adverse visual impacts. The visual resources and aesthetics information below provide a baseline for analyzing potential impacts as a result of the Proposed Action. Management objectives for the VRM classifications are described below:

- Class I Objective: "To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention."
- Class II Objective: "To retain the existing character of the landscape. The level of change to the characteristic landscape should be low."
- Class III Objective: "To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate."
- Class IV Objective: "To provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high."

The visual contrast rating stage involves determining whether or not potential visual impacts from proposed surface-disturbing activities or developments would conform to management objectives established for the area or whether project design adjustments would be required. Using the analysis from the visual contrast rating worksheet as a guide, developers can reduce visual impacts caused by a project (BLM 2003). VRM classes and their associated resource management objectives apply only to public land. According to BLM Manual 6330, Managing for Wilderness Study Areas (2012), "All WSAs should be managed according to VRM Class I management objectives until such time as Congress decides to designate the area as wilderness or release it for other uses." Table 13 shows the VRM classes for CCD lands categorized as Class I, II, III, or IV and undesignated lands as follows:

Table 13. VRM Classification in the CCD.

Class	Acres	% of CCD Lands
I	564,100	12
II	38,300	<1
III	320,600	7
IV	385,700	8
Undesignated	3,494,900	72

Source: BLM 2014.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential direct, indirect, and residual effects to resources that may result from the Proposed Action or No Action Alternative, as well as identifies the potential monitoring needs associated with the specific resources. In this document, the terms "effect" and "impact" are used synonymously.

4.1.1 Noxious and Invasive Weeds

Proposed Action

Under the Proposed Action, the CCD would implement mechanical, manual, biological, chemical and prescribed fire treatment of noxious and invasive weeds.

Effects from Mechanical Treatments

Mechanical methods include weed whackers, chainsaws, and mowing, including flail mowing and boom mowers. Some of these methods (e.g., chainsaws and weed whackers) can be more target-specific than others; all methods share some of the drawbacks that manual methods do (e.g. need of repeat treatment, disturbed vegetation and soil disturbance can promote weed spread, disturbance to non-target species, etc.). Weed whacker methods are common in recreation sites, as the area would not need to be closed for re-entry intervals as they would with herbicide application. Mowing is often used at communication, storage, and administrative sites to prevent invasive plants from becoming a fire hazard. When using mechanical and manual methods, all equipment and clothing is normally cleaned and inspected before being moved off-site. This lessens, but does not eliminate, the possibility of spreading invasive plants to the next worksite.

Effects from Manual Treatments

Manual methods (such as pulling, digging, and grubbing weeds) can be used to control some noxious and invasive weeds, particularly if the population is relatively small. Grubbing is often used when a single plant is found. These techniques can be extremely target-specific, minimizing damage to adjacent desirable plants, but they can be labor and time intensive. The CCD would use manual control for many small biennial or annual species such as musk thistle, Scotch thistle, and Mediterranean sage. Treatments must typically be administered several times annually to prevent the invasive plant from re-establishing. In the process, laborers may trample vegetation and disturb soil, providing isolated but nevertheless prime conditions for re-invasion by the same or other noxious or invasive weeds. Manual techniques can be effective for small infestations and/or where a large pool of labor is available. They can be used in combination with other techniques; for example, when shrubs are pulled and cut, re-sprouts and seedlings can be treated with herbicides or fire several weeks or months later (Tu et al. 2001).

Effects from Biological Treatments

Biological control agents are host specific organisms (mostly insects but can also be bacterium, nematodes, mites, or pathogens) that target noxious and invasive weeds and reduce their reproduction and vigor. Biological control agents typically help keep the plant in balance when they occur in the original native community from where the weed(s) originated. Absence of these natural community controls is often what allows weed to spread and become invasive in its new habitat. Most of the species used for biological control are host-specific and are not known to attack non-target species. Biological controls would seldom remove an invasive plant

entirely, but can dampen its reproduction, spread and extent, and keep it in some sense of balance compared to other plants in that community. Biological controls are usually acquired from the same alien ecosystems as the target invasive plant originated, and so are vigorously tested by the APHIS to ensure that they are not likely to become pests themselves. Since the biological control agents are not successful unless there are enough noxious and invasive weeds for them to feed upon, typically only large sites are targeted. Once large populations become unmanageable, other methods of control are not always economical or physically possible.

Effects from Chemical Treatments

The use of herbicides could effectively control all of the types of noxious and invasive weeds known to be within the CCD for habitat protection and large-scale rehabilitation projects. Non-herbicide methods could be more focused where they are effective, or used in conjunction with herbicides; thus, treatments under the Proposed Action could be more focused where they are most effective.

Containing existing infestations and preventing them from spreading would be the highest priority for most of the noxious and invasive weeds. The second priority would be restoring areas dominated by annual grass species to native or more favorable species, which would create a more weed resistant (and fire resistant) landscape. An ecologically-based approach to weed management would help rehabilitate currently infested areas and would decrease the rate of spread overtime.

A wide range of herbicides would help prevent herbicide resistance by using chemicals that control the plants through different mechanisms (sites) of action. Herbicide resistance is the inherited ability of a noxious or invasive weed to survive an herbicide application to which the original populations were susceptible. Naturally resistant plants occur within a population in extremely small numbers. They differ slightly in genetic makeup from the original populations, but they remain reproductively compatible with them. The repeated use of one herbicide, or of herbicides that kill the plants the same way (same mechanism or site of action), allows these few plants to survive and reproduce. The number of resistant plants then increases in the population until the herbicide no longer effectively controls it. The range of herbicides available under this IWMP would permit more effective rotation of herbicides, that when coupled with integrated invasive plant management, would help prevent the development of herbicide resistance. Many of the ALS-inhibitors (such as chlorsulfuron and metsulfuron methyl) recommend tank-mix partners and/or sequential herbicide application that have different mechanisms of action.

Effects from Prescribed Fire Treatments

Like other treatments, timing is critical and is dependent on characteristics of the noxious or invasive weeds, desirable plants, soil moisture, and environmental conditions. Prescribed fire used in conjunction with other weed treatment methods may increase the effectiveness to control or eradicate a noxious or invasive weed species. Fire can cause an increase those weeds that are fire tolerant or vigorously re-sprout. When carefully used it can be used to reduce vegetative cover prior to the application of herbicides, increasing the delivery of the herbicide to the target species. Successful revegetation efforts may involve the use of prescribed fire, followed by herbicide application, and reseeding.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments would be substantially similar to the Proposed Action. The use of mechanical and chemical treatments would continue to be used to treat infestations in the CCD. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. The number of acres treated in the CCD under the No Action Alternative would likely be less than under the Proposed Action.

4.1.2 Vegetation

This effects summary is compiled from the PEIS, pages 4-33 through 4-58, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to non-target vegetation.

Proposed Action
Effects from Mechanical Treatments
Mechanical treatments would injure or kill plants by removing some or all of the plant material on the treatment site. Mechanical treatments are typically selective and would minimize damage to non-target plants present at the treatment site. Mechanical methods are often followed up with herbicide treatments, because the machinery can spread seed and not kill roots.

Methods that remove entire plants by plowing or cutting roots would cause the most mortality to non-target plants, limiting their ability to recover without seeding. In many cases, revegetation would be required after treatments to ensure the recovery of the plant community and limit the invasion of the treated site by non-native species. Thus, mechanical treatments associated with revegetation, such as drill-seeding, would typically have both short-term and long-term positive effects by aiding in the recovery of native plant communities on a treated site. Methods that remove only aboveground plant biomass (e.g., mowing) would have few lasting effects on native plant communities, as non-target species would typically be able to recover quickly by resprouting.

Herbaceous plants would typically be more resilient to top-removal treatment methods, as many of these species die back annually. Growth of herbaceous plants often increases after mechanical treatments as a result of reduced competition with woody species for light, nutrients, and water. Treatments occurring during the growing period and prior to seed maturation and dispersal would have the greatest potential effects on herbaceous species.

The use of vehicles and other mechanical equipment could negatively affect native plant communities by bringing the propagules of non-native species into treatment sites and creating sites for weed establishment. In addition, repeated mechanical treatments, or treatments that remove large areas of vegetation, could adversely affect native communities by altering species composition.

Effects from Manual Treatments

Manual treatments would generally benefit native plant communities on public lands, without the risks of adverse effects to non-target species associated with most of the other treatment methods. Manual methods are highly selective, causing injury and mortality only to target plants/fuels, and because of their high cost, would only be used in limited areas where other treatment methods were not feasible. Most of the manual treatments would occur in evergreen shrublands and woodlands of the Temperate Desert Ecoregion, and in evergreen forests of the Mediterranean and Marine ecoregions. Manual treatments in evergreen forests would consist primarily of hand thinning by chainsaws to reduce stand densities and reduce hazardous fuels, and pruning to reduce ladder fuels. In all ecoregions and vegetation types, manual treatments could result in small amounts of trampling or accidental removal of non-target plants, particularly since repeated treatments are often required to prevent the reestablishment of aggressive weeds. There would also be minor risks associated with spilling oil and fuels from hand-held equipment, such as chainsaws, which could kill or harm plants. The overall effects to native communities, however, would be minimal and short term in duration.

Effects from Biological Treatments

Biological controls employ host-specific insects, pathogens, and disease that evolved with the target noxious or invasive weeds. These organisms are self-perpetuating and those that feed only on the target host are available for release. Available biological control agents do not attack native vegetation. They benefit native and other desirable plants by reducing the abundance and reproductive capacity of host noxious or invasive weeds, ideally reducing vigor, abundance, and density within a plant community. The effects are difficult to quantify as multiple factors such as weather patterns, climate, predators, and host availability affect biological control agent survival and impact to target noxious or invasive weeds.

Targeted grazing can effectively reduce the vigor and seed production of invasive plants, but is not likely to supply long-term control. Targeted grazing be used as a strategy to maintain or slow the spread of noxious and invasive weeds. Targeted grazing may be used to reduce foliage cover as a pre-treatment for use of chemicals. Multiple treatments from targeted grazing may increase risks to native vegetation by reducing vigor and invasive plant seed production of non-target species, and the ground disturbance can increase the opportunity for seed germination. These risks can be reduced by careful management of the timing of grazing. Alternately, disturbance from directed grazing could provide positive benefits by preparing a seedbed for seeding competitive native species.

Effects from Chemical Treatments

Herbicides have the potential to harm non-target plants. Some damage to non-target plant species from herbicide application is probable despite cautious planning and implementation. Herbicide impacts to non-target plants depend on (but are not limited to) the herbicide used, its selectivity, application rate, concentration, relative toxicity to the plants in the treatment area, likelihood of exposure, timing and method of application, environmental conditions during application, and plant stage of growth. Herbicide treatments affect non-target plants through direct application, overspray, off-site movement, and, potentially, accidental spills. Potential impacts include mortality, reduced productivity, and abnormal growth. Risk to off-site plants from spray drift is greater under scenarios with application from greater heights (i.e., aerial

application) or when air temperature or movement is high. Risk to off-site plants from surface runoff and movement through soil (leaching) is less likely; it is influenced by precipitation rate and timing, soil type, and application area.

However, measures taken to limit exposure such as selective application methods (e.g., spot applications, wiping and hand directed spraying), maximum and typical application rates (that are often less than the maximum allowed on the label, droplet size and drift reduction agents, and application restrictions based on environmental conditions (wind speed, precipitation, temperature, etc.), all reduce the off-target movement of herbicides. SOPs (Appendix A) are designed to minimize risk to non-target plants including crops.

Certain plants or groups of plants are more susceptible to specific herbicides, and collateral damage to non-target plants would depend upon their susceptibility to a particular herbicide. For example, 2,4-D, dicamba and picloram are selective and target broadleaf plants, so damage to perennial grasses would not be expected during normal use.

Herbicide treatments to control invasive plants would not affect plant communities to the extent that one community changes to another, although infestation of sagebrush communities by invasive annual grasses have caused conversions to grassland. Treatment effects to plant communities would typically relate to improvements in condition. Selective broadleaf herbicide applied aerially would have the most effect on forbs.

Effects from Prescribed Fire Treatments

Fire treatments would injure and kill plants, causing the most harm to species that are intolerant of fire, and in most cases benefiting fire-adapted or fire-dependent species. Fire would also stimulate the growth of certain plants, such as grasses and aspen. Many woody species would be top-killed by fire. Forbs, grasses, shrubs, and deciduous trees that have the capacity to resprout would be capable of recovering quickly. Some species readily reproduce from seed. Established perennial plants that can recover vegetatively would typically have a short-term competitive advantage over plants developing from seed because their well-developed root systems and stored energy reserves support rapid regrowth. Plants with growing points near the surface or dense growth at their base that concentrates heat (e.g., bluegrasses, Idaho fescue, and needle-and-thread grass) are more likely to be negatively affected by fire. Plants with their growing points protected by soil, such as perennial forbs and shrubs with deep roots, would generally respond more favorably to burning.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on vegetation would be substantially similar to the Proposed Action, although the CCD would likely treat fewer acres. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. The newly-approved herbicides may be more effective for use on noxious and invasive weeds, may be less toxic, or less likely to affect non-target plants. Under the No Action Alternative, the CCD would not use biological control agents such as insects, pathogens or targeted livestock grazing to

control noxious and invasive weeds, which can be effective in reducing a weed species competitiveness over time.

4.1.3 Wetlands/Riparian Zones

Proposed Action

This effects summary is compiled from the PEIS, pages 4-27 through 4-33, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to non-target vegetation.

Effects from Mechanical Treatments

Mechanical treatments would involve mowing, disking, and chopping. The effects of mechanical treatments on wetland and riparian areas would be related to the types and amounts of soil disturbance and vegetation removal, the proximity of the treatment to a wetland or riparian area, and the incidence of accidental spill.

Grubbing disturbs soil and can increase erosion, and thus may degrade aquatic habitat, especially when the treatment is performed on hillslopes. Erosion can be a problem on slopes greater than 20 percent. Thus, such mechanical methods would be avoided on steep hillslopes.

Chopping and mowing that mulches plant debris can aid in erosion control. Retention of a vegetated buffer between the treatment area and water could also reduce the risk of sedimentation and stabilize soils within an area. Emergent plants that are mowed as close as possible to the substrate to facilitate inundation of the stubble during the growing season, can be effective in reducing shoot density by 50 percent or more.

The use of heavy equipment can result in soil compaction, particularly in areas of moist soils that can increase surface runoff from the surrounding treated areas. Compaction by vehicles and other heavy equipment can reduce the porosity of soils, thus limiting water infiltration. The magnitude of effects to wetlands would depend on soil compaction and weather. One means to minimize the effect of heavy equipment on soil involves the use of tracked or low-pressure tires, which distribute vehicle weight over a larger area, thus reducing pressure on soil. Treatment by mechanical methods during dry months can also minimize the effects to wetlands by reducing the potential for surface water runoff into wetlands.

Spills resulting from fueling, equipment maintenance, and operation could adversely affect water quality and the health of wetland or riparian areas. These risks would be minimized by having provisions for incident response in the SOPs (Appendix A).

Effects from Manual Treatments

Manual treatments, which can target smaller areas, would be less likely to affect wetland and riparian areas than the other methods. 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. Typically, plant debris would be mulched and left on site. Fuel and lubricant spills that could result from using

chainsaws and trimmers would be contained or cleaned up before contamination spread to surrounding sensitive areas.

Effects from Biological Treatments

Although most biological control in wetlands and riparian areas would be accomplished using insects, there could be some use of livestock. The degree of effect to wetlands and riparian areas from treatments using domestic livestock 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. Temporary electric fencing, short-term use of a pasture, preconditioning livestock to encourage grazing of the targeted vegetation, and herding are examples of measures that could be taken to minimize impacts.

In most cases, these biological treatments would 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 would improve.

Effects from Chemical Treatments

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. Additionally, aquatic system herbicides are not species-specific, and the use of these herbicides may result in direct and indirect effects on wetland and riparian species diversity, competitive interactions, species dominance, and vegetation distribution. Herbicide applications could reduce plant cover leading to increased sedimentation, increased nutrient loading, alterations in native vegetation, and changes to temperature and hydrologic conditions. The effect of an herbicide's damage to non-target plants and the surrounding ecosystem can be evaluated by looking at its effects on: 1) species diversity; 2) functionality of the wetland or riparian area in terms of wildlife habitat, recreational use, or groundwater recharge; 3) forest product (e.g., timber, wood pulp) production; and 4) aspects affecting environmental quality (e.g., soil erosion, invasion of noxious weeds, creation of vegetative barriers).

An increase in soil erosion and surface water runoff could result from vegetation reduction near riparian and wetland areas, which could lead to streambank erosion and sedimentation (Ott 2000). The amount and likelihood of streambank erosion and sedimentation would be directly proportional to the size of the treatment area (i.e., larger treatment areas would have increased risk of streambank erosion and sedimentation). Additionally, sedimentation could result in a reduction in the acres of wetland and riparian habitat.

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. Some herbicides (e.g., sulfometuron methyl) that adsorb into soil particles

could be carried off-site, increasing their risk of affecting vegetation in wetlands and riparian areas.

Unintentional applications could have adverse effects for wetlands 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 wetlands and riparian areas and could damage non-target vegetation.

Effects from Prescribed Fire Treatments
The effect of fire on wetland and riparian areas would depend on the natural fire regime of the area, the time of year the fire occurred, and the extent of the fire. Fires can also consume or degrade peat soil, change the vegetation composition and structure of an area, and increase erosion and turbidity in wetlands. In general, prescribed fires would have fewer impacts than wildfires, as they are low severity and can be controlled to occur in one particular area.

Because of the high productivity of wetlands, and the density at which many wetland species occur (e.g., cattail), fuel loads are often considerably higher per unit area in wetlands than in uplands. In riparian areas where vegetation density is high, the potential for hotter, more extensive burns is elevated. High intensity fires could also kill large trees, with increases in stream flow and erosion as a result of vegetation loss.

Replacement of native vegetation by exotic plant species, many of which are highly flammable, can contribute to an increased incidence of fire in riparian areas. Tamarisk, giant reed, and annual grasses such as red brome all are highly flammable. The spread of many of these exotics is due in part to the same changes in stream flow regimes that render the riparian areas more susceptible to fire.

Fire intensity, magnitude, and behavior vary with the composition, density, and structure of local vegetation, litter depth, fuel loading and moisture content, soil composition, water table, and climate. As a result, fire may lightly char or slowly burn an area or may burn rapidly, resulting in crown-destroying burns, depending on the combination of these variables and site conditions

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on wetland/riparian zones would be substantially similar to the Proposed Action, however actual acres of treatments under the No Action Alternative would likely be less. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Risks to wetland and riparian plants from the use of newly-approved herbicides would be similar or lower than those approved for use in 2008.

4.1.4 Water Quality (Ground & Surface)
This effects summary is compiled from the PEIS, pages 4-20 through 4-27, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to water resources.

Proposed Action

Effects from Mechanical Treatments

The effects of mechanical treatments on water quality would largely depend on the techniques used to remove vegetation, the proximity of the treatment site to a stream or water body, and the slope of the site. The soil disturbance associated with machinery used to remove vegetation, such as grubbing, or rutting from wheels or tracks, would increase the likelihood of soil and plant material being carried into streams by surface runoff. In addition, the compaction of soil by heavy equipment would increase the likelihood of surface runoff by reducing the soil's infiltration capacity. However, leaving debris in place after treatments would limit the adverse effects on infiltration rates and sedimentation into streams. There would be risks to water quality associated with the use of heavy machinery or mechanized equipment used to treat vegetation, as fuel leaks and spills could occur. Releases of fuel would be more likely to affect surface water than groundwater, and would have the greatest effects to water quality if fuel was released directly into the water.

Effects from Manual Treatments

Because manual treatments would likely occur over small areas, and would involve minimal soil disturbance or vegetation removal, the effects to water resources would be minimal. Manual treatment seldom results in exposed soil, and plant materials would remain in the treatment areas, minimizing the risks of sedimentation and alterations to water flow. Precautions would be taken to minimize risks associated with the use of chainsaws or other power tools, including fuel spills.

Effects from Biological Treatments

Vegetation treatments using domestic livestock could affect water depending on the intensity and duration of grazing and the location of the treatment site relative to a given water body. Domestic animals can affect surface runoff as a function of trampling, soil disturbance, and soil compaction. In some cases, grazing may actually improve soil infiltration by breaking up physical crusts on the soil.

Livestock that graze in proximity to aquatic systems could affect water quality as a function of nutrient loading (e.g., nitrogen and phosphorous) and increase in bacterial and fecal coliforms. Furthermore, the nutrients found in livestock waste stimulate algal and aquatic plant growth when deposited directly or immediately adjacent to a water body. Although this plant growth can provide a food base for aquatic organisms, an excess of nutrients can stimulate algal blooms, which reduces water quality by lowering dissolved oxygen levels. The effects of grazing treatments on water quality would depend on the number of animals, the intensity of the program, and the proximity to surface water bodies.

There would be minimal effects to water resources as a result of introducing insects or pathogens into treatment sites. These agents typically kill target plants slowly, after which plants remain on the site, reducing the likelihood of surface runoff and sedimentation.

Effects from Chemical Treatments in Aquatic Systems

The application of herbicides to aquatic systems would not directly modify water quantity. Indirect effects to water quantity could occur if treatments that removed unwanted aquatic vegetation reduced plant uptake of water, increasing the amount of available water.

The BLM uses the following herbicides in riparian and aquatic habitats—2,4-D, glyphosate, imazapyr, triclopyr, diquat and fluridone. The remaining herbicides available to the BLM are registered for use only on terrestrial sites.

Herbicides applied to streams, ponds, and lakes for aquatic vegetation control could affect surface water quality if applied at concentrations that exceed label requirements. Based on the HHRA, there would be low risk to drinking water in areas treated with diquat, fluridone, glyphosate, or imazapyr, even if these herbicides were accidentally spilled in streams, ponds, or lakes used by humans. However, risk is moderate to high for drinking water if treated with 2,4-D or triclopyr.

Aquatic plant control can cause a high rate of plant decomposition and may cause rapid oxygen loss from water that can seriously degrade water quality. The magnitude of this effect depends on water temperature, lake or pond stratification, and the amount and rate of plant decomposition. The effects can persist from a few weeks to an entire growing season, but are generally not permanent.

Water quality degradation could result from removal of riparian vegetation and a reduction in shade. With the loss of shade, the resulting increase in surface-water temperature fluctuations may drive water temperature beyond tolerable limits for temperature sensitive fish and other aquatic species.

Effects from Chemical Treatments in Terrestrial Systems

The use of herbicides to remove vegetation could affect water quantity by altering the magnitude and frequency of base flows and the magnitude of peak flows. For some treatment areas, large-scale vegetation removal could improve groundwater recharge by limiting the amount of water lost through sublimation or plant evapotranspiration. In such cases, base flow, which is dependent on groundwater discharge, would increase. These changes could be very minor or short-lived if the vegetation did not evapotranspirate or sublimate large proportions of precipitation, or if areas were revegetated quickly.

In contrast to increasing base flows, vegetation removal could result in the reduction of groundwater discharge and reduced base flows as a function of reduced infiltration rates. Reduced infiltration rates result in more surface runoff reaching streams and lakes immediately after a rain event, thus increasing the velocity, frequency, and magnitude of peak stream flows. These changes in water quantity could alter the physical characteristics of stream channels. Any effects would persist until the sites were revegetated, unless channel characteristics were substantially changed during this period.

The four primary means of off-site movement of herbicides are runoff, drift, misapplication/spills, and leaching. Surface water could be affected by any of these means, while groundwater potentially would be affected only by leaching.

Herbicides registered for use in terrestrial habitats may affect surface water and groundwater as a result of unintentional spills or movement of herbicides from upland sites into aquatic systems. Pollution results from herbicide concentrations that are elevated enough to impair water quality and the beneficial use of that water. The potential for upland herbicide applications to reach water is affected by the herbicide's physical properties, the application method and rate, and site conditions.

The vegetation, ground cover, or soil type between a treatment area and a water body can influence whether herbicides would reach water. Thick vegetation might block drift or absorb an herbicide moving through water or ground before it reaches a water body. In comparison, where little to no vegetation is present, the herbicide would encounter less resistance when washing toward the water body.

Additional effects to water quality that could occur from herbicide treatments include increased nutrient loads to surface water and groundwater. Soluble nutrients can enter surface water or groundwater. Nutrients adsorbed to particles may be moved to water bodies by wind and water erosion. Nutrient enrichment of aquatic systems can lead to algal blooms and eutrophication (mineral and organic nutrient loading and subsequent proliferation of plant life), resulting in decreased dissolved oxygen contents. The extent and duration of effects would be dependent on the geographic location, and on the extent of vegetation removal, as well as on revegetation management practices. Removal of large amounts of vegetation along streams could lead to warmer water temperatures, to the detriment of fish and other aquatic organisms (BLM 2007).

Effects from Prescribed Fire Treatments

The potential effects of fire on water resources would depend largely on the severity and size of the fire, with a low severity burn being less likely to degrade water quality and quantity than a severe burn, and a small fire affecting a smaller surface area than a large fire. In addition, the closer the fire is to a water body, the more likely it would be to affect water quality.

The burning of vegetation would be expected to lead to an increase in surface runoff and sediment inputs to water, and a decrease in infiltration and thus groundwater recharge. The amount of runoff would be a factor of the timing and severity of the fire, the slope of the treatment site, and the timing, amount, and intensity of precipitation. High severity fires tend to burn much of the organic material on a site, exposing mineral soil, and sometimes forming hydrophobic soil layers Erosion, runoff, and water quality are often unaffected on level areas after a low severity prescribed burn. If a fire was of low enough severity that litter and duff layers were undamaged during the burn, effects to water resulting from runoff and erosion would be minimized. Additionally, burn timing is important; prescribed fire conducted prior to a precipitation event would have the greatest risks of increased surface runoff and sedimentation. Generally, low severity burns would result in no changes to stream flow. This is in contrast to conditions resulting after large or severe fires that increase stream flows for several years following the fire. Sedimentation may be reduced by avoiding burns on steep slopes; retaining

buffers along water bodies; revegetating treated sites; and minimizing use of burned sites by equipment, livestock, OHVs, and other ground-disturbing activities until the site has revegetated.

The effects of fire on water chemistry occur as a function of mobilization of nutrient loading from ash. Primary effects would result from increased nitrogen, phosphorus, and cations. Increased ammonium nitrogen and small increases in phosphorus and nitrate levels in water are common in burned areas.

Use of ground-disturbing fire equipment and fire lines on erosive and/or steep slopes can exacerbate erosion and sedimentation of nearby water bodies. Limiting the use of firefighting trucks and equipment to roads or disturbed areas can reduce soil loss.

Daily temperature fluctuations in streams are largely regulated by the amount of solar radiation they receive. Removal of overhead vegetation along watercourses can lead to increased water temperatures after a prescribed fire. Elevated stream temperatures are detrimental to most coldwater fish species. Retaining vegetated buffers between stream courses and treatment areas, and revegetating burned areas along streams, can help to reduce effects to water temperature and stream organisms.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on water quality would be substantially similar to the Proposed Action, however actual number of acres treated under the No Action Alternative would likely be less. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. These agents may be less toxic in aquatic settings. Newly-approved fluridone specifically indicated for aquatic use, would not be available in the CCD under the No Action Alternative.

4.1.5 General Wildlife

This effects summary is compiled from the PEIS, pages 4-59 through 4-73, and 4-74 through 4-91, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to non-target vegetation and to minimize adverse effects to wildlife.

The extent of effects to wildlife would vary by the extent and type of treatment, as discussed in the sections below. In general, treatments that reduce the spread and occurrence of noxious and invasive weeds, and restore native vegetation in degraded areas would benefit wildlife and their habitat. Spread of weeds has caused habitat fragmentation and the loss of connectivity between habitats. Fragmentation can isolate animals and reduce their ability to disperse. Treatments that restore native vegetation would reduce fragmentation and restore connectivity between habitats. In the long-term, proposed treatments are expected to improve native plant diversity, abundance, and connectivity for the benefit of wildlife and their habitats.

Proposed Action

Effects from Mechanical Treatments

Mechanical treatments would injure or kill plants by removing some or all of the plant material on the treatment site. These plants would generally be the target plants (invasive, non-native plants and noxious weeds), but some minimal amount of non-target vegetation used by wildlife species could also be injured or killed. Damage to non-target plants is expected to be minor and most cut stems and leaves would likely regrow. Mechanical techniques used to control aquatic vegetation can spread aquatic vegetation to new areas, disturb sediment, and remove fish and other aquatic organisms with harvested material. Mechanical methods are effective in restoring wildlife habitat and are the primary means of reseeding a site. However, disturbances associated with mechanical treatments (e.g., noise, presence of workers, trucks/ATVs, other equipment) could be substantial, though short in duration. Disturbance may alter animal behavior or cause wildlife to leave an area temporarily during the disturbance period. These effects would be short-term and not likely have much effect on the long-term health and habitat use of wildlife in the treatment area. Vehicles used for treatments could collide with or crush a variety of wildlife, especially slower moving species; burrowing species; and ground nesting birds, resulting in direct mortality or injury.

Mechanical treatments are particularly effective in sensitive areas, such as wetland and riparian habitat, where greater, more precise control over treatment effects is required or effects to non-target species are a concern. Mechanical treatments are effective where the risks to aquatic organisms from the use of herbicides are high.

Effects from Manual Treatments

Manual treatments can be expensive, but they allow for more precise, selective vegetation control than other methods and are often suitable in areas with sensitive wildlife species such as aquatic organisms. The presence of workers, trucks/ATVs, and hand-held equipment, including chainsaws, creates noise that can disturb animals and cause them to flee or alter their behavior or habitat use temporarily during the disturbance period. These effects would be short-term and not likely have much effect on the long-term health and habitat use of wildlife in the treatment area.

Manual treatments are particularly effective in sensitive areas, such as wetland and riparian habitat, where greater, more precise control over treatment effects is required or effects to non-target species are a concern. Manual treatments, which tend to be very selective and involve smaller treatment areas, are particularly effective where there are concerns about aquatic organisms.

Effects from Biological Treatments

Domestic livestock can be used to reduce or contain undesirable vegetation in some situations. These treatments would generally occur in herbaceous communities (annual and perennial grassland, and perennial forb communities) that have high levels of weed infestations.

Livestock can directly harm wildlife by trampling on animals or their nests, and grazing can alter grassland structure to the detriment of birds and small mammals.

When grazing is used for management, care would be taken to ensure that livestock do not substantially alter habitat structure. Certain habitats may be more sensitive to impacts caused by the use of livestock to control vegetation and therefore would require extra planning and management to be successful. The use of livestock in wetland and riparian areas not only has the potential to directly impact non-targeted vegetation, but there could also be unintended impacts to soils, streambanks, and stream morphology. Removal of riparian vegetation by livestock can lead to stream channels that are wider and shallower than streams in ungrazed areas. There may also be some direct effects on aquatic organisms as a result of livestock wading in streams. Animals defecating into aquatic systems could create water quality conditions that cause injury or mortality to aquatic organisms.

The use of domestic livestock to contain vegetation has a greater likelihood of affecting non-target vegetation than insects and pathogens, but also allows for treatment of larger areas and may stimulate new growth of desirable species. Grazing animals, such as goats, sheep, and cattle, can reduce above-ground biomass of targeted weed species and potentially create opportunities for native species to compete with the targeted weed species. The success of this type of treatment depends on site characteristics (e.g. current vegetative composition, soils, etc.), the timing and duration of the targeted grazing, the number of grazing animals, and the size of the area in which the treatment is to occur.

The effects of biological treatment using insects and pathogens would be minor. In most cases, the target plants would remain standing, although weakened or unable to reproduce. Insects are often used to control weeds because many species exhibit high host-specificity. Strict controls would be used to ensure that insects and pathogens used in treatments area specific to the target vegetation and do not harm non-target species. However, the success of biological control programs often depends on the presence of a more desirable plant community that can fill in the spaces opened by the removal of the weeds. Thus, biological control would not be effective where large stands of annual grasses, such as downy brome, are present and have displaced native vegetation. If the weed is controlled, the space is often filled by another weed, or the plant community reverts to the weed annual grass understory. Because control using biological agents would take time, wildlife might be better able to respond to changes in habitat than after treatments that modify habitat over a short period of time, such as herbicide application.

Effects from Chemical Treatments

While some field studies suggest that appropriate herbicide use is not likely to directly affect wildlife, herbicides (used properly or improperly) can potentially harm wildlife individuals, populations, or species. Harm at the population or species level is unlikely for most general wildlife species because of the size and distribution of treatment areas relative to the dispersal of wildlife populations and the foraging area and behavior of individual animals.

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. 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 regeneration; habitat and range disruption (as wildlife may avoid sprayed areas for several years following treatment), resulting in changes

to territorial boundaries and breeding and nesting behaviors; and increase in predation of small mammals due to loss of ground cover.

In the absence of prominent direct effects, the main risk to wildlife from herbicide use is habitat modification. The extent of direct and indirect effects to wildlife from modifying habitat 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. Injury and mortality would largely occur to target plants (noxious and invasive weeds), but some non-target vegetation used by wildlife species could also be injured or killed.

The effects of herbicide use on wildlife would depend directly on the sensitivity of each species to the particular herbicides used (and 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., amphibians, small mammals), would have a greater chance of being directly adversely affected 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 herbicide would be more likely to be affected, particularly if the herbicide bioaccumulated in their systems. Although these scenarios were not modeled for the PEIS, wildlife could also experience greater effects in systems where herbicide transport is more likely, such as areas where herbicides are aerially sprayed, dry areas with high winds, or areas where rainfall is high and soils are porous. Wildlife that inhabit 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 vegetation interception, which depends on site and application characteristics, would also affect direct spray effects. The effects of herbicide use on wildlife 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 impacts to wildlife

The PEIS Risk Assessments suggested several common effects of herbicides to wildlife including fish and other aquatic organisms (BLM 2007). Birds or mammals that eat grass that has been sprayed with herbicides have relatively greater risk for harm than animals that eat other vegetation or seeds, because herbicide residue is higher on grass; this phenomenon is apparent in risks predicted for large mammalian herbivores by the Risk Assessments. Grass foragers might include deer, elk, rabbit, chukar, quail, and geese. However, harmful doses of herbicide are not likely unless the animal forages exclusively within the treatment area for an entire day. In addition, insect foragers (e.g., bats, shrews, and numerous bird species) would be at risk from herbicide applications because of the small size of insects and their correspondingly large surface area (BLM 2007).

The extent of disturbance to fish and other aquatic populations caused by herbicide treatments would vary by the extent and method of treatment and chemical used. Herbicides could come into contact with and affect fish and aquatic invertebrates through direct application (of herbicides approved for use in these habitats), drift, runoff, wind transport, or accidental spills or spraying. At low concentrations, herbicides would typically have little or no effect on aquatic organisms. At moderate concentrations, herbicides may not kill fish or other aquatic organisms, but could be detrimental to the survival, growth, reproduction, or behavior of certain organisms. At high concentrations, herbicides can be lethal to aquatic organisms. Potential effects include mortality, reduced productivity, abnormal growth, and alteration of habitat.

Herbicides are an effective means of controlling weeds and other invasive vegetation. Herbicide treatments may be the only effective way to control large areas of annual weeds and are also effective for rhizomatous invasive plants that are unpalatable to livestock, require repeated cutting or pulling for control, or are located in remote areas where other treatment methods are not feasible.

Effects from Prescribed Fire Treatments

Prescribed fire can kill and injure animals, although the number of wildlife killed by fires is probably a small proportion of most animal populations. Animals with limited mobility that live above ground are most vulnerable, but at times even large mammals are killed by fire. Fire may threaten a population if it is limited in size, range, or mobility, such as the extinct heath hen, whose demise might have been accelerated by scrub fires.

The time of year of prescribed fire is an important variable in wildlife mortality. The eggs and young of birds are susceptible to fire, especially ground-nesting birds. The nesting season often coincides with the active period of plant growth, when moisture conditions are too wet to sustain prescribed fires. If a fire burns in a mosaic pattern, leaving some areas of vegetation relatively unscathed, some young may survive. The young of small mammals that build dens or nests near the ground, such as small rodents and hares, are susceptible to fire. Small mammals can often escape fire by going into burrows or hiding in rock crevices, under stumps or roots, or in large dead wood.

The fire regime and microsite characteristics can influence wildlife mortality from fire. Many desert and semi-desert habitats burned infrequently in the past because of sparse fuels. In these areas, patchy fire spread may have provided areas of unburned habitat where reptiles and small mammals could escape fire. Some amphibians and reptiles, in addition to small mammals, escape fire by burrowing into the soil or hiding under moist duff or leaves that burn less readily than drier forest or rangeland materials.

Wildlife that leaves an area due to prescribed fire may return soon thereafter if food or cover is available in unburned areas, or even in burned areas. For example, scavengers and predators would often return to a burned area to feed upon insects or other dead or dying animals harmed by fire. Other wildlife may emigrate until more suitable conditions return.

Prescribed fire can create a mosaic of different kinds of vegetation, with variability in size, composition, and structure of patches, as well as connectivity among patches. Within a large fire, there can be substantial variation in fire severity and many patches of vegetation may not

burn, resulting in variation in plant mortality and perpetuation of the mosaic nature of the landscape. Some areas would burn more intensely than others, influencing the nature of the vegetation that remains. When fire increases the heterogeneity of the landscape, some species of wildlife benefit from having increased opportunities to select from a variety of habitat conditions and successional stages.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on wildlife would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under both alternatives, wildlife habitat would benefit from treatments in the long-term, although under the No Action Alternative newly-approved herbicides with lower toxicity to wildlife would not be used. The number of acres treated each year in the CCD under the No Action Alternative would be lower than the Proposed Action. Exposure risks to wildlife under the No Action Alternative would be less than the Proposed Action. Wildlife habitat conditions would likely see greater improvements under the Proposed Action than the No Action Alternative as a result of increased treatments.

4.1.6 Migratory Birds
The effects to migratory birds would be substantially similar to those described for general wildlife (see Section 4.1.5). The SOPs listed in Appendix A would be used to reduce potential unintended effects to non-target vegetation and to minimize potential effects to migratory birds.

4.1.7 BLM Sensitive Species

4.1.7.1 Plants.
This effects summary is compiled from the PEIS, pages 4-56 through 4-59, which is hereby incorporated by reference in its entirety (BLM 2007).

Proposed Action
Effects from Mechanical Treatments
Because mechanical treatments are intended to control entire stands of vegetation or to enhance structural diversity, they could result in injury or mortality to any sensitive plants present on the treatment site if these plants were not avoided. In instances where the top layer of soil was removed, the seed bank of the species would also be negatively affected. Species with small populations or very limited distributions could be extirpated by such an occurrence. Populations of annual sensitive plant species, however, should not be adversely affected, provided seed bank and germination conditions were not negatively affected by the treatment.

Effects to the habitat of sensitive plant species, in addition to the potential long-term benefits from the removal of noxious and invasive weeds, would include short-term adverse effects such as erosion and hydrologic alteration, as discussed under effects to vegetation.

Over the long-term, the suitability of the treatment site for supporting sensitive species would depend on the suite of species that became established after the site was cleared. A site cleared but not replanted or reseeded would typically favor early successional species, and would be

expected to be beneficial for early successional sensitive plants. However, noxious and invasive weeds are also well-adapted to disturbed sites, and in many cases can outcompete sensitive plant species. It is expected that mechanical treatments would occur on sites with a large amount of undesirable vegetation, and it is likely that propagules of these species would be able to recolonize the site. Thus, it is possible that mechanical treatments alone would have no long-term effect on sensitive species habitat, or would have a negligible effect. However, if replanting or reseeding with native species was also done at the site, long-term effects could be positive, by eventually replacing a site dominated by non-natives species to one dominated by native species.

Effects from Manual Treatments

Manual treatments would potentially provide benefits to sensitive species without causing injury to individual plants, provided workers were able to identify sensitive species and avoid disturbing them.

Effects from Biological Treatments

Adverse effects to sensitive plant species and/or their habitat from weed containment by domestic animals could include foraging of individual plants, trampling, compaction of soils, and, for wetland species, hydrologic alteration. Although plants are typically able to recover from removal of their aboveground portions, heavy grazing could cause a reduction in plant biomass, vigor, and seed production. In the case of non-secure populations of sensitive plant species, the stresses associated with grazing could cause long-term adverse effects, particularly if sensitive plant species were browsed or grazed before producing seed, or during times of drought or other environmental stress, or if the same plants were grazed repeatedly. Although treatments with domestic livestock can improve the habitat of some sensitive species by reducing the cover and vigor of non-native or undesirable species, grazing can reduce the quality of habitat by spreading weed propagules. Since many populations of sensitive species occur in areas that have a large component of native species, introduction of weed propagules into these areas would be expected to have long-term adverse effects on sensitive species populations.

No adverse effects to sensitive plant species are expected from the use of biological control agents, since these insects and pathogens generally do not affect non-target plant species or habitats. Under the review process, biological control agents undergo an extensive screening and testing process APHIS before an organism can be released. Despite these safeguards, there is always a risk that the release of an agent into a habitat in which it does not occur could result in unforeseen ecological repercussions.

Effects from Chemical Treatments

The potential effects of herbicide treatments on sensitive plant species would depend on a number of factors, including the location of the application in relation to sensitive species populations, the type of application method utilized, the type of chemical formulation used, and the timing of the application in relation to the phenology of the sensitive species. In the case of sensitive plant species, manual spot applications of herbicides may be the only suitable means of applying herbicides that can adequately ensure the protection of sensitive populations.

All of the herbicides analyzed in Risk Assessments would pose risks to terrestrial sensitive plant species in a situation where plants were directly sprayed. Herbicides with the greatest likelihood

of harming sensitive plants would include bromacil, chlorsulfuron, clopyralid, diflufenzopyr, diquat, imazapyr, metsulfuron methyl, Overdrive®, picloram, sulfometuron methyl, and triclopyr. These herbicides would also present the most risk to terrestrial sensitive plant species as a result of drift from a nearby application site. The herbicide with the lowest risk to terrestrial plants is imazapic, which, according to its Risk Assessment, can be broadcast sprayed by ground methods 25 feet from a sensitive plant without risk.

Herbicides with the greatest likelihood of affecting sensitive plant species via surface runoff include imazapyr, metsulfuron methyl, picloram, and triclopyr. Of these herbicides, picloram has the longest soil half-life. Herbicides with the least likelihood of affecting sensitive terrestrial plant species include imazapic, chlorsulfuron, glyphosate, and bromacil.

Aquatic sensitive plant species could be harmed by a normal application of an aquatic herbicide, accidental direct spray or spray drift of a terrestrial herbicide from a nearby upland, accidental spill, or surface runoff from an upslope area into the water body where the plant is located. Use of 2,4-D and diquat to control vegetation in aquatic habitats would pose the greatest risks to any sensitive plant species also in the habitat. Aquatic herbicides that would be safe for use in aquatic habitats where sensitive plant species occur include fluridone and the low-toxicity formulations of glyphosate. In addition, triclopyr acid could be applied directly to the water column at the standard concentration without harm to sensitive aquatic plant species. The safest terrestrial herbicides to use near aquatic habitats would be picloram and diflufenzopyr (BLM 2007).

Effects from Prescribed Fire Treatments

The potential effects of fire treatments on sensitive plant species would vary depending on a number of factors. The timing of the burn; the area, frequency, and severity of the burn; the level of resistance or adaptation by individual species to fire; the presence of fire-adapted vegetation; and the historical fire disturbance regime of the habitat would all influence the effects on special status population in the area. In most cases, mortality of some plants would occur if a fire were to burn directly through a population. The negative effect on the population would increase if a severe fire were to kill subsurface reproductive structures, or buried seeds. If an entire population was burned, extirpation of that population could potentially occur. Low intensity burns in fire adapted habitats could potentially benefit some sensitive plant species by increasing flower production and/or seed germination.

The indirect effects on sensitive plant species as a result of changes in habitat would largely depend on conditions of the site. Many sensitive plant species on public lands, are early-successional species that would be expected to benefit indirectly from prescribed burns. In some cases sensitive plant species would need to be protected from fire while the surrounding habitat was burned.

In habitats where non-native species have become adapted to fire (often in rangelands), fire treatments would be expected to further degrade the quality of the habitat because the fire-adapted invasive species would potentially outcompete native sensitive plant species in occupying sites cleared by burning.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on BLM sensitive plant species would be substantially similar to the Proposed Action, although the CCD would likely treat fewer acres. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. The newly-approved herbicides may be more effective for use on noxious weeds, may be less toxic, or less likely to affect non-target plants. Under the No Action Alternative, the CCD would not use biological control agents such as insects, pathogens or targeted livestock grazing to control noxious and invasive weeds, which can be effective in reducing a weed species competitiveness over time. Exposure risks to non-target plants under the No Action Alternative would be less than the Proposed Action. Native vegetation would likely see greater improvements under the Proposed Action than the No Action Alternative as a result of increased treatments.

4.1.7.2 Animals
This effects summary is compiled from the PEIS, pages 4-91 through 4-94, which is hereby incorporated by reference in its entirety (BLM 2007).

In general, the potential effects to sensitive wildlife species would be similar to those described for general wildlife. However, the rarity and sensitivity of sensitive species and their habitats potentially make them more likely to be affected by treatments. On the other hand, sensitive species may in some cases also benefit more from treatments than general wildlife species with larger, more secure populations.

This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to non-target vegetation and to minimize potential effects to sensitive wildlife species. The extent of effects to sensitive species would vary by the extent and type of treatment, as discussed in the sections below. In general, treatments that reduce the spread and occurrence of noxious and invasive weeds, and restore native vegetation in degraded areas would benefit sensitive species and their habitat. Spread of noxious and invasive weeds has caused habitat fragmentation and the loss of connectivity between habitats. Fragmentation can isolate animals and reduce their ability to disperse. Treatments that restore native vegetation would reduce fragmentation and restore connectivity between habitats. In the long-term, proposed treatments are expected to improve native plant diversity, abundance, and connectivity for the benefit of sensitive species and their habitats.

Proposed Action
Effects from Mechanical Treatments
Use of mechanical treatments to remove vegetation would run the risk of crushing small animals, including insects, reptiles and amphibians, the young and eggs of ground nesting birds, and small mammals. Burrowing species could be harmed by mechanical treatments that disturb soil. Mechanical treatments could also destroy burrows and nests. For some sensitive species, loss of even a few individuals as a result of crushing could substantially increase the susceptibility of the population to future disturbances. Risks would be greatest if treatments occurred over the entire area occupied by a population.

Disturbances associated with mechanical treatments (e.g., noise, presence of workers, trucks/ATVs, equipment) could be substantial, though short in duration. Many mobile animals, such as large adult birds and mammals, could simply leave the area temporarily to avoid the disturbance. Less mobile animals may not be able to leave, particularly if the treatment area was relatively large. The noise and human presence associated with mechanical treatments could cause some animals to leave nests. For particularly sensitive species, these disturbances could result in reduced breeding success.

Effects from Manual Treatments

Manual treatments would be unlikely to kill or injure mobile animals. Less mobile animals might not be able to leave the area, resulting in disturbance and stress. These effects would be short-term in nature, provided treatments did not require repeated entry into habitat. Some sensitive wildlife species would be forced to leave nests or young behind temporarily, resulting in a risk of reduced reproductive success to an already sensitive population.

Effects from Biological Treatments

The effects of undesirable vegetation containment by domestic animals on sensitive species would depend on numerous factors, including the size and mobility of the species, the length of the grazing treatment, and whether the domestic animals used would be likely to graze on important forage plants or other required habitat components.

Larger, mobile animals, and birds that nest out of reach of domestic animals should be able to avoid contact with grazers. Less mobile species, young animals, including the eggs of ground nesting birds, and insects would be more susceptible to injury or mortality through trampling and crushing.

Sensitive species that are themselves grazers could be adversely affected by containment treatments by competing with domestic animals for prime forage plants. Effects would be greatest in areas where forage is already limited. Although the ultimate effect could be an increased quantity of preferred forage plants in subsequent years, loss of forage during a single year could have lasting effects on already small and sensitive populations. Effects would be greatest if the treatments occurred over a large area of existing habitat.

Use of biological control agents to control weeds could result in minor disturbances to some species from the presence of workers in sensitive habitats (e.g., nesting areas during the breeding season). For most sensitive species, these effects would be minor and short-term, and would not have lasting effects on populations. Provided workers did not return repeatedly to the habitats of these sensitive species during the breeding season, long-term effects to populations would not occur.

It is not anticipated that use of biological control agents would result in adverse effects to the habitats of sensitive species. Gradual reduction in weed cover would improve many habitats without causing sudden losses of vegetation or structural changes. There would be some risk associated with using agents that attack plant species that are closely related to species required by sensitive species for survival (e.g., butterfly host plants). Biological control agents undergo

an extensive screening and testing process prior to being permitted by the APHIS program and released. Despite these safeguards, there is always a risk that the release of an agent into a habitat in which it does not normally occur could result in unforeseen ecological harm.

Effects from Chemical Treatments

Terrestrial herbicides with the greatest likelihood of affecting sensitive species, via any exposure pathway, include 2,4-D, bromacil, diuron, and hexazinone, which pose moderate to high risks to sensitive species under one or more exposure scenarios involving the typical application rate (see PEIS Tables 4-23 and 4-24, BLM 2007). Terrestrial herbicides with the least likelihood of affecting sensitive wildlife species include chlorsulfuron, diflufenzopyr, imazapic, and sulfometuron methyl, for which no risks to sensitive species were predicted via any exposure pathway.

Aquatic herbicides with the greatest likelihood of affecting sensitive amphibian species during a normal application to an aquatic habitat are diquat and some formulations of glyphosate. Normal applications of 2,4-D and imazapyr would not pose a risk to aquatic amphibians. Terrestrial herbicides with the greatest likelihood of affecting sensitive amphibian species as a result of a spill, drift, accidental direct spray into an aquatic habitat, or surface runoff are bromacil, diuron, and picloram. The following herbicides would pose no risk to aquatic amphibians, according to the Risk Assessments: chlorsulfuron, diflufenzopyr, imazapic, Overdrive®, and sulfometuron methyl (BLM 2007).

Effects from Prescribed Fire Treatments

The potential for a fire treatment to directly harm sensitive wildlife species would depend on the animal's ability to escape the treatment area. Slow-moving wildlife, such as insects and other arthropods, and several species of small mammals would be more at risk than species that would be able to flee the area.

Indirect effects to sensitive wildlife species as a result of habitat alteration would depend on the habitat needs of the species. Species that require dense vegetation for cover, would likely be adversely affected by prescribed burns. Fire could potentially reduce the availability of forage in the treatment area, although the new growth after fire would likely be of increased forage quality. Although habitats could quickly recover from fire treatments, the effects of habitat loss to species with non-secure populations could persist over the long-term and make populations more susceptible to extirpation. In addition, if a fire treatment were to burn through the entire habitat of a small, isolated population, extirpation of that population could potentially occur.

Sensitive wildlife species with large home ranges and more general habitat requirements would be unlikely to be affected by fire treatments, provided they did not occur near denning or breeding areas, and human contact was avoided. These species are typically large enough to avoid a treatment area during a burn, and are not specifically dependent on the type or structure of vegetation in their habitat.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on

sensitive species would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under both alternatives, sensitive species habitat would benefit from treatments in the long-term, although under the No Action Alternative newly-approved herbicides with lower toxicity to wildlife would not be used. The number of acres treated each year in the CCD under the No Action Alternative would be lower than the Proposed Action. Exposure risks to sensitive species under the No Action Alternative would be less than the Proposed Action. Sensitive species habitat conditions would likely see greater improvements under the Proposed Action than the No Action Alternative as a result of increased treatments.

4.1.8 Threatened & Endangered Species

4.1.8.1 Plants

The effects to threatened and endangered plant species would be substantially similar to those described for BLM sensitive plant species (see Section 4.1.7.1). As stated in Sections 1.6 and 2.1.5, the BLM would complete consultation with the USFWS prior to implementing any treatments in or adjacent to occupied habitats.

4.1.8.2 Animals

The effects to threatened and endangered animal species would be substantially similar to those described for BLM sensitive animal species (see Section 4.1.7.2). As stated in Sections 1.6 and 2.1.5, the BLM would complete consultation with the USFWS prior to implementing any treatments in or adjacent to occupied habitats.

On December 18, 2014 the BLM received concurrence from USFWS for chemical treatments of noxious weeds within or adjacent to habitat occupied by CWS, therefore the need for Section 7 consultation for this species is unlikely in the future unless new circumstances or new treatment methods are proposed (BLM 2015).

4.1.9 Soils

This effects summary is compiled from the PEIS, pages 4-11 through 4-19, which is hereby incorporated by reference in its entirety (BLM 2007).

Proposed Action

Effects from Mechanical Treatments

Mechanical control methods, including the use of weed whackers, chainsaws, and mowers, would be expected to result in negligible to moderate localized short-term effects to soil resources. Ground disturbance would be due primarily to foot traffic or the use of off-highway vehicles to transport equipment or workers. With respect to biological soil crusts, mechanical methods involving the use of heavy equipment, such as blading and rangeland seed drilling, have the potential to cause moderate localized short-term impacts because of track or wheeled equipment needed to pull or push the equipment. Blading may initially disturb crust presence, but in the long-term, it would improve local biological soil crust habitat by reducing weed cover.

Effects from Manual Treatments

Manual methods such as pulling or digging to control noxious and invasive weeds have negligible effects on soil resources. Manually digging and pulling weeds are expected to result in localized short-term ground disturbance primarily due to foot traffic and tool use. Effects of manual treatments are more likely to be realized on biological soil crust communities. Pulling and digging noxious and invasive weeds can result in trampling and dislodging sensitive biological soil crusts, particularly when the crusts are dry. To reduce disturbance and potential damage to biological soil crusts, SOPs require mechanical and manual treatments to minimize disturbances to biological soil crusts (e.g., by timing treatments when crusts are moist).

Effects from Biological Treatments

The introduction of beneficial microorganisms and biological control agents can affect soil properties, biota, and soil processes. Many biological control species would increase nitrogen inputs into the soil and interact with other soil biota. Improved soil aggregation and heightened carbon accumulation can also occur. The utilization of biological control nematodes may result in greater nutrient release within the root-soil interface, but can interact with other organisms (e.g. reduce mycorrhizal populations) (FAO 2014).

Many studies and established programs show that grazing weeds at a specific time, duration, and intensity can effectively reduce their abundance (Davison et al. 2005). Impacts to soils and biological soil crusts by targeted grazing would vary by season of use, length of grazing period, and number of grazing animals. Crusts on all soil types are least vulnerable to disturbance when soils are frozen or snow covered. Biological crusts on sandy soils are less susceptible to disturbance when moist or wet; on clay soils, when crusts are dry (BLM 2001a).

Prolonged grazing on wet fine-textured soils can cause soil compaction, shearing, and post-holing. If extensive, changes in soil functions and site hydrology can occur. Dry-season grazing would avoid potential damage to these soils. However, grazing turnout in early spring is the most ideal for sites containing biological soil crusts. Biological soil crusts are the most resistant to disturbance under moist springtime conditions.

Effects from Chemical Treatments

Persistence is the length of time an herbicide remains in the soil. It is measured in half-life, or the length of time in days that half of the initial concentration of herbicide remains in the soil. One quarter of the initial application would remain at the end of the next half-life cycle. Persistence depends upon the amount of herbicide applied to the soil, the amount taken up by roots, off-site movement, and how fast a chemical breaks down or degrades. Degradation rates vary by soil texture and characteristics, as well as precipitation and temperature. Herbicides can be degraded by soil organisms, chemical reactions, or by sunlight (USFS 2011).

The ability of an herbicide to bind to soil particles is affected by soil adsorption affinity. Also known as K_{oc} values, soil adsorption values are strong indicators of herbicide mobility within the soil profile. Herbicides with high K_{oc} values bind strongly to soil particles, which may limit leaching and off-site movement. Additional factors that affect the fate of herbicides include soil physical, chemical, and biological properties. Soil pH, texture (amount of sand, silt, and clay), percentage of organic matter, depth to restrictive layer, presence of a water table, and soil

temperature and moisture regimes contribute to herbicide fate and transport. Site characteristics that factor into the analysis include physical elements that can influence the susceptibility of exposed soil surfaces to wind erosion and runoff potential.

The soil types on the CCD exhibit a wide range of the characteristics described above. Analysis of the fate, transport, and effects of specific herbicides are limited by soil properties and function at the site level. Project planning considers site-specific soil characteristics in determining appropriate herbicide formulations, size of buffers if needed, application methods, and timing, as described below.

For this analysis, the NRCS soil survey information that is most useful for determining effects of chemical application on soil resources consolidate to four of the factors listed above. The amount of organic matter in the top six inches of the soil controls the ability of soil to capture herbicides: less than one percent was considered a severe limitation and soils between 1 and 2.5 percent levels were considered cautionary. Soils with 2.5 to 3 percent may tie up soil-applied herbicides prior to being delivered to the plant, thus soils greater than 2.5 percent organic matter were considered a binding mechanism for herbicides.

Soils that have greater than 20 percent average clay contents are considered by the NRCS to be in a sandy clay, silty clay, or clay loam texture classification class. Thus, these soils may have sufficient levels of clay to adsorb and thus retain herbicides within the soil profile or surface. The average percentage of sand within the soil is also important from an infiltration and water routing perspective. Soils with a percentage of sand greater than 50 percent were used as a screening mechanism to determine when soils may have a greater potential to infiltrate into the soil profile. Where that may occur, some herbicides (like picloram) could connect with ground water if water tables are near the surface.

Microbiotic Soil Crusts: The effects to microbiotic crusts are largely confined to the breakage and disturbance of the actual crusts caused by manual methods or the expected disturbance that is incurred while applying chemicals to the treatment areas. This is due to the limited information regarding actual direct effects of herbicide application on biological soil crusts.

Studies of direct impacts of herbicides (glyphosate or 2,4-D) on microbiotic soil crusts by Youtie et al. (1999) and Metting (1981) have demonstrated in laboratory settings that there is a wide range from positive, neutral or adverse effects. However, the authors provided caution stating that the results were not conclusive and extrapolating this information to the field may not yield that same response.

The stated risk to this issue is the disruption and degradation of the microbiotic soil crusts. The intensity may vary from extremely low (aerial application using aircraft) to moderate (multiple treatments of the same ground with OHV sprayers). The spatial extent could encompass portions of watersheds and be either scattered or conjoined. The treatment affects would be short and longer term depending on retreatment frequency and methods. Those areas where multiple applications of herbicides are required over three or five years may have two very different effects. The first is short-term, when herbicides are directly applied to microbiotic crusts. However, the second effect, the potential destruction and displacement of those same crusts,

would require decades to rebuild if reoccurring vehicle tread traffic breaks up the crust and recovery cannot occur. Therefore, the magnitude of the impact may be negligible at the CCD level and moderate at the local level.

The Potential of Herbicides to be Transported Off-Site: Some herbicides attach to soil particles and could be moved by wind or water; the process is known as saltation (NSERL 2014). Only herbicides with residual properties that remain active once they come in contact with the soil become a concern in this situation. Picloram is the only herbicide with this property in both alternatives.

There are several conditions needed to have saltation events. More than half of the soil surface cover has to be removed to expose the soil to the influence of wind (such as might occur with a burn or broadcast herbicides). The soil would have to be subject to wind velocities necessary to move soil particles. Generally, winds of greater than 30 mph have been used when modeling this process in an agriculture setting (Hagen 1991). In addition, the soil would have to be dry.

Herbicides that bind to soil particles or have persistent longevity in the soil would be those most likely to affect other non-target areas through this process. Chlorsulfuron, glyphosate, imazapic, imazapyr, and picloram fit one criteria or the other. Those herbicides that have a persistent or moderately persistent half-life would be the ones of particular concern about being transported off-site (off-site is considered from the point of application but may still be within a treatment area).

The Fate of Herbicides in Soils: Herbicide half-life and persistence in the soil determines the duration of effects. The length of time most of the proposed herbicides remain active in the soil is within the first growing season, and thirty to 100 days is considered moderately persistent. The degradation of the applied chemicals occurs through several mechanisms in the soil; these include attachment to soil particles or organic matter, processing and degradation by microbes, and degradation by sunlight.

Herbicides in soil are broken down into other compounds, most of which are non-toxic. This occurs at the surface of the soil, with volatilization and photolysis, evaporation into the air, and under the influence of sunlight. In the soil, microorganisms (bacteria, fungi, or algae) and macroorganisms (nematodes, earthworms, and processors of organic matter) break down herbicides. They can also be broken down by water (hydrolysis), or they are moved through the soil under the influence of gravity (leaching).

Effects from Prescribed Fire Treatments

Fire treatments would potentially alter the physical properties of soil by consuming organic matter, modifying soil structure, and harming soil organisms. Because organic matter contributes to surface soil structure and porosity, burning of organic matter during fire treatments could result in soil structure degradation. Such degradation can persist from a year to decades, depending on the severity of the fire and post-fire ecosystem conditions. Persistent soil structure deterioration following fire would be greatest in cold and arid climates. Surface runoff and soil erosion would increase after severe fire as a result of these physical changes.

Prescribed fire that consume large quantities of surface organic matter can reduce the productivity of soils by reducing moisture-holding capacity. Soils with little organic matter (e.g., many aridisols) would be most susceptible to losses of organic matter through fire treatments, especially from frequent burns. Soils with high organic matter content would tend to burn slowly, and it is unlikely that the organic matter would be completely consumed by fire.

Prescribed fire could cause long-term changes in soil temperatures, with increases in both hot and cold temperature extremes caused by the loss of shade and insulating organic matter, and by the accumulation of blackened fire residues. Loss of soil insulation can influence the dates of both the first and last frosts and freezes of soil and understory vegetation. Warmer soils increase the rate of decomposition and nutrient availability to post-fire vegetation.

A severe fire could cause water repellency in soil, resulting from the condensation of organic compounds onto soil particles. Water repellent soil layers eliminate water infiltration, thereby increasing surface runoff and erosion. This process is most likely to occur in coarse-textured soils, and has also been frequently reported in arid soils of the southwest.

Prescribed fire treatments would alter soil chemistry by volatilizing organic matter and by changing the form, distribution, and quantity of nutrients. A reduction of incorporated organic matter as a result of fire is especially important in arid, semi-arid, and forested sites because many of the nutrients on these sites are tied up in the organic matter. Burning surface organic matter could also cause the loss of some nutrients (primarily carbon, nitrogen, and sulfur) through volatilization, and could cause soils to become less acidic.

Prescribed fire treatments would kill some soil organisms on the site including microorganisms, microarthropods, biological soil crusts, and plant roots. The effects of fire on soil microorganisms would be dependent on fire severity. Observed effects have ranged from no detectable effect in the case of infrequent, low severity fires, to total sterilization in very severe fires. There have been few scientific studies of the responses of soil macroinvertebrates to fire. It appears that the response is driven by changes in habitat structure or by changes in the amount or the quality of food resources after fire.

Biological soil crusts could be negatively affected by fire, depending on fire severity. Algae are generally the first to recover from fire and can form a protective crust within 5 to 10 years after fire. Lichens and mosses are slower to recover and may take 10 to 20 years to achieve substantial cover. In some cases, such as a low severity fire treatment, crust aggregation might persist to some degree even though crust organisms are killed.

Fire severity would determine the degree of effects to soil, with more severe fires causing more extensive and long-term soil changes. Of the three components of severity (heat, duration, depth), duration would likely contribute most to belowground soil damage. The adverse effects of concentrated heat have been observed after the burning of pinyon-juniper slash piles, which has resulted in soil sterilization. Low to moderate severity fires would have fewer adverse effects on soils, and in some cases might even improve soil nutrient availability. In general, subsurface heating would be greater in forestlands than rangelands, as rangelands generally support lighter fuel loadings and frequently result in fires of shorter duration that produce less

subsurface heating. Depth and condition of duff and soil moisture content are important regulators of subsurface heating, with less subsurface heating in wet duff than in dry duff. In some cases, subsurface heating could be substantially less in forests with damp soil and little duff, compared to rangelands with dry soil and dense accumulations of duff. Recovery of soil quality after a treatment would depend on the burning intensity and its effects on soil processes, and also on the previous land-use practices.

Ground equipment associated with prescribed fire treatments, such as equipment used to create fire lines, could disturb soils, contributing to compaction and an increased risk of erosion.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on soils would be substantially similar to the Proposed Action. Under the No Action Alternative, newly-approved herbicides since 2008 and biological treatments or prescribed fire would not be utilized. There would be fewer tools available for the CCD in controlling noxious and invasive weeds. Under the Proposed Action, a greater number of acres treated would occur, slightly increasing impacts to soils over the No Action Alternative.

4.1.10 Livestock Grazing

This effects summary is compiled from the PEIS, pages 4-94 through 4-99, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to livestock and grazing operations.

Proposed Action
Effects from Mechanical Treatments
Use of mechanical treatments could temporarily reduce the amount of livestock forage on the treatment site. Treatments that rip up plants, would be more likely to reduce forage than treatments that cut plants off at the base. These effects would be short-term in nature, as forage species would regrow following treatments.

Mechanical methods that remove competition and overstory vegetation would be expected to enhance grass production if grasses are present on the site. However, mechanical removal could negatively affect plants by compacting soils, creating bare ground, and uprooting desirable species. Ground disturbance could provide increased opportunities for weeds and increase the need to reseed after treatment.

Effects from Manual Treatments
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.

Effects from Biological Treatments
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.

Use of domestic livestock 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 targeted grazing has improved the conditions of the range, opening up infested sites for grass regrowth, and thus providing additional forage for authorized livestock grazing.

Effects from Chemical Treatments

The extent of direct and indirect effects to livestock from herbicide treatments were evaluated in the PEIS. 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 affected by herbicide use if their range extent was completely treated or areas frequented by the livestock were 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 re-entry 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 grazing 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 Risk Assessments suggested several possible common effects of herbicides to livestock. Livestock, which likely consume large quantities of grass, have greater risk for harm than wildlife that feed on other herbaceous vegetation or seeds and fruits, because herbicide residue is higher on grass than it is on other. However, exposure to harmful doses of herbicide would be unlikely, since animals would be removed from the area, 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. 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 (BLM 2007).

Effects from Prescribed Fire Treatments
The effects of fire on livestock would depend largely on the timing of the fire and the pre-burn condition of the site. Over the short-term, prescribed burning would likely reduce the cover of grass and forb species available to livestock. Livestock would also have to be relocated during the treatment. In addition, livestock would need to be kept off of treated areas for a short time after a prescribed fire to give forage ample time to recover. The length of time would vary by site.

The burning of rangeland generally results in increased perennial grass production and grazing capacity as well as increased forage availability from the removal of physical obstructions posed by brush and small trees. Following fire, there may be greatly increased amounts of flowering and fruiting, including a significantly enhanced output of grass seed. The amount of flowering and fruiting may decrease over pre-fire levels for some time if plants are severely damaged by fire.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on livestock would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under both alternatives, native plant species would benefit from treatments in the long-term, although under the No Action Alternative newly-approved herbicides with lower toxicity to livestock would not be used. Livestock would benefit in the long-term from improved forage conditions, especially since grazing animals tend to avoid the consumption of noxious weeds. Grazing operations under the No Action Alternative would not benefit from targeted grazing, which could be used in the CCD to reduce cheatgrass under the Proposed Action.

4.1.11 Wild Horses and Burros
This effects summary is compiled from the PEIS, pages 4-99 through 4-102, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects wild horses and burros.

Effects from Mechanical Treatments
Use of mechanical treatments could temporarily reduce the amount of forage on the treatment site. Long-term benefits to forage production could also occur. In addition, wild horses and burros could experience short-term disturbances associated with mechanical noise and the presence of humans. However, since animals could leave the area during treatments, effects would be minor.

Effects from Manual Treatments
Manual treatments would have minimal effects on wild horses and burros or their forage, as they would occur over a very small area and target undesirable forage species.

Effects from Biological Treatments
The use of domestic livestock to control vegetation could result in minor competition with wild horses and burros. However, these effects would be localized and short-term in duration, and would not adversely affect wild horse and burro populations. Wild horses and burros are more generalists in regards to their feeding behavior than domestic livestock, and would graze over a larger area than animals brought in for treatments.

Insects and pathogens that target weed species would be unlikely to affect populations of wild horses and burros. These treatments target undesirable forage species, would generally not harm desired non-target species, and are slow-acting.

Effects from Chemical Treatments
The extent of direct and indirect impacts to wild horses and burros would be influenced by several factors, including the herbicide selected for treatment, the species composition of the site to be treated, the type of application, the physical characteristics of the treatment area, environmental conditions, and the timing of the application in relation to the behavior of the wild horses and burros. The impacts of herbicide use on wild horses and burros would depend directly on the sensitivity of each species to the particular herbicide used and indirectly on the degree to which a species or individual is positively or negatively affected by changes in herd management area conditions.

Adverse indirect effects could include reduction in forage amount and preferred forage type. If their range extent was partially or completely sprayed, wild horses and burros would be at risk for exposure to herbicides directly via contact with the herbicide upon application, or indirectly via dermal contact with or ingestion of sprayed vegetation. It is unlikely that an animal's entire range would be sprayed.

The Risk Assessments (PEIS, Appendix D) assessed the risks of herbicides to wild horses and burros. Wild horses and burros, which likely consume large quantities of grass, have relatively greater risk for harm than smaller wildlife 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. However, exposure to harmful doses of herbicide would be unlikely since animals would cover a large area during their daily movements, and thus would likely be exposed only to small amounts of herbicide (BLM 2007).

Effects from Prescribed Fire Treatments
Fire treatments occurring in HMAs would have the potential to affect wild horse and burro herds in those areas. Direct effects to animals from fires would be unlikely, as they would be able to flee the burn area. With large fires, wild horses or burros may be forced onto areas that are not designated for wild horse and burro management.

Over the short-term, fire could reduce the suitability of the treatment site to support wild horses and burros. The degree of effects would be dependent on the size and severity of the fire, the climatic conditions, and any other animals (i.e., domestic livestock or wildlife) using the site for grazing purposes. A large fire that consumed much of a HMA could potentially result in a loss of animals. In the case of a small, low severity fire, wild horses and burros would be likely to find suitable forage in the area. Wild horses are accustomed to migrating in search of food and shelter in response to climatic variation and natural disturbances that alter food supplies. Food stresses to populations following prescribed fire would be the greatest on sites occupied by large populations of other domestic animals, or during harsh climatic conditions, such as drought.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on wild horses would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed included in the Proposed Action would not be utilized. Under both alternatives, native plant species would benefit from treatments in the long-term, although under the No Action Alternative newly-approved herbicides with lower toxicity to wild horses and burros would not be used. Wild horses and burros would benefit in the long-term from improved forage conditions, especially since grazing animals tend to avoid the consumption of noxious weeds.

4.1.12 Area of Critical Environmental Concern
This effects summary is in addition to the PEIS, pages 4-114 through 4-118, which is hereby incorporated by reference in its entirety (BLM 2007).

Proposed Action
Effects from Mechanical, Manual Treatments
Mechanical and manual treatments in ACECs would be conducted in a manner that retains the values for which the ACEC was designated. The use of mechanical equipment to control noxious and invasive weeds would be minimized as that type of activity would have the highest potential for impact to soils and the visual character of ACECs.

Manual removal of noxious and invasive weeds would cause short-term, localized impacts to the ACECs. Pulling, grubbing, or digging out of root systems would cause minor impacts to soil surfaces. Some non-target species may be inadvertently damaged or removed during manual treatments. These short-term impacts would be outweighed in the long-term benefits of these efforts that would promote the reestablishment of native species.

Effects from Biological Treatments
The use of biological control agents would occur in ACECs when appropriate. Biological control agents are host-specific and would not affect non-target species. As these agents are approved by APHIS prior to their use, the effects on sensitive species would be minimal.

Effects from Chemical Treatments
The use of herbicides would have short-term, localized impacts to ACECs. After treatments there would be an increase in dying or dead plant material, depending on the size of the weed infestation. This would have minimal impacts to ACECs established for their scenic qualities.

Herbicide treatments could affect non-target or sensitive plant species, however these effects would be outweighed by the long-term promotion of the reestablishment on native species.

Effects from Prescribed Fire Treatments
The effects of prescribed fire on ACECs would depend on a number of factors, such as the vegetation type of the site, the condition of the site, and the particular unique quality of the site that requires special management. In general, sites with special qualities that could be destroyed by fire would be the most likely to experience significant adverse effects from fire treatments. Sites at which natural fire cycles have been altered, and that do not contain attributes that would be susceptible to loss by burning, would be likely to benefit from these treatments.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on ACECs would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under the No Action Alternative, fewer acres would be subject to treatment activities, reducing slightly the impacts to ACECs as compared to the Proposed Action. However, in the long-term, ACECs would benefit from the increased treatments under the Proposed Action as a result of improved native vegetation conditions.

4.1.13 Wilderness Study Areas
This effects summary is compiled from the PEIS, pages 4-114 through 4-118, which is hereby incorporated by reference in its entirety (BLM 2007). BLM Manual 6330 was issued in 2012, however no new analysis was necessary.

Proposed Action
Effects from Mechanical Treatments
The use of mechanical treatment methods could adversely affect WSAs because vehicles and heavy equipment for the most part are incompatible with the "unspoiled" nature of wilderness. For this reason, mechanical treatments would only be allowed on a very limited number of sites where no other method is feasible. In all of these cases, mechanical treatments would require special approval, and would be carefully planned to improve or maintain the quality of the WSAs.

Effects from Manual Treatments
Manual treatments would be the least obtrusive method for use in WSAs and the most appropriate. Because this method of vegetation removal is very selective, damage to non-target vegetation would be minimized.

Effects from Biological Treatments
The use of other biological control agents (e.g., insects, pathogens) to control vegetation in WSAs would involve the introduction of non-native organisms into these largely unaltered landscapes, thereby potentially introducing new effects. However, these other biological control agents would not be likely to adversely affect WSAs, provided that they were host-specific and only affected non-native plant species. Although the risks of its occurrence are slim, an

inadvertent release of a biological control agent that affects native species could significantly degrade the ecological integrity of a WSA.

Effects associated with the use of livestock have the potential to affect WSAs. Livestock grazing could alter plant communities, spread noxious or invasive weeds on their fur or through their feces, and potentially influence native wildlife movements and use patterns within WSAs. The use of grazing animals to control noxious and invasive weeds would be less intrusive than other treatments, particularly mechanical methods.

Effects from Chemical Treatments
Use of herbicides to treat undesirable vegetation could potentially affect the "naturalness" of WSAs by killing non-target native vegetation through imprecise application and/or drift. The degree of effect would depend on the application method, with spot applications less likely to cause adverse effects than aerial applications. For the most part, vehicle-mounted sprayers would not be used to treat vegetation, given the existing restrictions on WSAs. However, vehicles could be used in extreme scenarios, if approved.

The effects of chemical treatments on WSAs would depend on numerous site-specific factors. Some WSAs could support resources that are more sensitive to exposure to herbicides than resources in other WSAs. There would also be human health risks involved with using certain types of herbicide application (e.g., aerial application) in WSAs that are managed to support recreational activities (BLM 2007).

Effects from Prescribed Fire Treatments
The effects of prescribed fire on WSAs would depend on a number of factors, such as the vegetation type of the site, the condition of the site, and the particular unique quality of the site that requires special management. In general, sites with special qualities that could be destroyed by fire would be the most likely to experience significant adverse effects from fire treatments. Sites at which natural fire cycles have been altered, and that do not contain attributes that would be susceptible to loss by burning, would be likely to benefit from these treatments.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on ACECs would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under the No Action Alternative, fewer acres would be subject to treatment activities, reducing slightly the impacts to WSAs as compared to the Proposed Action. However, in the long-term, WSAs would benefit from the increased treatments under the Proposed Action as a result of improved native vegetation conditions.

4.1.14 Lands with Wilderness Characteristics
Lands with wilderness characteristics was not a specifically analyzed as a resource in the PEIS, however effects considered for ACECs and WSAs may apply to LWC units (see 4.1.12 and 4.1.13).

Proposed Action
The CCD has not yet completed a land use plan revision that would determine how LWC units are to be managed. A final decision on which units would or would not be managed for wilderness characteristics is not be anticipated until 2016.

The effects of implementing mechanical, manual, biological, chemical or prescribed fire treatments would be expected to have short-term effects that could vary in magnitude, depending on the size of treated area, and whether or not motorized equipment was used.

No Action Alternative
The No Action Alternative is substantially similar to the Proposed Action.

4.1.15 Cultural Resources
This effects summary is compiled from the PEIS, pages 4-102 through 4-110, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to cultural resources.

Proposed Action
Effects from Mechanical and Manual Treatments
Root plowing, tilling and drill seeding, mowing, roller chopping and cutting, blading, grubbing, and feller-bunching would damage surface and subsurface cultural resources if the sites were not avoided. Treatments involving surface and shallow subsurface disturbance would likely introduce organic materials to lower soil layers, thereby contaminating surface or shallow subsurface cultural resource sites containing early historic or prehistoric datable organics, such as charcoal, wood, or preserved plant materials. Plant and pollen contamination would lead to incorrect or inaccurate analytical results by researchers studying such remains preserved at sites. Surface and shallow subsurface effects would also include horizontal and vertical displacement of the upper portion of soils in which archaeological resources are contained, compromising depositional context and integrity, and artifact damage or destruction.

Prior to treatments, the BLM would coordinate with tribes to avoid plants identified as being important in traditional subsistence, religious, or other cultural practices. Timing of treatments would be critical to avoid conflict with traditional cultural practices. Once concerns of tribes were identified, the BLM would take these concerns into consideration when treating vegetation in sensitive areas.

The use of hand tools and hand-operated power tools to cut or clear vegetation could disturb both surface and subsurface cultural resources. However, such manual treatments have the least potential to affect known identified cultural sites.

Effects from Biological Treatments
Biological treatments using grazing animals could damage surface artifacts and disrupt surface and shallow subsurface cultural materials. However, pre-treatment site-specific investigations and development of measures to discourage livestock from using sensitive areas would decrease this possibility. Because of their small size and host-specific action, insects or pathogens would

be unlikely to affect cultural resources, although organic site constituents (e.g., baskets, cordage, etc.) might be affected, if present.

Consultation with tribes would be undertaken to locate any areas of vegetation of importance to tribes and that could be affected by biological treatments. The BLM would work with tribes to minimize effects to these resources from grazing or other biological treatments.

Effects from Chemical Treatments

While herbicide treatments could affect buried organic cultural resources, they would be more likely to have a negligible effect on traditional cultural practices of gathering plant foods or materials important to local tribes or groups. The effect of herbicide treatments on cultural resources would depend 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—even some types of stone from which artifacts are made. Chemical treatments could also alter or obscure the surfaces of standing wall masonry structures, pictograph or petroglyph panels, and organic materials. While chemicals could affect the surface of exposed artifacts, they could also generally be removed without damage if the artifacts were treated soon after exposure.

Depending on the selected application method, herbicide applications would have limited ability to avoid plants identified by tribes as being important in traditional subsistence, religious, or other cultural practices. Consultation would be undertaken with tribes to locate any areas of vegetation of importance to the tribe that could be affected by herbicide treatments, which could then be subject to potential cancellation. Certain herbicides could also pose a possible health risk, through residues left on plants used as traditional foods or for ceremonial purposes, or by contaminating other food sources or drinking water. The risk would vary depending on the time of plant use and herbicide treatment, and the portions of the plants that are used by tribal members (BLM 2007).

Effects from Prescribed Fire Treatments

The effects of prescribed fire on cultural resources would vary depending on temperature and duration of exposure to heat. Generally, higher temperature and/or longer exposure to heat increases the potential for damage to cultural resources. As a general rule, fire does not affect buried cultural materials.

Stumps that smolder and burn have the potential to affect nearby buried materials. Heavy duff, surface logs, and roots that smolder and burn have the potential to expose subsurface materials to heat over a period of time, and hence have the potential to affect cultural materials. Fires that burn hot and fast through a site may have less of an effect on certain types of cultural materials than fires that smolder in the duff, or than logs that burn for a period of time.

Some effects of prescribed fire on certain cultural materials may be insubstantial. That is, the fire might not actually diminish characteristics that make a site eligible for the NRHP. For example, although high heat could destroy obsidian hydration bands on surface artifacts, the surface component of the affected site might not be of particular value in the site's overall

assessment. Fire could burn the solder out of a hole-in-cap can without diminishing the can's ability to provide chronological information for a site.

Because prescribed fire can be controlled, cultural resource specialists could work with fire managers to determine the predicted temperature and duration of a fire through an area, and possibly to modify burn plans to minimize effects to cultural resources.

Protecting cultural resources during a prescribed fire would begin with fire management planning. During planning, the BLM would define vulnerable cultural resources by classes of site-types and specific sites, identify appropriate protection measures for them, and identify appropriate management responses with regard to cultural resources in the event of fire. Consultation with SHPO, Tribes, and other appropriate entities would be part of the project planning process, especially when designing fire-specific protocols for identification and protection of potentially affected cultural resources.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. The effects from these treatments on cultural resources would be substantially similar to the Proposed Action. New chemicals approved by the BLM since 2008 and the use of biological treatments or prescribed fire included in the Proposed Action would not be utilized. Under the No Action Alternative, fewer acres would likely be treated than the Proposed Action, slightly reducing impacts to cultural resources from treatment activities. However, in the long-term cultural resources would benefit more from the Proposed Action than the No Action Alternative as a result of improved native vegetation conditions.

4.1.16 Native American Religious Concerns
The effects to Native American religious concerns would be substantially similar to cultural resources (see Section 4.1.15).

4.1.17 Air Quality
This effects summary is compiled from the PEIS, pages 4-4 through 4-11, which is hereby incorporated by reference in its entirety (BLM 2007).

Proposed Action
Effects from Manual and Mechanical Treatments
Particulate matter associated with operation and use of mechanical and hand-held equipment, as well as driving on unpaved roads to and from the treatment site, would be the primary pollutant associated with mechanical and manual treatments. Power equipment and machinery exhaust would emit CO, SO_2, NO_2, VOCs, and other minor pollutants. However, emissions would generally be small, localized, and temporary.

Effects from Biological Treatments
Biological control organisms would have few direct effects on air quality. Grazing animals would generate odors and dust, but these emissions would be minor, localized, and short-term in duration. Emissions associated with vehicle exhaust and dust would occur during transport to treatment sites; these emissions would also be minor, localized, and short-term in duration.

Practices to minimize transportation emissions would be the same as those identified for mechanical and manual treatments. Odors and dust associated with grazing animals could be reduced by limiting the density of animals confined to an area.

Effects from Chemical Treatments

The effects of herbicide use on air quality originate primarily from ground vehicle (truck, ATV, and boat) and aircraft (plane and helicopter) exhaust emissions, as well as fugitive dust (dust created by vehicle travel on unpaved roads) resulting from herbicide transport and application. In addition, spray drift (movement of herbicide in the air to unintended locations) and volatilization (the evaporation of liquid to gas) of applied herbicides temporarily results in herbicide particles in the air, which can be inhaled and deposited on skin or plant surfaces, with the potential to affect humans, wildlife, and non-target plants. In addition, herbicide particles could be transported long distances from the target location, depending on weather conditions and the herbicide application method (BLM 2007).

Effects from Prescribed Fire Treatments

The most predominant atmospheric effect of both prescribed fire is smoke. In addition to affecting the visual characteristics of an area, smoke can also affect the health of humans, plants, and animals that come into contact with smoke.

The total volume of smoke produced from a prescribed fire depends primarily on the amount of fuel consumed and the temperature of the burn. Factors influencing smoke production include fuel type, fire behavior, fuel moisture, particle size, particle arrangement, and fuel weight per unit area. In general, emissions per unit of fuel burned are greater at higher fuel moistures and lower temperatures. Fuel beds composed of small particles packed tightly together tend to burn more slowly and produce more smoke than larger particles less tightly packed. Finally, the more fuel available to burn, the greater the smoke production.

A number of air pollutants are found in smoke emissions, including CO_2, CO, PM_{10} and $PM_{2.5}$, and VOCs. Carbon dioxide and water vapor make up the majority of emissions (about 90 percent) from prescribed fire. Lesser quantities of CO, PM_{10}, $PM_{2.5}$, and VOCs are also produced.

Carbon dioxide makes up more than 70 percent of the total mass emitted from fire. Carbon dioxide emissions from fire have no direct health or visibility effects. Carbon dioxide is a "greenhouse gas" and figures prominently in global climate change assessments.

Carbon monoxide is the most abundant air pollutant emitted during burning, representing nearly six percent of the total mass emitted. This amounts to approximately 20 to 500 pounds of CO per ton of fuel consumed. Carbon monoxide has no effect on visibility, but can present a direct health hazard to fire line workers. Because CO dilutes rapidly to levels below the NAAQS, it presents minimal risk to community air quality around prescribed burns.

Particulate matter is the most important air pollutant emitted from fire because of its far-reaching effects. Particulate matter represents approximately two percent of the total mass emitted from fire. This amounts to approximately 20 to 180 pounds of PM emitted per ton of fuel consumed.

The particles emitted from fires vary in size and composition, depending on the intensity of the fire and the characteristics of the fuel bed.

From an air quality standpoint, the two most important size categories of particulate matter are $PM_{2.5}$ and PM_{10}. Fine particles are readily transported by wind, and can affect community air quality at long distances from fires.

Volatile organic compounds are a diverse group of potentially toxic air pollutants containing hydrogen, carbon, and sometimes oxygen and other trace elements. Together, VOCs represent nearly one percent of the total mass emitted in fires. Approximately 20 pounds of VOCs are produced for each ton of fuel consumed. The primary risk from VOCs is adverse effects to human health.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. On-going weed treatment activities due not contribute pollutants to an extent that could change the status of any air basins in the CCD. The No Action Alternative would likely have fewer emissions and particulates than the Proposed Action, because the Proposed Action would likely result in increased acres of treatment and new methods (including aerial spraying). The No Action Alternative would also have fewer particulate emissions because the No Action Alternative does not include prescribed fire as a treatment method of noxious and invasive weeds.

4.1.18 Human Health and Safety

This effects summary is compiled from the PEIS, pages 4-134 through 4-140, which is hereby incorporated by reference in its entirety (BLM 2007). This effects summary assumes that the SOPs listed in Appendix A would be used to reduce potential unintended effects to human health and safety.

Proposed Action
Effects from Mechanical Treatments
Workers using tractors and other heavy equipment would face the same types of risks as workers using similar equipment; however, risks of severe injuries from mechanical treatments would be low if workers adhered to standard safety procedures.

Contact with cutting blades, mulchers, shredders, drills, or similar equipment during operation could hurt machinery workers. Operators could be injured or killed by losing control of their equipment, which would be most likely to occur during treatments on steep slopes, near wetlands or other unstable surfaces, or in dense foliage. Rocks and other flying debris kicked up by equipment could harm the operator or other workers near the treatment site. These risks could be minimized by avoiding treatments on steep slopes or traveling perpendicular to the slope, maintaining equipment in optimal working order, and using shields on equipment to deflect flying debris. High noise levels during equipment operations could cause operators to experience partial hearing impairment. Use of hearing protection devices would help to reduce noise risks. Exhaust gases could be harmful to equipment operators working in tight spaces.

Workers using machinery in powerline ROWs would need to be extra careful to avoid contact with the powerline, or with vegetation touching the powerline, to avoid electrocution.

The public would be at a slight risk for injury from flying debris. Risks to the public would be greatest for vegetation treatment activities near public facilities and along ROW. Maintaining a safety buffer around treatment areas would limit the risk of harm to the public from mechanical treatment operations.

Fuels and lubricants used in mechanical equipment could spill into a stream or other water body from an accident or leak, or during refueling, potentially fouling drinking water sources. The BLM would refuel trucks, tractors, and other equipment away from water bodies, preferably at a designated fueling site, and would carry sorbents or other spill cleanup materials or equipment to work sites to clean up any minor spills that occurred during equipment operation.

Effects from Manual Treatments

Nearly all manual treatments would involve pulling or cutting vegetation with non-motorized hand equipment or chainsaws. Workers would be exposed to a variety of risks when using hand tools and pulling weeds. Hand pulling exposes workers to the hazards of physical contact with irritant weeds, such as leafy spurge, which can cause blisters, dermatitis, and inflammation. Workers could also suffer allergic reactions to pollen from grasses and forbs.

Workers would be at risk from biting and sucking insects, such as ticks and mosquitoes. Workers could also come into contact with poisonous snakes. Workers surprising wildlife would be at risk for attacks. Some manual treatments would occur in remote areas where use of motorized equipment is difficult. The time required to obtain medical treatment in remote areas may complicate some injuries.

Workers implementing manual treatments would be in good physical condition. Nonetheless, physical exertion during hot weather could lead to heat stroke. Exertion could also exacerbate existing chronic health problems or result in a stroke or heart attack. Falls or other accidents could also occur. When using hand tools, workers could hit or cut themselves with tools, be hit by falling trees, shrubs, or debris, or fall onto sharp equipment or the ends of cut vegetation. Injuries could range from minor scrapes to major bleeding or bone fractures. Severe injuries occurring in remote areas could become fatal. Maintaining equipment in optimal working condition and using automatic shut-off devices would help to reduce the likelihood of injury. Workers would be exposed to noise and exhaust from motorized equipment. Use of hearing protection and operation of equipment in well-ventilated areas would minimize effects to operator health.

It is unlikely that the public would be at risk from manual treatments. It is possible that flying debris could accidentally hit a person, but safety zones around work areas would minimize this possibility.

Effects from Biological Treatments

Livestock managers could be stepped on, trampled, kicked, or bitten by livestock, or hurt while operating vehicles when transporting livestock to or from the treatment area. Workers could also

suffer minor discomfort from exposure to livestock fecal material and animal odors. Members of the public could experience similar effects if they were to come into contact with livestock. Large numbers of livestock, combined with a long period of vegetation containment, could result in large amounts of fecal material within the treatment area. If fecal material were to enter surface waters through direct deposition or from runoff, members of the public downstream from the treatment site could drink contaminated water. Using stock tanks as an alternate water source, constructing range fencing, and moving and dispersing livestock away from riparian and other aquatic areas would reduce this risk.

Workers could be hurt during operation of equipment to transport and release insects and pathogens at treatment sites. Only biological control agents that have been studied and determined not to pose a risk to non-target or desirable species would be used to treat vegetation. It is unlikely that the public would come into contact with these organisms when harvesting vegetation.

Effects from Chemical Treatments

Aerial applications of herbicides pose a greater risk to the public due to off-site drift than ground applications, as herbicides applied at greater distances from the ground are able to drift farther from the target application area. Therefore, public receptors within a larger radius of the treatment site would be at risk if the herbicide was applied aerially than if it was applied by a ground application method.

Spot applications would be less likely to pose a risk to downwind receptors than boom/broadcast applications. However, spot applications would be more likely to pose a risk to the worker charged with applying the herbicide; because these workers are more likely to come into contact with the herbicide, their exposure doses could be higher. In particular, there would be a low to moderate risk to workers applying diquat by backpack or horseback from exposure to the herbicide, whereas those applying diquat at the typical application rate by ATV or truck would not be at risk.

Most of the herbicides do not pose a risk to human receptors when applied at the typical application rate. At the maximum application rate, however, more herbicides, under more exposure scenarios, have the potential to adversely affect human health. Based on the HHRAs, fluridone, chlorsulfuron, clopyralid, glyphosate, picloram and triclopyr would not pose a risk when applied at the typical rate, but would pose a risk under one or more exposure scenarios involving applications at the maximum application rate. There would not be risks associated with scenarios involving applications of dicamba, diflufenzopyr, imazapic, imazapyr, metsulfuron methyl, or sulfometuron methyl at the maximum (or typical) application rate.

There would be risk to workers treating noxious and invasive weeds with 2,4-D, bromacil, diquat, diuron, or tebuthiuron at either the typical or the maximum application rate. Diuron pose risks to most receptors under scenarios involving the typical application rate. There would be low to moderate risks to receptors aerially applying 2,4-D, diquat, bromacil, or tebuthiuron, even at typical rates, and most workers would be at risk when applying these herbicides at maximum application rates. 2,4-D pose risks to ground applicators, particularly under scenarios involving the maximum application rate. Mixer/loaders would be at low risk during aerial applications of

fluridone, and high risk during aerial applications of bromacil, diuron, or tebuthiuron. Applicators would be at risk during ground broadcast applications of atrazine or diuron at the typical rate, and during ground broadcast applications of bromacil, chlorsulfuron, or tebuthiuron at the maximum rate. All occupational receptors would be at risk from applying hexazinone, tebuthiuron, and triclopyr at the maximum application rate. The rest of the potential occupational exposures would not pose a risk to receptors. Workers involved in the aerial application of herbicides appear to be at greater risk than other occupational receptors; however, the application method that poses the greatest risk to workers appears to vary depending on the herbicide, so application methods for each herbicide would be carefully evaluated with respect to potential human health effects.

In general, public receptors are less at risk than occupational receptors. However, within this category, children can be more at risk than adults. Public receptors do not appear to be at risk from applications of chlorsulfuron, dicamba, diflufenzopyr, imazapic, imazapyr, metsulfuron methyl, or sulfometuron methyl. Diquat application at the typical application rate poses low risks to child residents. When applied at the maximum rate, diquat would pose low to moderate risks to all public receptors, except swimmers. Diuron would pose risks to most public receptors under worst-case exposures. In addition, 2,4-D, bromacil, clopyralid, diuron, glyphosate, hexazinone, picloram, tebuthiuron, and triclopyr could pose risks to public receptors under one or more accidental exposure scenarios (e.g., exposure resulting from the spill of an herbicide into a small pond). For most herbicides (except diquat), risks to public receptors could be minimized or avoided by using the typical application rate and following SOPs that would greatly reduce the likelihood of accidents (BLM 2007).

Effects from Prescribed Fire Treatments

Workers and the public would be at risk from prescribed fire. Risks to workers and the public would include injury and fatality as a result of the fire itself, from inhalation exposure from combustion products, and from inhalation of volatized herbicide residues.

Prescribed fire presents various hazards to ground crews, who could possibly receive injuries ranging from minor to severe burns resulting in permanent tissue damage. Risks to workers would be minimized by use of protective clothing and by following standard safety procedures. The public could be exposed to similar risks if the fire escaped from the treatment area. The remoteness of most treatment areas and presence of fire crews and safety equipment would make the risk of injury to the public extremely low.

Substances that may be found in wood smoke include water, particulate matter, carbon monoxide, carbon dioxide, nitrogen oxides, aldehydes, ketones, and other substances. Carbon dioxide and water make up over 90 percent of total mass emitted from fire.

Particulate matter is the principal pollutant of concern from fires, particularly for particles less than 10 microns in diameter. Approximately 14 to 50 tons of particulate matter is produced per ton of fuel burned. Particulate matter affects pulmonary function; and children, the elderly, and asthmatics are especially sensitive to exposure.

Although the long-term health effects from occupational smoke exposure are not well known, evidence suggests that brief, intense exposures to carbon monoxide and particulate matter can easily exceed short-term exposure limits in peak exposure situations such as direct attack and holding fire lines downwind of an active prescribed burn. The long-term health effects to firefighters from smoke exposure are unknown, although there is anecdotal evidence that the incidence of cardiopulmonary disease and death may be greater than in the general population.

Smoke can cause highway safety problems when it impedes a driver's ability to see the roadway. This is a minor issue in the more remote areas of the West where most public lands are located.

The gaseous components of smoke, including carbon monoxide, carbon dioxide, and nitrogen oxides, generally decompose or diffuse into the atmosphere relatively quickly. Emissions of carbon monoxide range from about 80 pounds per ton of wood burned for flames to 800 pounds per ton for smoldering fires. Carbon monoxide could represent a direct hazard to human health at the fire line. Carbon monoxide from prescribed fires likely poses no risk to community air quality.

Polynuclear aromatic hydrocarbons (PAHs) are of significant toxicological concern when evaluating the effects from wood smoke because they contain at least five carcinogenic materials. Aldehydes and ketones are ciliary toxicants that inhibit the removal of foreign material from the respiratory tract. Aldehydes are also known irritants that may be adsorbed onto the surface of particulate matter.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would continue to treat noxious and invasive weeds based on the site-specific approach in the 2008 EA. Under the No Action Alternative, fewer acres would be treated than the Proposed Action, as a result there would be slightly less exposure risk to the public and employees.

4.1.19 Visual Resources

This effects summary is compiled from the PEIS, pages 4-110 through 4-113, which is hereby incorporated by reference in its entirety (BLM 2007).

Effects from Mechanical Treatments
Use of mechanical treatments to clear vegetation would be likely to remove large quantities of vegetation from a treatment site, in many cases exposing soil and leaving dead plant material on the ground to turn brown. Mechanical methods such as tilling and mowing have the potential to scarify the landscape and leave bare soil and dead vegetation that contrast with the surrounding colors. Mowing can also create an uneven, ragged appearance along roadsides and ROWs, but in other areas can result in a well-manicured, pleasing look.

Mechanical treatments on flat terrain, such as sagebrush communities, would have less effect on visual resources than treatments on steeper terrain, such as pinyon-juniper woodlands, which would be more visible on the landscape. The effects of mechanical treatments on visual resources would be temporary, and would only last until the reestablishment of vegetation on the treatment site, typically one or two growing seasons.

Effects from Manual Treatments

There would be some visual changes to the landscape as a result of manual treatments, but since this treatment method would be limited to small areas, these changes would be much less noticeable than the alterations caused by other treatment methods. In some cases, manual treatments would result in the extraction of weeds from a sensitive site, immediately resulting in an improvement in the quality of visual resources on the site. In other cases, such as the removal of vegetation with chainsaws, the effects would be negative, though minor, and would last until the treated areas were concealed through revegetation.

Effects from Biological Treatments

The use of domestic animals to contain undesirable vegetation would cause minimal effects to visual resources. The sight of domestic animals would not cause any adverse effects, as the presence of these animals is typically common and expected on public lands. Trampling and consumption of vegetation by livestock, as well as the presence of feces on the ground, would minimally reduce the quality of visual resources. However, these effects of grazing would not create sharp visual contrasts, and would be short-term in nature, becoming largely unnoticeable after revegetation of the site.

The use of insects and pathogens to control weeds would cause some visual alterations to the landscape. Plants attacked by these agents often show visual symptoms of disease or parasitism are regarded as visually unappealing. However, these changes would only be noticeable upon close examination of the site. The overall appearance of the treatment area would likely remain relatively unchanged. Because these agents kill target species gradually, the effects would be less visibly distinct than treatments that kill a large area of vegetation all at once.

Effects from Chemical Treatments

In general, herbicide treatments would have short-term negative effects and long-term positive effects on visual resources. The greater the area of vegetation treatment, the greater the visual effect is likely to be. Large treatments alter a larger portion of the landscape than small treatments, and the effects are more likely to be observed by people. However, areas receiving large-scale treatments are most likely to be degraded lands of low to moderate scenic quality, resulting in a smaller visual effect from treatment and likely an improvement in the scenic quality of the land over the long term. Color contrasts caused by vegetation removal would be most apparent in areas dominated by green and/or flowery vegetation and by large plants, such as coniferous forests. The visual effects would be heightened if the herbicides also prevented the manifestation of seasonal changes in vegetation, such as spring flowers and/or fall color. The contrast between a cleared area and the surrounding vegetation would be less for much of the arid west, where low-growing shrubs, and browns, grays, and earth tones dominate the landscape, than for areas with greater amounts of rainfall. Therefore, browned vegetation would not be as apparent. In addition, the brown colors associated with vegetation treatments would be the least noticeable during the late fall and the winter, when they would blend more naturally with surrounding colors than in the spring and summer, when the green colors of new growth are more likely to be present.

Effects from Prescribed Fire Treatments

During prescribed fire treatments, there would be some effects to visual resources, with localized deterioration of air quality and reduced visibility caused by smoke. These effects would only persist as long as the fire itself. In addition to affecting the visual characteristics of an area, smoke can also affect the health of humans, plants, and animals that come into contact with smoke.

Following a fire, the blackened appearance of the treated areas would create a color contrast, affecting visual resources. Darkened stumps and snags would be visible for many years following treatments. Although vegetation would begin to reappear in the growing season after the fire, softening the visual contrasts, there would be lasting evidence of the burn.

The total volume of smoke produced from a fire primarily depends on the amount of fuel consumed and the temperature of the burn. Factors influencing smoke production include fuel type, behavior, and moisture; fuel weight per unit area; and particle size and arrangement. Particulate matter is the most important air pollutant emitted from fire because of its far-reaching effects.

The quantity of emissions from prescribed fire, and thus the air quality effects from smoke, varies from fire to fire, depending on several factors. A fire's size, duration, intensity, fuel type, surface fuel loading by size class, and fuel moisture content all affect its total fuel consumption and emission characteristics. The fire's intensity and distance from receptors, as well as current meteorological conditions such as wind speed and atmospheric stability, affect the concentrations that arrive at downwind receptors. Regionally, visibility effects are roughly proportional to the total annual emissions from wildfires. The greater the emissions, the greater the expected effects on visibility.

1) Prescribed fire emissions can be reduced by:
2) having clear smoke management objectives;
3) burning when conditions favor rapid combustion and dispersion;
4) burning under favorable moisture conditions;
5) using backfires when applicable;
6) burning smaller vegetation blocks when appropriate; and
7) coordinating with regional and local air pollution and fire control officials to ensure that the burn plan complies with federal, State, and local regulations.

4.2 Residual Effects

"Residual effects" are those adverse effects that remain after implementation of mitigation measures. No major (significant) adverse effects have been identified in this draft programmatic EA. Measures have been incorporated into the elements of the Proposed Action to avoid and minimize adverse effects (Appendix A). This draft programmatic EA is tiered to the 2007 ROD which considered any potential significant effects from the treatment of noxious and invasive weeds.

5.0 CUMULATIVE EFFECTS

A cumulative effect is defined under NEPA as "the change in the environment which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other action". "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR Part 1508.7). Past, present, and reasonably foreseeable future actions are analyzed to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the Proposed Action and/or Alternatives may have an additive and significant relationship to those effects.

5.1 Geographic Scope

The geographic scope of the Cumulative Effects Study Area (CESA) is the CCD, an area encompassing approximately 9.0 million acres of public lands and non-BLM managed lands (private, other State or federal agency etc.). The CESA also includes those HMAs and grazing allotments that are partially within CCD and other BLM district(s) for a total CESA of approximately 10.2 million acres of public and non-BLM managed lands (private, other State or federal agency etc.) (Figure 11). Only those resources directly or indirectly affected by the Proposed Action or No Action Alternative are analyzed for cumulative effects.

5.2 Timeframe of Effects

The timeframe for cumulative effects analysis is 10-years. Short-term cumulative effects would occur at the time of treatment (a few days to a few weeks), whereas long-term cumulative effects may occur over several years.

5.3 Past and Present Actions

Approximately 46 percent of the CESA is under non-BLM management. These lands consist of private lands, State and county lands, and other federal lands such as those managed by the Department of Defense. The distribution of noxious and invasive weeds occur throughout the CESA, regardless of land ownership. Various treatment methods may be used to control and/or eradicate noxious and invasive weeds on these lands. Major past and present actions occurring in the CCD and not subject to BLM decision-making include: agriculture including livestock grazing; industrial, residential and commercial development; recreation; transportation; energy corridors and development; and mineral extraction. These activities are approved and/or regulated by local and State laws, regulations and ordinances and are likely to continue in the future.

For BLM-managed lands within the CCD, past and present actions fall into these major categories: minerals exploration and development; renewable energy; vegetation management including the treatment of noxious and invasive weeds; wild horse and burros management; wildland fire management (suppression, fuels management, emergency stabilization and rehabilitation); recreation including special event permitting; military training operations; livestock grazing; and lands and realty (ROWs, leases, patenting, communication sites, land tenure adjustments).

5.4 Reasonably Foreseeable Future Actions

According to BLM 2014, the following are reasonably foreseeable future projects, plans or actions for BLM-managed lands in the CCD.

Table 14. Reasonably Foreseeable Future Actions on BLM-Managed Lands.

Program	Actions
Energy and minerals development	Within the CCD, there are currently two gold and silver operations, one copper mine, one magnesium compound operation, one salt mine, four diatomite operations, one gypsum operation, two perlite operations, one carbonate (limestone and lime) mineral operation, one pumice operation, and one pozzolan operation. There are 23 plans of operations for exploration (greater than five acres) or mining of locatable minerals. There are three active competitive contracts for salable minerals removing more than 200,000 cubic yards annually, and more than 260 contracts or free use permits for smaller volume salable minerals operations. There are 148 geothermal leases covering approximately 299,200 acres, with five associated power plants and an active geothermal power production of 183 megawatts. As many as five 15-megawatt geothermal power plants may be constructed and contribute to 605 acres of disturbance during the next 10-years. There are currently 30 oil and gas leases in the CCD. To date only exploration has occurred. According to BLM 2014, there is no reason to believe that oil and gas production would be foreseeable in the CESA during the next 10-years.
Renewable energy	Two utility-scale photovoltaic solar plants, two utility-scale wind developments, and two small mobile biomass facilities may be permitted during the next 15-years. A plan has been submitted to the BLM for a 560-acre solar panel field by Luning Solar. Construction has been authorized for three geothermal power plants.
Vegetation management	Forestry uses in the CCD include personal and commercial harvest of trees for fuel wood, poles and posts for fence building, collection of pinyon pine nuts, and cutting of Christmas trees. Mechanical, manual and chemical treatments of undesirable vegetation would continue. Removal of pinyon-juniper expansion, and treatment of noxious invasive weeds such as cheatgrass would occur. Approximately 50,000 acres of vegetation treatments, primarily focused in pinyon-juniper encroachment, have been approved and would be implemented across the CCD during the next 10-years.
Livestock grazing	There are 111 allotments and 52 permittees in the CCD. Seventy-seven percent of the allotment area currently available for grazing. Eighty-two percent of the permits were for cattle, with sheep and horse grazing accounting for the remaining 18 percent. Associated with grazing allotments to assist in grazing management are infrastructure including: allotment and pasture fencing; water troughs and pipelines, and catch corrals. Term grazing permits are issued on a 10-year basis. The CCD issues a fully analyzed term grazing permit about once per year, this trend is anticipate to continue during the next 10-years.
Recreation	Dispersed recreational activities occur throughout the CCD. Sightseeing, rock hounding, hiking, horseback riding, hunting and fishing are among some of the on-going activities. The use of all-terrain and four-wheel drive vehicles is common throughout the CCD on various routes (single or double-track, unmaintained and maintained dirt roads, and paved county and State routes). Authorized Special Recreation Permits within the CCD include: competitive motorcycle and horse endurance events, and all-terrain vehicle touring. There are approximately 40 special recreation permits for vendors, outfitters and guides, and competitive/commercial events in the CCD. This trend is likely to continue over the next 10-years. Approximately 77 percent of the CCD is currently managed as “open”. No comprehensive inventory for the CCD exists as to how many miles of travel routes exist. Route development often occurs from user-created trails which are then repeatedly used, enlarged and expanded. This trend, especially in the western, more urban-interface portion of the CCD, is anticipated to continue over the next 10-years.

Program	Actions
Lands and realty	Land tenure adjustments likely to occur in the CCD include: conveying or leasing lands under the Recreation and Public Purposes Act; conveying lands as a result of special Congressional legislation such as the National Defense Authorization Act enacted on December 19, 2012; and acquiring sensitive parcels under the Southern Nevada Public Lands Management Act. Approximately 24,000 acres of public lands have been approved for conveyance under recent legislation. Right-of-ways can be authorized for roads, underground or overhead utilities, and facilities such as waste water treatment facilities. Over the past 10 years, the CCD has averaged the issuance of approximately 28 right-of-way authorizations per year. Approximately 35 right-of-ways area applied for annually with that trend expected to continue during the next 10-years. Military training operations (e.g. helicopter and other aviation training, land navigation, search and rescue, and driver training) are anticipated to continue to occur on CCD lands over the next 10-years.
Wild horses and burros management	There are 17 herd management areas within the CCD that support wild horses or burros. Management activities include: periodic gathers occur to remove excess animals and apply population fertility controls. A wild horse gather is conducted on average once every other year in the CCD. The removal of wild horses because of public complaints occurs at a higher rate of two to six times per year, but generally involves one or two animals. This trend is anticipated to continue over the next 10-years.
Wildland fire management	The 10-year average for wildlife fire in the CCD is approximately 16,000 acres per year. The number of acres treated as a part of the emergency, stabilization and rehabilitation would be based on available funding and staff resources. The CCD treats on average approximately 3,000 acres post-fire per year. Post-fire treatments include chaining, aerial seeding, planting on native plant seedlings and soil stabilization activities. These activities are likely to occur over the next 10-years.

Source: modified from BLM 2014.

5.5 Analysis by Resource

Only those resources directly or indirectly affected by the Proposed Action and/or No Action Alternative are considered for cumulative effects. The following resources are not present or would not be affected:

- Environmental Justice
- Fire Management
- Global Climate Change
- Land Use Authorization
- Minerals
- Paleontology
- Recreation
- Socioeconomics
- Travel Management
- Wastes, Hazardous or Solid
- Wild and Scenic Rivers

Noxious and Invasive Weeds

Proposed Action

Under the Proposed Action, vectors that could spread noxious and invasive weeds, such as grazing animals, wildfire, vegetation treatments, construction activities from minerals and realty developments would continue. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. The use of a wide range of techniques to control and/or eradicate infestations of weeds would likely result in the long-term reduction in weed populations or the rate of spread of weeds in the CCD. The risk of spread of weeds onto non-BLM managed lands in the long-term would likely be reduced.

No Action Alternative (Current Management)

Under the No Action Alternative, vectors that could spread noxious and invasive weeds, such as grazing animals, wildfire, vegetation treatments, construction activities from minerals and realty developments would continue. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. The limited treatment options in the long-term may result in no net decrease in weed populations or decrease in the rate of spread of weeds in the CCD. The risk of spread of weeds onto non-BLM managed lands may be unchanged under the No Action Alternative.

Vegetation

Proposed Action

Under the Proposed Action, the spread of noxious and invasive weeds would continue to affect vegetation in the CCD. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to non-target species would likely increase as the number of treatments, methods, and range of chemicals used to treat noxious and invasive weeds increases. In the long-term, decreases in noxious and invasive weed populations would improve vegetative conditions, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve vegetative conditions that support increased diversity of wildlife. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to vegetation from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the spread of noxious and invasive weeds would continue to affect vegetation in the CCD. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Short-term cumulative effects to target and non-target species would likely be less than the Proposed Action. In the long-term, decreases in noxious and invasive weed populations would improve vegetative conditions, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve vegetative conditions that support increased diversity of wildlife. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to vegetation from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

Wetland/Riparian Zones

Proposed Action

Under the Proposed Action, the spread of noxious and invasive weeds would continue to affect wetland/riparian zones. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to non-target species would likely increase as the number of treatments, methods, and range of chemicals used to treat noxious and invasive weeds increases. Some of the chemicals approved for use in aquatic settings since 2008 may pose less toxicity risk to water resources than older chemicals. In the long-term, decreases in noxious and invasive weed populations would improve wetland/riparian communities, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve wetland/riparian zone conditions that support increased diversity of wildlife in wetland/riparian zones. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wetland/riparian zones from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the spread noxious and invasive weeds would continue to affect wetland/riparian zones. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Short-term cumulative effects to target and non-target species would likely be less than the Proposed Action. In the long-term, decreases in noxious and invasive weed populations would improve wetland/riparian communities, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve conditions that support increased diversity of wildlife in wetland/riparian zones. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wetland/riparian zones from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

Water Quality (Surface/Ground)

Proposed Action

Under the Proposed Action, the spread of noxious and invasive weeds would continue to affect water quality. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to water resources would likely increase as the number of treatments, methods, and range of chemicals used to treat noxious and invasive weeds increases. Some of the chemicals approved for use in aquatic settings since 2008 may pose less toxicity risk to water resources than the older chemicals. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to water quality from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the spread noxious and invasive weeds would continue to affect water quality. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals

approved for use (Proposed Action) in aquatic settings since 2008 may pose less toxicity risk to water resources than the older chemicals. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to water quality from treatment of noxious and invasive weeds would be neutral or beneficial. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to water quality from treatment of noxious and invasive weeds would be neutral.

General Wildlife, Migratory Birds

Proposed Action

Under the Proposed Action, wildlife and migratory birds and their habitats would continue to be affected by the spread noxious and invasive weeds. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to wildlife and migratory birds would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Some of the chemicals approved for use since 2008 may pose less toxicity risk to wildlife and migratory birds than older chemicals. The use of chemical treatments by aerial application, and use of prescribed fire would likely increase short-term effects to wildlife and migratory birds through displacement. In the long-term, increased control or eradication of noxious and invasive species would be expected to benefit wildlife and migratory birds through improved habitat conditions. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wildlife from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, wildlife and migratory birds and their habitats would continue to be affected by the spread noxious and invasive weeds. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals approved prior to 2008 may pose greater toxicity risk to wildlife and migratory birds than newer chemicals. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wildlife from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

BLM Sensitive Species, Threatened & Endangered Species (Plants)

Proposed Action

Under the Proposed Action, the spread of noxious and invasive weeds would continue to affect vegetation in the CCD. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to non-target species would likely increase as the number of treatments, methods, and range of chemicals used to treat noxious and invasive weeds increases. In the long-term, decreases in noxious and invasive weed populations would improve vegetative conditions, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve vegetative conditions that support increased diversity of wildlife. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to sensitive plants from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)
Under the No Action Alternative, the spread of noxious and invasive weeds would continue to affect vegetation in the CCD. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Short-term cumulative effects to target and non-target species would likely be less than the Proposed Action. In the long-term, decreases in noxious and invasive weed populations would improve vegetative conditions, decrease the wildfire frequency and intensity as a result of treatment of cheatgrass, and improve vegetative conditions that support increased diversity of wildlife. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to sensitive plants from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

BLM Sensitive Species, Threatened & Endangered Species (Animals)
Proposed Action
Under the Proposed Action, sensitive wildlife species, threatened and endangered species (animals) and their habitats would continue to be affected by the spread noxious and invasive weeds. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Some of the chemicals approved for use since 2008 may pose less toxicity risk than older chemicals. The use of chemical treatments by aerial application, and use of prescribed fire would likely increase short-term effects to through displacement. In the long-term, increased control or eradication of noxious and invasive species would be expected to benefit sensitive wildlife species, and threatened and endangered species (animals) through improved habitat conditions. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to sensitive wildlife from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)
Under the No Action Alternative, sensitive wildlife species, threatened and endangered species (animals) and their habitats would continue to be affected by the spread noxious and invasive weeds. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals approved prior to 2008 may pose greater toxicity risk than newer chemicals. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to sensitive wildlife from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

Soils
Proposed Action
Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. The use of prescribed fire over large areas

could increase soil erosion potential in the short-term. However, weed treatments that decrease wildfire frequency caused by the spread of annual grasses such as cheatgrass could support greater soil stability and establishment of native plants that decrease soil erosion potential. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to soils from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)
Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Short-term cumulative effects would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. The use of prescribed fire over large areas could increase soil erosion potential in the short-term. However, weed treatments that decrease wildfire frequency caused by the spread of annual grasses such as cheatgrass could support greater soil stability and establishment of native plants that would decrease soil erosion potential. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to soils from treatment of noxious and invasive weeds would be neutral.

Wild Horses and Burros
Proposed Action
Under the Proposed Action, wild horses and burros would continue to be affected by the spread noxious and invasive weeds. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Some of the chemicals approved for use since 2008 may pose less toxicity risk to wild horses and burros than older chemicals. The use of chemical treatments by aerial application, and use of prescribed fire would likely increase short-term effects to wild horses and burros through displacement. In the long-term, increased control or eradication of noxious and invasive species would be expected to benefit wild horses and burros through improved forage. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wild horses and burros from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)
Under the No Action Alternative, wild horses and burros would continue to be affected by the spread noxious and invasive weeds. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals approved prior to 2008 may pose greater toxicity risk to wild horses and burros than newer chemicals. Fewer acres of noxious and invasive weeds would likely be treated under the No Action Alternative than under the Proposed Action. Any amount of control or eradication of noxious and invasive species would be expected to benefit wild horses and burros through improved forage. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to wild horses and burros from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

Livestock Grazing

Proposed Action

Under the Proposed Action, livestock would continue to be affected by the spread noxious and invasive weeds. Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Some of the chemicals approved for use since 2008 may pose less toxicity risk to livestock than older chemicals. The use of chemical treatments by aerial application, and use of prescribed fire would likely increase short-term effects to livestock through displacement. In the long-term, increased control or eradication of noxious and invasive species would be expected to benefit livestock through improved forage. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to livestock from treatment of noxious and invasive weeds would be beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, livestock would continue to be affected by the spread noxious and invasive weeds. Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals approved prior to 2008 may pose greater toxicity risk to livestock than newer chemicals. Fewer acres of noxious and invasive weeds would likely be treated under the No Action Alternative than under the Proposed Action. Control or eradication of noxious and invasive species would be expected to benefit livestock through improved forage. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to livestock from treatment of noxious and invasive weeds would be beneficial, although to a lesser degree than under the Proposed Action.

Area of Critical Environmental Concern

Proposed Action

Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to ACECs would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. ACECs established for their scenic qualities would be affected primarily by mechanical, manual and prescribed fire treatments which can alter the visual characteristics of the ACEC. In the long-term, the control or eradication of noxious and invasive weeds would be expected to cumulatively benefit ACECs by maintaining or restoring native plant communities. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to ACECs from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would likely treat fewer acres of noxious and invasive weeds than under the Proposed Action. Short-term impacts from treatments would be less, as there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. In the long-term, the weed treatments under the Proposed Action would be

expected to cumulatively benefit ACECs by maintaining or restoring native plant communities more than under the No Action Alternative. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to ACECs from treatment of noxious and invasive weeds would be neutral.

Wilderness Study Areas

Proposed Action

Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to WSAs would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Implementation of treatments with consideration of the non-impairment standard for WSAs would mean that effects from treatment would be short-term. Prescribed fire treatments could have the greatest short-term visual impacts to WSAs, as compared to the other methods. In the long-term, the control or eradication of noxious and invasive weeds would be expected to cumulatively benefit WSAs by maintaining or restoring native plant communities. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to WSAs from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would likely treat fewer acres of noxious and invasive weeds than under the Proposed Action. Short-term impacts from treatments would be less, as there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. In the long-term, the control or eradication of noxious and invasive weeds under the Proposed Action would be expected to cumulatively benefit WSAs more than under the No Action Alternative. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to WSAs from treatment of noxious and invasive weeds would be neutral.

Cultural Resources, Native American Religious Concerns

Proposed Action

Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. In the short-term, the use of mechanical and prescribed fire treatments has the greatest potential to effect cultural resources. This would be minimized or avoided through pre-treatment surveys that would be used to establish exclusion areas within treatment units. All treatment categories have the potential to affect non-target species, including those that have traditional uses. This would be minimized through consultation with interested tribes prior to conducting treatment activities. In the long-term, cumulatively these resources would be expected to benefit from the Proposed Action through the maintenance or restoration of native plant communities. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to cultural resources from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would likely treat fewer acres of noxious and invasive weeds than under the Proposed Action. Short-term impacts from treatments would be

less, as there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. In the long-term, the control or eradication of noxious and invasive weeds under the Proposed Action would be expected to cumulatively benefit cultural resources more than under the No Action Alternative through improvement of native plant communities. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to cultural resources from treatment of noxious and invasive weeds would be neutral.

Air Quality

Proposed Action

Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. In the short-term, the use of prescribed fire treatments has the greatest potential to effect air quality. Following the SOPs in Appendix A during fire treatments would minimize potential short-term impacts on air quality. Cumulatively in the long-term, prescribed fire treatments would not be expected to cause a change to air quality conditions. All other treatment methods would be expected to have no or minor short and long-term cumulative effects to air quality. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to air quality from treatment of noxious and invasive weeds would be neutral.

No Action Alternative (Current Management)

Under the No Action Alternative, the CCD would likely treat fewer acres of noxious and invasive weeds than under the Proposed Action. Short-term impacts from treatments would be less, as there would be fewer treatment options utilized. There would be no prescribed fire treatments; short-term impacts to air quality would be less than under the Proposed Action. Without this treatment option available, more mechanical treatments may be employed, increasing emissions. Cumulatively in the short and long-term, manual, mechanical and chemical treatments would be expected to have no or minor cumulative effects to air quality. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to air quality from treatment of noxious and invasive weeds would be neutral.

Human Health and Safety

Proposed Action

Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. There would be increased risks to human health and safety in the short-term as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Some of the chemicals approved for use since 2008 may pose less toxicity risk to employees and the public compared to older chemicals. The use of chemical treatments by aerial application, and use of prescribed fire would likely increase short-term risks to the recreating public and tribal members collecting plants for traditional uses. Cumulatively in the long-term, risk exposure to the human health and safety would be minor or none. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to human health and safety from treatment of noxious and invasive weeds would be neutral.

No Action Alternative (Current Management)
Under the No Action Alternative, there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. Some of the chemicals approved prior to 2008 may pose greater toxicity risk to employees and the public than newer chemicals. Risk exposure in the long-term under the No Action Alternative would be expected to be less than under the Proposed Action. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to human health and safety from treatment of noxious and invasive weeds would be neutral.

Visual Resources
Proposed Action
Under the Proposed Action, the CCD would treat weed infestations through the use of mechanical, manual, biological, chemical, and prescribed fire methods. Short-term cumulative effects to visual resources would increase as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. Prescribed fire treatments could have the greatest short-term impacts to visual resources, as compared to the other methods. In the long-term, the control or eradication of noxious and invasive weeds would be expected to cumulatively benefit visual resources by maintaining or restoring native plant communities. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to visual resources from treatment of noxious and invasive weeds would be neutral or beneficial.

No Action Alternative (Current Management)
Under the No Action Alternative, the CCD would likely treat fewer acres of noxious and invasive weeds than under the Proposed Action. Short-term impacts from treatments would be less, as there would be fewer treatment options utilized (no biological controls or prescribed fire) and fewer chemicals available (only those approved in 2008) to control or eradicate noxious and invasive weeds. In the long-term, the control or eradication of noxious and invasive weeds under the Proposed Action would be expected to cumulatively benefit visual resources more than under the No Action Alternative. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to visual resources from treatment of noxious and invasive weeds would be neutral.

6.0 PERSONS, GROUPS, AND AGENCIES CONSULTED

6.1 List of Preparers

Bureau of Land Management

Name	Title	Project Expertise
Brian Buttazoni	Planning & Environmental Coordinator	NEPA Compliance, Human Health and Safety, Area of Critical Environmental Concern, Visual Resources, Cumulative Effects
John Axtell	Wild Horse and Burro Specialist	Wild Horses and Burros
Katrina Leavitt, Linda Appel, Chelsey Simerson, Ken Vicencio	Range Management Specialist	Livestock Grazing, Vegetation
Rachel Crews, Jason Wright	Archeologist	Cultural Resources and Native American Religious Concerns
Niki Cutler, Michelle Stropky	Hydrologist	Air Quality, Soils, Wetlands/Riparian Zones, Water Quality (Ground & Surface)
Dean Tonenna	Natural Resource Specialist	Vegetation, BLM Sensitive Species (Plants), Threatened and Endangered Species (Plants), Noxious Weeds and Non-Native Plant Species
Pilar Ziegler, Chris Kula	Wildlife Biologist	BLM Sensitive Species (Animals), Threatened and Endangered Species (Animals), General Wildlife, Migratory Birds
Arthur Callan, Dan Westermeyer	Outdoor Recreation Planner	Wilderness Study Areas, Lands with Wilderness Characteristics
Angelica Rose	Planning & Environmental Coordinator	NEPA Compliance

6.2 Public Review

The *Integrated Weed Management Plan/Draft Programmatic Environmental Assessment* (DOI-BLM-NV-C000-2015-0003-EA) has been made available to the public, organizations and other agencies for a 45-day review and comment period. The public review and comment period closes on July 1, 2015.

Although not required for an EA by regulation, an agency may respond to *substantive* and *timely* comments. Substantive comments:

1) question, with reasonable basis, the accuracy of information in the EA;
2) question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis;
3) present new information relevant to the analysis;
4) present reasonable alternatives other that those analyzed in the EA; and/or
5) cause changes or revisions in one or more of the alternatives.

No response is necessary for non-substantive comments (BLM, 2008).

6.3 Tribes, Individuals, Organizations or Agencies Consulted

The following individuals, organizations, Tribes and agencies were consulted during the preparation of this draft programmatic EA or were notified of this documents availability for commenting:

Individuals
Beaupre, A.
Bassett, J.
Baumeister, L.
Bone, D.
Borda, T.
Britton, A.
Byrson, A.
Brown, H.
Cable, R.
Callahan, R.
Card, W.
Casey, M.
Clark, T.
Coombs, D.
Cupurro, S.
Damonte, L.
Depaoli, E.
Depaoli, R.
Estill, J.
Felton, S.
Fulstone Jr., F.
Fulstone, S.
Fulstone, S. or M. Hussman
Good, C.
Hendrix, R.
Hodges, H.
Holmgren, D.
Huntsberger, R.
Mendes, A. and L.
McKinney, M.
Nappe, T.
Nutall, M.
Paine, E. and R.
Park, D.
Plouviez, P.
Lee, K. and T.
Mendes, A. and L.
Nuttall, M.
Ricci, G. and J.

Risi, M.
Santos, J.
Shullanberger, D. and M.
Snow, G.
Stanley, J.
Stix, D.
Swickard, T.
Takacs, G.
Tipton, T. and J.
Tomack, S.
Washburn, W. and G.
Weishaupt, M.

Organizations/Companies
A&K Earthmovers
American Colloid Co.
Bently Agrodynamics
Bighorn Guide Service
Damonte Ranch, LLC
Ellison Ranching Co.
F.I.M. Corporation
Friend of Nevada Wilderness
Guild Bovard Mine
Hidden Splinter Resources
Hiskett and Sons
Hodges Transportation
Hunewill Land & Livestock Co.
Jersey Valley Cattle Company
Kennecott Rawhide Mining Co.
Milestone Minerals, Inc.
Mosquito Mining Co.
Nevada Bighorn Unlimited
Nevada Cattlemen's Association
Nevada Sunrise Exploration
Nevada Wilderness Association
Nevada Woolgrowers Association
Noble Materials
Pauite Pipeline Co.
Resource Concepts Inc.
Schroeder Law Offices
The Sierra Club
Sierra Pacific Power Co.
Stix-Card LTD
Sustainable Grazing Coalition
Talbott Sheep Co.
The Nature Conservancy

Western Watersheds Project
White Sage Grazing Association
Wildlands Defense

Tribes
Bridgeport Indian Colony
Fallon Paiute-Shoshone Tribe
Lovelock Indian Colony
Pyramid Lake Paiute Tribe
Reno-Sparks Indian Colony
Susanville Indian Rancheria
Walker River Paiute Tribe
Washoe Tribe of Nevada and California
Yerington Paiute Tribe
Yomba Shoshone Tribe

Agencies
Alpine County Board of Supervisors
Bureau of Indian Affairs
Churchill County Commissioners
Fallon Naval Air Station
Mineral County Commissioners
Mineral County Public Lands Advisory Board
Nevada Department of Agriculture
Nevada State Clearinghouse (multiple State agencies)
Nevada State Grazing Board District N-3

7.0 REFERENCES

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Appendix A – Standard Operating Procedures and Mitigation Measures by Resource

Information included in this Appendix is a compilation of information originally presented in the PEIS (BLM 2007).

Standard Operating Procedures have been identified to reduce adverse effects to environmental and human resources from vegetation treatment activities based on guidance in BLM manuals and handbooks, regulations, and standard BLM and industry practices.[2] The list is not all encompassing, but is designed to give an overview of practices that would be considered when designing and implementing a vegetation treatment project on public lands (BLM 2007). Effects described in this draft programmatic EA are predicated on application of the SOPs or equivalent, unless an on-site determination is made that their application is unnecessary to achieve their intended purpose or protection. For example, the SOPs to "complete vegetation treatments seasonally before pollinator foraging plants bloom" would not be applied to treatments not likely to have a significant effect on pollinators.

PEIS Mitigation Measures were identified for all potential adverse effects identified for herbicide applications in the PEIS (BLM 2007), and adopted by its Record of Decision (BLM 2007a). In other words, no potentially significant adverse effect identified in the 17 States analysis remained at the programmatic scale after the PEIS Mitigation Measures were adopted.

BLM manuals and handbooks are available online at http://www.blm.gov/wo/st/en/info/blm-library/publications/blm_publications/manuals.html

Mechanical
BLM Handbook H-5000-1 (Public Domain Forest Management), and manuals 1112 (Safety) and 9015 (Integrated Weed Management).

Manual
BLM Domain Forest Management, and manuals 1112 (Safety), and 9015 (Integrated Weed Management).

Biological
BLM manuals 1112 (Safety), 4100 (Grazing Administration), 9014 (Use of Biological Control Agents on Public Lands), and 9015 (Integrated Weed Management) and Handbook H-4400-1 (Rangeland Health Standards).

Chemical
BLM Handbook H-9011-1 (Chemical Pest Control), and manuals 1112 (Safety), 9011 (Chemical Pest Control), 9015 (Integrated Weed Management), and 9220 (Integrated Pest Management).

[2] Manual-directed standard operating procedures and other standing direction may be referred to as best management practices in resource management and other plans, particularly when they apply to water.

Prescribed Fire
BLM Manual 9214 (Prescribed Fire Management) and Handbook H-9214-1 (Prescribed Fire Management Handbook).

General

Mechanical
- Ensure that power cutting tools have approved spark arresters.
- Ensure that crews have proper fire-suppression tools during the fire season.
- Wash vehicles and equipment before leaving weed infested areas to avoid infecting weed-free areas.
- Keep equipment in good operating condition.

Manual
- Ensure that crews have proper fire-suppression tools during fire season.
- Minimize soil disturbance, which may encourage new weeds to develop.

Biological
- Use only biological control agents that have been tested and approved to ensure they are host specific.
- If using domestic animals, select sites with weeds that are palatable and non-toxic to the animals.
- Manage the intensity and duration of containment by domestic animals to minimize overutilization of desirable plant species.
- Utilize domestic animals to contain the target species in the treatment areas prior to weed seed set. Or if seed set has occurred, do not move the domestic animals to uninfested areas for a period of seven days.

Chemical
- Prepare an operational and spill contingency plan in advance of treatment.
- Conduct a pretreatment survey before applying herbicides.
- Select the herbicide that is least damaging to the environment while providing the desired results.
- Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, other ingredients, and tank mixtures.
- Apply the least amount of herbicide needed to achieve the desired result.
- Follow herbicide product label for use and storage.
- Have licensed or certified applicators or State-licensed “trainees” apply herbicides, or they can be applied by BLM employees under the direct supervision of a BLM-certified applicator.
- Use only USEPA-approved herbicides and follow product label directions and “advisory” statements.
- Review, understand, and conform to the “Environmental Hazards” section on the herbicide product label. This section warns of known herbicide risks to the environment and provides practical ways to avoid harm to organisms or to the environment.
- Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas.
- Minimize the size of application area, when feasible.

- Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/ landowners.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify adjacent landowners prior to treatment, if appropriate.
- Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are 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 spill conditions 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.
- Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent.
- Use drift control agents and low volatile formulations.
- Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas.
- Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
- Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.
- Turn off application equipment at the completion of spray runs and during turns to start another spray run.
- Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Clean OHVs to remove plant material.
- The BLM has suspended the use of the adjuvant R-11.

<u>Prescribed Fire</u>

- Prepare a fire management plan.
- Use trained personnel with adequate equipment.
- Minimize frequent burning in arid environments.
- Avoid burning herbicide-treated vegetation for at least six months.

Vegetation, BLM Sensitive Species (Plants)

See Handbook H-4410-1 (National Range Handbook), and manuals 5000 (Forest Management) and 9015 (Integrated Weed Management).

Mechanical

- Power wash vehicles and equipment to prevent the introduction and spread of weed and exotic species.
- Remove damaged trees and treat woody residue to limit subsequent mortality by bark beetles.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.
- Use lighter chains with 40 to 60 pound links where the objective is to minimize disturbance to the understory species.
- As appropriate, use two chainings to reduce tree competition and prepare the seedbed. Carry out the second chaining at the most advantageous time for seeding (late fall or early winter, in most cases).
- Do not chain in areas where annual rainfall is less than 6-9 inches, especially if downy brome is present.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.

Manual

- Remove damaged trees and treat woody residue to limit subsequent mortality by bark beetles.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.

Biological

- Use domestic animals at the time they are most likely to damage invasive species.
- Manage animals to prevent overgrazing and minimize damage to sensitive areas.
- 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, including the application of state or regional grazing administration guidelines, needed to maintain desirable vegetation on the treatment site.
- Use plant stock or seed from the same seed zone and from sites of similar elevation when conducting revegetation activities.

Chemical

- 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 plants for revegetation and restoration projects to compete with invasive plants until desired vegetation establishes.
- Use weed-free feed for horses and pack animals. Use weed-free straw and 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, to maintain desirable vegetation on the treatment site.
- Minimize the use of terrestrial herbicides (especially sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are identified (BLM 2007).
- Establish appropriate (herbicide-specific) buffer zones (Tables A-1 and A-2) around downstream water bodies, habitats, and species/populations of interest. Consult the ecological risk assessments prepared for the PEIS for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios (BLM 2007).
- Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible (BLM 2007).
- Do not apply sulfometuron methyl aerially (BLM 2007).
- When necessary to protect sensitive plant species, implement all conservation measures for plants presented in the PEIS Programmatic Biological Assessment (see PEIS Appendix 5) (BLM 2007).

Prescribed Fire

- Limit fire to the smallest possible are to meet treatment objectives.
- Conduct low intensity burns to minimize adverse impacts to large vegetation.
- Limit the cleared are for fire breaks and clearings to reduce the potential for weed infestations.

Wetlands/Riparian Zones

Mechanical

- Manage riparian areas to provide adequate shade, sediment control, bank stability, and recruitment of wood into stream channels.
- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Manual

- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Biological

- Manage animals to prevent overgrazing and minimize damage to wetlands.
- Following treatment, reseed or replant with native vegetation if the native plant community cannot recover and occupy the site sufficiently.

Chemical

- 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 from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- See mitigation for Water Resources and Vegetation (BLM 2007).

Prescribed Fire

- Limit fire to the smallest possible are to meet treatment objectives.
- Conduct low intensity burns to minimize adverse impacts to large vegetation.
- Limit the cleared are for fire breaks and clearings to reduce the potential for weed infestations.

Water Quality (Surface & Ground)

See Manual 7000 (Soil, Water, and Air Management).

Mechanical

- Minimize removal of desirable vegetation near residential and domestic water sources.
- Do not wash equipment or vehicles in water bodies.
- Maintain minimum 25- foot wide vegetated buffer near streams and wetlands.

Manual

- Maintain vegetated buffer near residential and domestic water sources.
- Minimize removal of desirable vegetation near residential and domestic water sources.
- Minimize removal of desirable vegetation near water bodies.
- Minimize use of domestic animals near residential or domestic water sources.
- Minimize use of domestic animals adjacent to water bodies if trampling or other activities are likely to cause soil erosion or impact water quality.

Chemical

- 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 target aquatic 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 an aquatic body.
- Do not rinse spray tanks in or near water bodies.
- Do not broadcast pellets where there is danger of contaminating water supplies.
- Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
- Establish appropriate (herbicide-specific) buffer zones for species/populations (BLM 2007).
- Areas with potential for groundwater for domestic or municipal use shall be evaluated through the appropriate, validated model(s) to estimate vulnerability to potential groundwater contamination, and appropriate mitigation measures shall be developed if such an area requires the application of herbicides and cannot otherwise be treated with non-herbicide methods (BLM 2007).

- Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- Maintain buffers between treatment areas and water bodies. Buffer widths would be developed based on herbicide and site-specific conditions to minimize impacts to water bodies.

Prescribed Fire

- Conduct prescribed burns where consistent with water management objectives.
- Plan prescribed burns to minimize negative impacts to water resources.
- Minimize prescribed burns on steep hillslopes or revegetate hillslopes immediately after burning.
- Maintain vegetated buffers between treatment areas and water bodies.
- Maintain a vegetated buffer near drinking water sources.

General Wildlife, Migratory Birds, BLM Sensitive Species (Animals)

See manuals 6500 (Wildlife and Fisheries Management), 6780 (Habitat Management Plans) and 6840 (Special Status Species).

Mechanical and Manual

- Minimize treatments during nesting period and other important periods for birds and other wildlife. If treatments are to occur during the migratory bird nesting period (e.g. March 1 to July 31 for raptors and April 1 to July 31 for all other avian species), pre-construction avian surveys would be conducted in appropriate habitats. If nesting migratory birds are present, appropriate buffers would be applied until the young have fledged or the nest has failed.
- Retain wildlife trees and other unique habitat features where practical.

Biological

- Minimize the use of livestock grazing as a vegetation control measure where and/or when it could impact nesting and/or other important periods for birds and other wildlife.
- Consider and minimize potential adverse impacts to wildlife habitat and minimize the use of livestock grazing as a vegetation control measure where it is likely to result in removal or physical damage to vegetation that provides a critical source of food or cover for wildlife.

Chemical

- Use herbicides of low toxicity to wildlife including fish and other aquatic organisms, 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.
- To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, glyphosate, hexazinone, or triclopyr, where feasible (BLM 2007).
- Minimize the size of application areas, where practical, when applying 2,4-D and Overdrive® to limit impacts to wildlife, particularly through contamination of food items (BLM 2007).
- Where practical, limit glyphosate and hexazinone to spot applications in grazing land and wildlife habitat areas to avoid contamination of wildlife food items (BLM 2007).
- Do not use the adjuvant R-11 (BLM 2007).
- Either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians (BLM 2007).
- To protect wildlife species, implement conservation measures for terrestrial animals presented in the PEIS Programmatic Biological Assessment (see PEIS Appendix 5) (BLM 2007).

Prescribed Fire

- Minimize prescribed fire during nesting and other important periods for wildlife.
- Retain wildlife trees and other unique habitat features.

Threatened and Endangered Species

See Manual 6840 (Special Status Species) and PEIS Biological Assessment.

Mechanical

- Minimize use of ground- disturbing equipment near threatened and endangered species.
- Survey for threatened and endangered species if project could impact these species.
- Use temporary roads when long-term access is not required.

Manual

- Survey for threatened and endangered species if project could impact these species.

Biological

- Survey for threatened and endangered species if project could impact these species.

Chemical

- Provide clearances for threatened and endangered species before treating an area. Consider effects to threatened and endangered species when designing herbicide treatment programs.
- Use a selective herbicide and a wick or backpack sprayer to minimize risks to threatened and endangered species.
- Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for threatened and endangered species in the area to be treated.
- To protect threatened and endangered species, implement conservation measures for terrestrial animals presented in the PEIS Programmatic Biological Assessment (see PEIS Appendix 5) (BLM 2007).

Prescribed Fire

- Minimize prescribed fire during nesting and other important periods for wildlife.
- Retain wildlife trees and other unique habitat features.

Soils

See Manual 7000 (Soil, Water, and Air Management).

General

- Assess the susceptibility of the treatment site to soil damage and erosion prior to treatment.

Mechanical

- Time treatments to avoid intense rainstorms.
- Time treatments to encourage rapid recovery of vegetation.
- Further facilitate revegetation by seeding or planting following treatment.
- Use equipment that minimizes soil disturbance and compaction.
- Minimize use of heavy equipment on slopes greater than 20 percent.
- Conduct treatments when the ground is sufficiently dry to support heavy equipment.
- Implement erosion control measures in areas where heavy equipment use occurs.
- Minimize disturbances to biological soil crusts (e.g., by timing treatments when crusts are moist).
- Reinoculate biological crust organisms to aid in their recovery, if possible.
- Conduct mechanical treatments along topographic contours to minimize runoff and erosion.
- When appropriate, leave plant debris on site to retain moisture, supply nutrients, and reduce erosion.
- Consider chaining when soils are frozen and plants are brittle to minimize soil disturbance.

Manual

- Time treatments to avoid intense rainstorms.
- Time treatments to encourage rapid recovery of vegetation.
- Further facilitate revegetation by seeding or planting following treatment.
- Minimize soil disturbance and compaction.
- Minimize disturbance to biological soil crusts (e.g., by timing treatments when crusts are moist).
- Reinoculate biological crust organisms to aid in their recovery, if possible.
- When appropriate, leave plant debris on site to retain moisture, supply nutrients, and reduce erosion.
- Prevent oil and gas spills to minimize damage to soil.

Biological

- Minimize use of domestic animals if removal of vegetation may cause significant soil erosion or impact biological soil crusts.
- Closely monitor timing and intensity of biological control with domestic animals.
- Avoid grazing on wet soil to minimize compaction and shearing.

Chemical

- 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 percent where there is the possibility of runoff carrying the granules into non-target areas.

Prescribed Fire

- Ensure prescribed fire is consistent with soil management objectives.
- Plan burns to minimize damage to soils.
- When appropriate, reseed following burning to reintroduce species, or to convert a site to a less flammable plant association, rather than to specifically minimize erosion.
- When appropriate, leave plant debris on site to retain moisture, supply nutrients, and reduce erosion.
- Time treatments to avoid intense rainstorms.
- Use equipment and methods that minimize soil disturbance and compaction.
- Conduct mechanical treatments along topographic contours to minimize runoff and erosion.
- Minimize use of heavy equipment on slopes greater than 20 percent.

Livestock Grazing

See Handbook H-4120-1 (Grazing Management).

Mechanical

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Manual

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Biological

- Notify permittees of proposed treatments and identify any needed livestock grazing, feeding, or slaughter restrictions.
- Design treatments to take advantage of normal livestock grazing rest periods, when possible, and minimize impacts to livestock grazing permits.
- Provide alternative forage sites for livestock, if possible.
- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.

Chemical

- Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible.
- As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable.
- Use herbicides of low toxicity to livestock, where feasible.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources.
- Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
- Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary.
- Provide alternative forage sites for livestock, if possible.
- Minimize potential risks to livestock by applying glyphosate, hexazinone, or triclopyr at the typical application rate where feasible (BLM 2007).

- Do not apply 2,4-D, dicamba, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through contamination of food items (BLM 2007).
- Where feasible, limit glyphosate and hexazinone to spot applications in rangeland (BLM 2007).

Prescribed Fire

- Notify permittees of proposed prescribed fire.
- Schedule prescribed fire to take into account livestock behavior, grazing season and patterns.

Wild Horses and Burros

Mechanical

- Avoid critical periods (March 1 to July 1) and minimize impacts to habitat that could adversely affect wild horse or burro populations.

Manual

- Avoid critical periods (March 1 to July 1) and minimize impacts to habitat that could adversely affect wild horse or burro populations.

Biological

- Avoid critical periods (March 1 to July 1) and minimize impacts to habitat that could adversely affect wild horse or burro populations.

Chemical

- Minimize using herbicides in areas grazed by wild horses and burros.
- Use herbicides of low toxicity to wild horses and burros, where feasible.
- Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
- Minimize potential risks to wild horses and burros by applying glyphosate, hexazinone, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use (BLM 2007).
- Consider the size of the application area when making applications of 2,4-D, dicamba, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to wild horses and burros (BLM 2007).
- Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros (BLM 2007).
- Where practical, limit glyphosate and hexazinone to spot applications in rangeland (MM).
- Do not exceed the typical application rate of Overdrive® or hexazinone in HMAs during the peak foaling season in areas where foaling is known to take place (BLM 2007).

Prescribed Fire

- Minimize potential hazards to horses and burros by ensuring adequate escape opportunities.
- Avoid critical periods and minimize impacts to critical habitat that could adversely affect wild horse or burro populations.

Areas of Critical Environmental Concern and Wilderness Study Areas

See handbook H-8550-1 (Management of Wilderness Study Areas [WSAs]).

General

- Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area, and to bring only weed-free hay and straw onto BLM lands.
- 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.

Mechanical

- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in WSAs, and where possible in other areas.
- If mechanized equipment is required, use the minimum amount of equipment needed.
- Time the work for weekdays or off-season.
- Require shut down of work before evening if work is located near campsites.
- If aircraft are used, plan flight paths to minimize impacts on visitors and wildlife.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.

Manual

- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in WSAs, and where possible in other areas.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.
- Biological
- Use the least intrusive methods possible to achieve objectives, and use non-motorized equipment in wilderness and off existing routes in WSAs, and where possible in other areas.

Chemical

- Use the “minimum tool” to treat noxious weeds and other invasive plants, relying primarily on the use of ground based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock.
- Use herbicides only when they are the minimum treatment method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness.
- Give preference to herbicides that have the least impact on non-target species and the wilderness environment.
- Implement herbicide treatments during periods of low human use, where feasible.
- Address wilderness and special areas in management plans.

- Mitigation measures that may apply to wilderness and other special area resources are associated with human and ecological health and recreation (BLM 2007).

Prescribed Fire

- Minimize soil-disturbing activities during prescribed fire activities.
- Revegetate sites with native species if there is no reasonable expectation of natural regeneration.

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), and 8270 (Paleontological Resource Management). See also: Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act.

Mechanical

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.
- Identify cultural resource types at risk from mechanical treatments and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by mechanical treatments.

Manual

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.
- Identify cultural resource types at risk from manual treatments and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by manual treatments.

Biological

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and interested tribes.

- Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected, adversely or beneficially, by biological treatments.

Chemical

- Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act and State protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes.
- Follow BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.
- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments; work with tribes to minimize impacts to these resources.
- Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
- Do not exceed the typical application rate when applying 2,4-D, fluridone, hexazinone, and triclopyr in known traditional use areas (BLM 2007).

Prescribed Fire

- Identify cultural resource types at risk from fire use and design inventories that are sufficient to locate these resources. Provide measures to minimize impacts.
- Identify opportunities to meet tribal cultural use plant objectives for projects on public lands.
- Monitor significant paleontological and cultural resources for potential looting of materials where they have been exposed by prescribed fire.

Air Quality

See Manual 7000 (Soil, Water, and Air Management).

Mechanical

- Maintain equipment in optimal working order.
- Use heavy equipment under adequate soil moisture conditions to minimize soil erosion.
- Minimize vehicle speeds on unpaved roads.
- Minimize dust impacts to the extent practicable.

Manual

- Maintain equipment in optimal working order.
- Minimize vehicle speeds on unpaved roads.
- Minimize dust impacts to the extent practicable.

Chemical

- 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).

Prescribed Fire

- Prepare clear smoke management objectives;
- Evaluate weather conditions, including wind speed and atmospheric stability, to predict the effects of fires and impacts from smoke;
- Burn when conditions favor rapid combustion and dispersion;
- Burn under favorable moisture conditions;
- Burn small vegetation blocks when appropriate;
- Manage smoke to prevent air quality violations and minimize impacts to smoke-sensitive areas; and
- Coordinate with regional and local air pollution and fire control officials, and obtaining all applicable smoke management permits, to ensure that burn plans comply with federal, State, and local regulations.

Human Health and Safety

Mechanical

- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Cut all brush and tree stumps flat, where possible, to eliminate sharp points that could injure a worker or the public.
- Ensure that only qualified personnel cut trees near powerlines.

Manual

- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Cut all brush and tree stumps flat, where possible, to eliminate sharp points that could injure a worker or the public.

Biological

- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.

Chemical

- Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted.
- Use protective equipment as directed by the herbicide product label.
- Post treated areas with appropriate signs at common public access areas.
- Observe restricted entry intervals specified by the herbicide product label.
- Provide public notification in newspapers or other media where the potential exists for public exposure.
- Store herbicides in secure, herbicide-approved storage.
- 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.
- Use the typical application rate, where feasible, when applying 2,4-D, fluridone, hexazinone, and triclopyr to reduce risk to workers and the public (BLM 2007).
- Do not apply sulfometuron methyl aerially (BLM 2007).
- Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate (BLM 2007).
- Do not apply hexazinone with an over-the-shoulder broadcast applicator (backpack sprayer) (BLM 2007).

Prescribed Fire

- Use some form of pretreatment, such as mechanical or manual treatment, in areas where prescribed fire cannot be safely introduced because of hazardous fuel buildup.
- Wear appropriate safety equipment and clothing, and use equipment that is properly maintained.
- Notify nearby residents who could be affected by smoke.

- Maintain adequate safety buffers between treatment area and residences/structures.
- Burn vegetation debris off ROWs to ensure that smoke does not provide a conductive path from the transmission line or electrical equipment to the ground.

Visual Resources

See Manual 8400 (Visual Resource Management).

Mechanical

- Minimize dust drift, especially near recreational or other public use areas.
- Minimize loss of desirable vegetation near high public use areas.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Minimize earthwork and locate away from prominent topographic features.
- Revegetate treated sites.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Manual

- Minimize dust drift, especially near recreational or other public use areas.
- Minimize loss of desirable vegetation near high public use areas.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Biological

- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Chemical

- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Minimize 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.
- Avoid aerial spraying near agricultural or densely populated areas, where feasible.
- Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; avoid treating areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences).
- Lessen visual effects in Class I and Class II visual resource areas.
- When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established VRM objectives.

Prescribed Fire

- Minimize use of fire in sensitive watersheds to reduce the creation of large areas of browned vegetation.
- Consider the surrounding land use before assigning fire as a treatment method.
- At areas such as visual overlooks, leave sufficient vegetation in place, where possible, to screen views of vegetation treatments.
- Avoid use of fire near agricultural or densely populated areas, where feasible.
- Lessen visual effects in Class I and Class II visual resource areas.
- Design activities to repeat the form, line, color, texture of the natural landscape conditions to meet established VRM objectives.

APPENDIX B. BLM Sensitive Plants That May Be Present or Their Habitat May Be Present in CCD.

Altered andesite popcornflower is an annual herb found in Washoe, Storey, and Carson City counties. Altered andesite popcornflower grows in dry, shallow, mostly acidic, gravelly, clay soils of smallcone series, derived from weathering of hydrothermal sulfide deposits formed in andesite, or sometimes in rhyolitic or granitoid rocks; mostly in barren yellowish to orange brown patches on ridges, knolls, and steep slopes.

Ames milkvetch is a perennial herb found in Washoe County closer to the California-Nevada state border at an elevation between 4,625 and 5,200 feet. Ames milkvetch grows in granitic and sandy soil on small hillsides in sagebrush scrub plant communities.

Beatley buckwheat is a low, matted perennial that is endemic to Nevada in Churchill and Mineral counties. Beatley buckwheat may be found in low elevations around 5,600 feet in Great Basin scrub habitats. The soil that Beatley buckwheat can be found in is volcanic ash deposited with high concentrations of tuff.

Bodie Hills rockcress is a perennial herb that is restricted to the Wassuk Range in Mineral County. Bodie Hills rockcress is typically found in dry, open, rocky soil, as well as exposed surfaces or crevices of granite or rhyolitic (volcanic) mountain summits at an elevation range of 6,720-9,970 feet.

Bodie Hills draba has been documented in Douglas, Lyon, and Mineral counties at elevations of 6,200 to 8,500 feet. The typical habitat is shrub steppe (low sagebrush habitats) or occasionally pinyon and juniper forests, but excessive tree cover can inhibit its growth. Bodie Hills draba grows in soils that are typically rocky (tertiary volcanic) or have moderate clay content.

Churchill Narrows buckwheat has only been documented in the Churchill Narrows portion of the Pine Nut Mountain Range within Lyon County specifically Clifton Flat, Fort Churchill and Adriance Valley. Churchill Narrows buckwheat grows in diatomaceous soil (soft and off-white soil created from fossilized remains of diatoms), at an elevation of 4,300 to 4,600 feet, with neighboring plant species including shadscale saltbush, ephedra, spineless horsebrush, burrobrush (*Hymenoclea salsola*), desert prince's plume (*Stanleya pinnata*), whitestem blazingstar (*M. albicaulis*), volcanic buckwheat (*Eriogonum lemmonii*), flatbrown buckwheat (*Eriogonum deflexum*), and squirreltail.

Eastwood milkweed is a long-lived perennial that is endemic to Nevada. Eastwood milkweed grows at an elevation of 4,680 to 7,080 feet in barren, moisture-accumulating microsites with little competition from surrounding plants in many types of basic soils (pH greater than 8) like calcareous clay hills, carbonate or basaltic gravels, sand, or shale outcrops.

Lahontan beardtongue is a Nevada endemic found in four occurrences in Churchill County. The Lahontan beardtongue grows in washes, roadsides, and canyon floors, particularly on carbonate containing substrates. It is generally found where subsurface moisture is available throughout most of summer and it may be restricted to calcareous substrates.

Lavin's milkvetch is a perennial herb that has been found in Douglas, Lyon, and Mineral counties at elevations of 5,700 to 7,467 feet. Lavin's milkvetch grows in soil typically on northeast to southeast facing slopes, badlands, small hills, or slopes that are dry, open, and barren containing gravel with clay originating from volcanic ash or carbonate.

Margaret rushy milkvetch is endemic to the Pine Nut and Virginia Mountain Ranges in Carson City, Douglas, Lyon, and Storey counties. It typically grows at an elevation of 4,700 to 7,800 feet in rocky soils on slopes and flats in mixed pinyon-juniper and sagebrush landscapes.

Masonic Mountain jewelflower can be found in Mineral and Lyon counties. It grows in volcanic or granitic rocky slopes or andesite soil in pinyon-juniper woodland, high elevation sagebrush-grass zones, and Jeffrey pine-white fir forests and in elevations of 6,500 to 8,500 feet.

Mono County phacelia is a small annual plant found in Lyon and Mineral counties. It grows in alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin in pinyon-juniper and mountain sagebrush zones. Mono County Phacelia grows in low intensity artificial or natural disturbances including road berms that cross its soil type and, less frequently, naturally eroding badlands or apparently undisturbed soil.

Nevada dune beardtongue grows in the sandy soils of valley bottoms, sometimes on road banks and other recovering disturbances. It is often found in association with Indian ricegrass, fourwing saltbush, greasewood, and rubber rabbitbrush (*Ericameria nauseosa*). This species is dependent on sand dunes or deep sand.

Oryctes is a small annual found only in deep loose sand of stabilized dunes, washes, and valley flats between 3,900 and 5,960 feet in elevation in western Nevada. This species appears only in years with optimal rainfall and temperature.

Pine Nut Mountains mousetails exists on the upper north and east slopes of Mount Siegel in the Pine Nut Mountains at elevations between 6,990 and 8,550 feet. It is wetland-dependent, restricted to periodically wet areas or where the water table and/or bedrock are close to the surface in decomposed granite or sod of meadow margins. This species is associated with features such as springs, riparian corridors, and ephemeral ponds. Accompanying vegetation includes dry rush/forb meadow, adjacent surrounding sagebrush scrub, and occasionally surrounding pinyon/juniper/mountain mahogany woodlands.

Playa phacelia is found in Washoe County. Playa phacelia grows in alkali playas and seasonally inundated areas with clay soils. This species is dependent upon wetlands for habitat.

Sagebrush pygmyleaf is a diminutive annual herb, branched at the base with green flowers. This species grows in sandy soils and gravel of exposed areas on dunes, flats, and disturbed areas, in sagebrush scrub in Washoe County.

Sand cholla is a stem-succulent, spiny shrub with magenta flowers. It grows in sand on dunes, well-drained slopes, flats, and borders of dry lakes and washes in desert or sagebrush scrub from 3,950 to 6,300 feet in elevation in western and central Nevada.

Shevock bristlemoss is a rare moss with small, dark green to blackish tufts to 1.5 cm high. Shevock bristlemoss grows in the driest habitats of North America on dry granitic boulders or ceilings of recesses in boulder piles in very dry areas. This species is found between 2,460 and 6,890 feet in pinyon-juniper woodland in Voltaire Canyon near Carson City.

Sierra Valley mousetails is found in the Carson and Virginia ranges in Nevada on flats and benches between 4,870 and 7,300 feet in elevation. It is restricted to shallow, rocky to sandy soils derived from volcanic rock or alluvium. These soils have shallow clayey sub-soils that result in slow drainage and/or vernal saturation; thus, the depth of the local perched water table and spring dry-down rate may be crucial to the distribution of this species. This species is dependent upon Nevada wetland margins in the yellow pine, mountain sagebrush, and mountain mahogany zones.

Sodaville milkvetch may be found in moist, alkaline, aquatic/wetland areas like drainages near cool springs co-existing with saltgrass, greasewood, and alkali sacaton (*Sporobolus airoides*). The Sodaville milkvetch has been reported in Mineral County at low elevations of 4,150 to 4,705 feet.

Tiehm blazingstar is a subshrub with only seven known populations in Nevada. It grows in areas of sparse vegetation, co-occurring with *Frasera gypsicola* on gypsum spring mounds, the tops of hills of white soil, and rock outcrops in the white river valley.

Tiehm peppercress occurs in the foothill and low mountain regions of the Virginia and Pine Nut ranges including Table Mountain in Lyon County. Populations occur in both high and low elevation in basaltic or sedimentary rocks and at the fringes of rocky scree or talus piles, clay soil, and the base of rock outcrops. It grows in association with shadscale, bitterbrush, sagebrush, and rarely, Utah juniper.

Tonopah milkvetch is a perennial herb from a buried root crown restricted to Churchill, Lyon, and Mineral counties at elevations 4,535 to 6,000 feet. Tonopah Milkvetch grows in sand dunes, old beaches, valley floors, or drainages with deep loose sandy soil often with greasewood.

Washoe pine is a long-lived seral species is important to wildlife, houses birds unique to the area, and is found in small stands on the eastern slope of Mt. Rose in Washoe County. It is found in white fir communities growing in dry montane forest areas and volcanic ridges at elevations of 5,500 to 8,500 feet.

Wassuk beardtongue is a robust perennial herb with 12 reported occurrences in Douglas and Mineral counties. It generally grows in areas with mild disturbance including steep decomposed granite slopes, rocky drainage bottoms, roadsides or other recovery disturbances with enhanced runoff in open, rocky to gravelly soils on perched tufa shores. The Wassuk beardtongue is locally abundant on recent burns in the pinyon-juniper, sagebrush, and upper mixed-shrub shadscale zones.

Williams combleaf is a small perennial aquatic or aquatic dependent herb in Washoe, Lyon, Douglas, and Mineral counties. It grows in relatively barren sandy to clay or mud margins and at

bottoms of nonalkaline seasonal lakes perched over volcanic bedrock in sagebrush, pinyon-juniper, and mountain sagebrush zones. Williams combleaf occurs in the Virginia Range Williams Combleaf ACEC.

Windloving buckwheat has been documented in Churchill and Washoe counties. It has an elevation range of 4,750 to 9,836 feet, and can become established in a variety of soil types. Most common habitat types documented are high elevation mountain ridges and slopes in gravel or volcanic outcrops co-occurring with low sagebrush, green rabbitbrush (*Chrysothamnus viscidiflorus*), sandberg bluegrass, squirreltail, and King's sandwort (*Arenaria kingii*), as well as, low elevation populations in dry, barren, undisturbed hillsides with light-colored clay soils co-occurring with spineless horsebrush (*T. canescens*), rubber rabbitbrush, green rabbitbrush, shadscale, bottlebrush squirreltail, basin wildrye, and Torrey's milkvetch (*Astragalus calycosus*) (BLM 2014).

APPENDIX C. Grazing Allotments.

Allotment Name	Acres	Allotment Name	Acres
Adriance Valley	32,100	Horse Spring	15,300
Antelope Mountain	55,800	Hudson Hills	42,700
Artesia	13,400	Indian Creek	1,000
Bagley Valley	5,800	Jumbo	26,200
Barney Riley	2,200	Koch Ditch	500
Basalt	22,200	La Beau Flat	121,300
Bass Flat	37,600	Lahontan	55,800
Belleville	164,300	Lincoln Flat	17,900
Big Canyon	14,000	Little Huntoon	13,700
Black Mountain	14,300	Lucky Boy	19,500
Boyer Ranch	129,500	McBride Flat	5,100
Buckeye	82,000	Mickey Pass	4,800
Bucky O' Neil	39,800	Mill Canyon	19,200
Butler Mountain	46,100	Millberry Canyon	1,300
Carson	3,400	Mountain Well-Laplata	133,200
Carson Hill	5,100	New Pass	10,000
Carson Plains/Gold Hill	21,200	Nine Mile	27,000
Cedar Mountain	60,200	Olinghouse	23,000
Central	300	Pah Rah	4,500
Churchill Butte	10,700	Pauite Canyon	69,900
Churchill Canyon	48,500	Parker Butte	30,700
Clan Alpine	358,500	Perry Springs-Deadman	59,200
Cleaver Peak	40,500	Phillips Well	79,900
Clifton	19,200	Pilot-Table Mountain	526,900
Clifton Flat	7,600	Pine Nut	19,000
Constantia North	9,600	Plumas Station	5,500
Constantia South	10,700	Rawe Peak	6,900
Copper Kettle	72,100	Red-Burbank	4,800
Cow Canyon	146,200	Red Rock	3,500
Desert Mountain	21,300	River	120
Dixie Valley	261,200	Salt Wells	51,200
Duck Hill	5,300	Sand Canyon	4,000
East Walker	30,100	Spanish Springs/Mustang	24,500
Eastgate	306,000	Spring Gulch	52,500
Edwards Creek	56,500	Stewart Springs	15,783
Eldorado Canyon	9,700	Stockton Flat	9,400
Flanigan	54,500	Truckee-Virginia	20,200
Fort Churchill	14,600	Wade Valley	630
Frenchman Flat	25,100	Wedekind	230
Garfield Flat	220,400	Wheeler Flat	10,900
Gillis Mountain	166,200	White Cloud	77,200
Gray Hills	98,800	White Hills	25,300
Hackett Canyon	6,800	Wilson Canyon	3,200
Hallelujah Junction	15,200	Winnemucca Ranch	44,500
Hangman	500	Winters Ranch	1,000
Hardscrabble Canyon	12,500		
Harvey Flat	4,500		
Hay Press	1,200		
Hole in the Wall	82,500		
Horse Mountain	62,600		

APPENDIX D. Herd Management Areas.

The *Augusta Mountains HMA* is located in the Augusta Mountains northeast of Fallon, Nevada. This HMA is situated within three BLM districts, with Winnemucca District as lead. The CCD portion of the HMA (90,347 acres) is rolling hills and mountainous terrain, with substantial portions covered with pinyon-juniper.

The *Clan Alpine HMA* is centered in the Clan Alpine Mountains northeast of Fallon, Nevada and south of the Augusta Mountains HMA. This 313,122 acre HMA is mostly mountainous terrain.

The *Desatoya HMA* is east of the Clan Alpine HMA and centered in the Desatoya Mountains. The HMA lies within two BLM districts; the CCD has the lead responsibilities. The 162,962 acre HMA (23,110 acres within the CCD) is mostly covered in pinyon-juniper.

The *Dogskin Mountain HMA* is north of Reno, Nevada, and centered in the Dogskin Mountain Range. This 6,871 acre HMA is has very steep, rocky and rugged terrain and dominant vegetation includes sagebrush, rabbitbrush and pinyon-juniper is abundant in the higher elevations of the HMA.

The *Flanigan HMA* is north of Reno, Nevada, and partially borders the Pyramid Lake Indian Reservation. The 16,181 acre HMA is mostly mountainous terrain within the Virginia Mountains. Dominant vegetation includes sagebrush, rabbitbrush. Pinyon-juniper is abundant in the higher elevations of the HMA.

The *Fort Sage HMA* is located in both Nevada and California. The HMA is north of Reno, Nevada, and west of the Flanigan HMA. The CCD portion of the HMA is 2,043 acres.

The *Garfield Flat HMA* is south of Hawthorne, Nevada. This 135,974 acre HMA consists of flat to rolling terrain.

The *Granite Peak HMA* is north of Reno, Nevada, and west of the Dogskin Mountains HMA. This 3,862 acre HMA consists of rolling terrain. Dominant vegetation includes sagebrush, rabbitbrush. Pinyon-juniper is abundant in the higher elevations of the HMA.

The *Horse Mountain HMA* is south of Fallon, Nevada. This 52,222 acre HMA consists of rolling to mountainous terrain. The HMA currently has no wild horses.

The *Lahontan HMA* is between Carson City and Fallon, Nevada, south of the Lahontan Reservoir. This 10,446 acre HMA consists of flat terrain. Dominant vegetation consists of Baileys greasewood, shadscale, sagebrush, Indian ricegrass and squirreltail.

The *Marietta Wild Burro Range* is a designated wild burro range. It is the only designated wild burro range and the only HMA with burros in the CCD. The HMA consists of 66,500 acres of flat to mountainous terrain south of Hawthorne, Nevada.

The *Montgomery Pass HMA* is within both Nevada and California southwest of Hawthorne, Nevada. The U.S. Forest Service has lead responsibilities for management of this HMA, which consists of rolling to mountainous terrain. The CCD portion of this HMA consists of 38,615 acres.

The *New Pass HMA* is within the Carson City and Battle Mountain Districts, with Battle Mountain having lead management responsibilities. The 24,699 acre CCD portion of this HMA is east of Fallon, Nevada, and consists of flat to mountainous terrain. Substantial portions of the HMA are covered in pinyon-juniper.

The *North Stillwater HMA* is within the Carson City and Winnemucca Districts, with Winnemucca having lead management responsibilities. The 45,773 acre CCD portion of this HMA is northeast of Fallon, Nevada, and consists of mountainous terrain.

The *Pilot Mountain HMA* is within the Carson City and Battle Mountain Districts. The CCD has lead responsibilities for this 481,391 acre HMA. The CCD portion (255,040 acres) of this HMA is south of Hawthorne, Nevada and is comprised of flat to mountainous terrain.

The *Pine Nut Mountains HMA* is south of Carson City. The topography of this 90,000 acre HMA ranges from 5,000 feet to 9,000 feet. Dominant vegetation consists of pinyon-juniper, sagebrush, Indian ricegrass, pine bluegrass, Sandberg bluegrass, Thurber needlegrass, and squirreltail.

The *South Stillwater HMA* is east of Fallon, Nevada, and consists of mountainous terrain. This 9,940 acre HMA is mountainous with dominant vegetation including pinyon-juniper, sagebrush, Indian ricegrass, pine bluegrass, Nevada bluegrass, Sandberg bluegrass, Thurber needlegrass, Idaho fescue and squirreltail.

The *Tule Ridge/Mahogany Flats HMA* is identified as an HMA; however, wild horses have never been present. This HMA is 4,009 acres in size.

The *Wassuk HMA* is south of Yerington, Nevada, and consists of flat to mountainous terrain with substantial areas of pinyon-juniper cover. This 51,742 acre HMA ranges in elevation from 5,500 to 8,000 feet and is dominated by pinyon-juniper, sagebrush, Indian ricegrass, Idaho fescue and squirreltail (BLM 2014).

APPENDIX E. Wilderness Study Areas.

The *Augusta Mountain WSA* is located in northeast Churchill County. The WSA includes 89,400 acres of BLM-managed lands. The elevation ranges from 3,400 feet to 8,400 feet. The WSA straddles a north-south ridge of the Augusta Mountain Range. The northern portion is a landscape of silicic ashflow tuff canyons and drainages. Isolated patches of pinyon-juniper are scattered through the area. The central section encompasses Cain Mountain, a limestone peak, which is the highest point of the WSA. The mountain drains in all directions via rugged, deep drainages, Favret Canyon being the largest. The canyons have fossils and are blocked by intermittent waterfalls, with dense pinyon-juniper stands in the upper reaches. The southern portion of the WSA is uniformly hilly with shallow southwest draining washes and gullies and gently sloping foothills vegetated with low sagebrush and rabbitbrush.

The *Burbank Canyon WSA* is primarily in Douglas County. Approximately 1,065 acres along the eastern edge of the WSA are in Lyon County.

The *Carson-Iceberg WSA* lies in Alpine County near the middle of the eastern edge of California. This WSA includes 550 acres of BLM-managed lands. The WSA comprises a mixed coniferous forest on both sides of the East Fork of the Carson River in the Eastern Sierra Nevada. The river flows northerly through a rugged, winding canyon for one-and-a-half miles in the WSA. The meadows of Silver King Valley flank the WSA to the east at an elevation of 6,400 feet, while the 7,000-foot western side of the WSA is surrounded by higher-elevation coniferous forest in the 154,000-acre Carson Iceberg Wilderness (U.S. Forest Service lands).

The *Clan Alpine Mountains WSA* is in Churchill County in west central Nevada. The WSA includes 195,700 acres of BLM-managed lands.

The *Desatoya Mountains WSA* lies along the Churchill/Lander county line, with the majority of the WSA found in the southeast corner of Churchill County. The WSA includes 42,200 acres in the CCD.

The *Gabbs Valley Range WSA* is located in Mineral County, 30 miles east of Hawthorne. The WSA contains 80,500 acres of BLM-managed lands.

The *Job Peak WSA* is in Churchill County in west-central Nevada. The WSA includes 89,400 acres in the CCD. The Job Peak WSA includes roughly the southern third of the Stillwater Mountain Range.

The *Slinkard WSA* is in northern Mono County and northeastern Alpine County, approximately seven miles north and west of Topaz, California. This WSA includes 2,400 acres in the CCD. This WSA lies at the extreme eastern edge of the Sierra Nevada geomorphic province and consists of a north-south trending mountain range, which is dissected by numerous drainages and canyons. The eastern slope is rugged and steep, while the western slope is more gentle and moderate. Elevation ranges from 6,800 feet to 8,938 feet. A tributary of Slinkard Creek is in the northern end of the unit. Vegetation in the unit consists of Great Basin shrubs and perennial

grasses. Dense stands of pinyon-juniper, white fir, quaking aspen, and Jeffrey pine occupy this WSA.

The *Stillwater Range WSA* is in Churchill County in west-central Nevada. The WSA includes 94,200 acres in the CCD. This WSA includes roughly the central third of the Stillwater Mountain Range (BLM 2014).