Ecological Resource Management Plan for the Rocky Flats Environmental Technology Site

Prepared for

Kaiser-Hill Company, LLC
Golden, Colorado

by

PTI
Environmental Services
Boulder, Colorado

PTI
ENVIRONMENTAL SERVICES
4940 Pearl East Circle, Suite 300 ▪ Boulder, Colorado 80301

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Kaiser-Hill Company, LLC
Rocky Flats Environmental Technology Site
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ACRONYMS AND ABBREVIATIONS

BEPA	Bald and Golden Eagle Protection Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COE	U.S. Army Corps of Engineers
CDOW	Colorado Division of Wildlife
CHWA	Colorado Hazardous Waste Act
CNHP	Colorado Natural Heritage Program
CWA	Clean Water Act
DOE	U.S. Department of Energy
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FNWA	Federal Noxious Weed Act
FWCA	Fish and Wildlife Coordination Act
IMP	Integrated Monitoring Plan
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NRPCP	Natural Resource Protection and Compliance Program
NTECA	Colorado Nongame, Threatened and Endangered Species Conservation Act
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFFO	Rocky Flats Field Office
Site	Rocky Flats Environmental Technology Site
USFWS	U.S. Fish and Wildlife Service
WMP	Watershed Management Plan

1. INTRODUCTION

This document specifies the plan of action for conserving the ecological resources within the Rocky Flats Environmental Technology Site (Site) Buffer Zone. The Buffer Zone encompasses approximately 6,000 acres surrounding the 300-acre industrial area (Figure 1). Within the Buffer Zone, a variety of communities exist, ranging from xeric tallgrass prairie to riparian woodlands. Human disturbance within the Buffer Zone has been minimal for the past several decades, allowing native plant communities to regenerate, and plant and animal species that have been displaced from other locations along the Front Range to persist and thrive at the Site. This plan has been prepared to set forth the management actions required to conserve these valuable ecological resources. It includes relevant Department of Energy (DOE) policies, specifies key assumptions used in generating the plan, establishes goals and management objectives, and assigns responsibilities among Site organizations to ensure compliance with the plan.

This is intended to be a "living document." It will be revised periodically as conditions change, new concerns arise, or applicable regulations are revised.

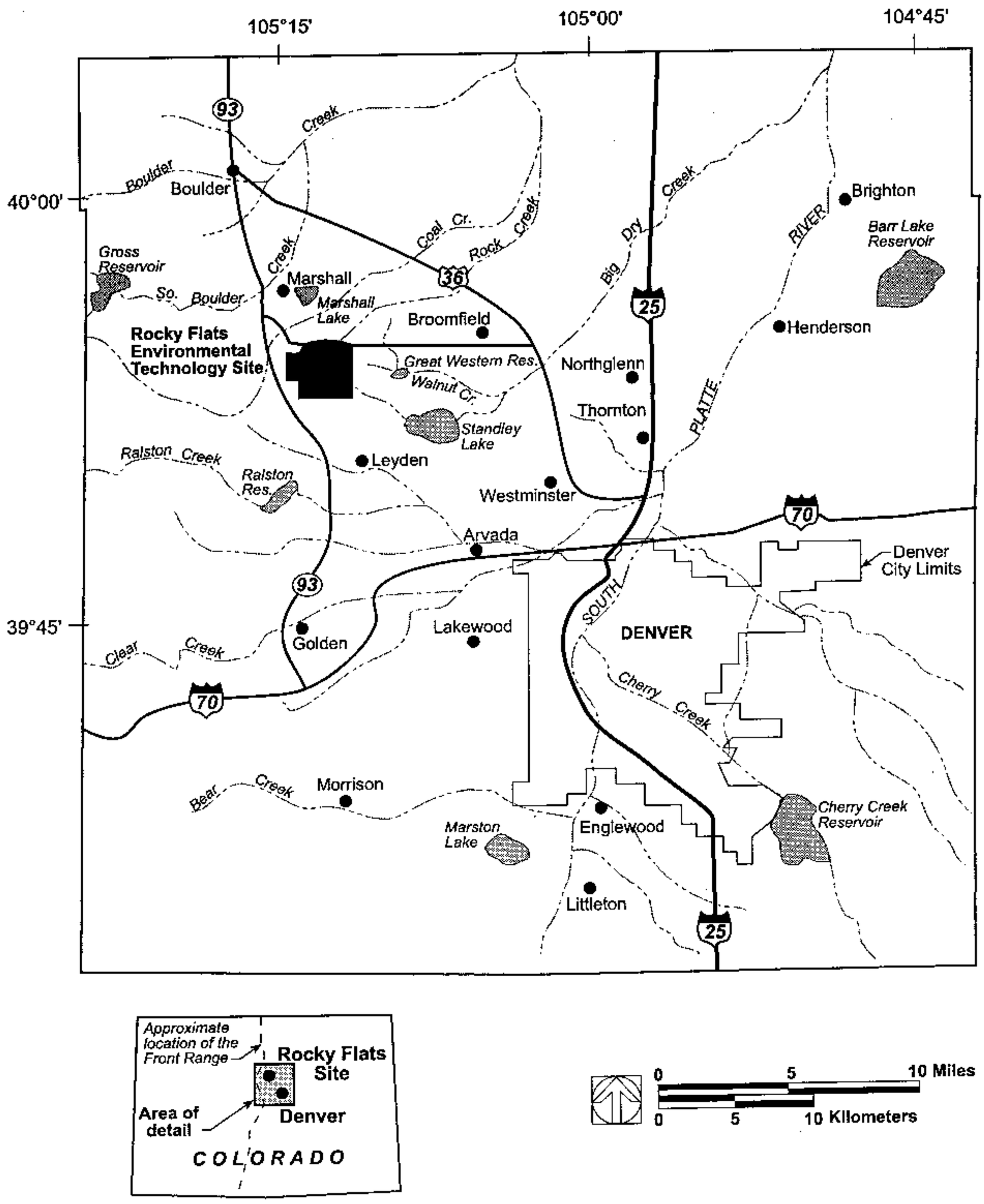

Figure 1. Location of the Rocky Flats Environmental Technology Site.

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2. POLICY

The DOE Rocky Flats Field Office (DOE, RFFO) policy regarding ecological resources at the Site is intended to conserve and manage these resources in a manner consistent with the Site cleanup mission. Remediation, construction, and maintenance activities are to be conducted in a manner that minimizes impacts to the ecosystem and maintains the high-quality plant and wildlife communities at the Site. Where degradation has occurred, DOE, RFFO and its operator will strive to improve the habitat condition. It is DOE, RFFO's intent to take no action in the Buffer Zone that would preclude future land use options.

3. SCOPE

The scope of this resource management plan includes all of the Site Buffer Zone, i.e., all DOE property outside the industrial area. The plan will remain in effect until the ultimate decommissioning of the Site as a DOE facility, or until the DOE no longer controls or owns the Buffer Zone. The ecological resources covered by this plan include all plants and animals within the Buffer Zone, as well as the physical resources that support them.

Key assumptions used to develop this plan include:

- Cleanup and closure of the Site in a safe, environmentally sound manner is the primary mission of DOE and its contractors.
- DOE has no legal control over existing surface or groundwater flows that originate offsite. It is understood that long-term surface and groundwater rights at the Site will be addressed by federal and state agencies in the future.
- Natural surface water flows will remain at current levels. It is assumed that long-term surface water management may change the character, though not the volume, of some downstream flows.
- Current mining of privately owned mineral resources within the Site boundary will continue; DOE, RFFO will not interfere with private mineral extraction that does not impede reasonable surface use.
- Any remedial actions conducted within the Buffer Zone pursuant to the regulatory requirements of the Rocky Flats Cleanup Agreement (RFCA)—the agreement for the Site developed in response to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120, Federal Facility Agreement—will incorporate National Environmental Policy Act (NEPA) values (NEPA; USC 1970) into appropriate decision documents. Corrective actions conducted at the Site pursuant to the Colorado Hazardous Waste Act (CHWA), or actions otherwise required by the Resource Conservation and Recovery Act (RCRA), will undergo appropriate review in accordance with NEPA.
- If Site activities require disturbance in the Buffer Zone, the timing and spatial extent of these activities will be minimized.
- Natural communities are dynamic and are expected to change over time.

- Any remedial or other human activities in the Buffer Zone will be subject to a review of compliance with Site resource protection procedures for Identification and Protection of Threatened, Endangered, and Special Concern Species (DOE 1994a), Migratory Bird Evaluation and Protection (DOE 1994b), and Wetland Identification and Protection (DOE 1997a)(see Appendix A).

- This management plan will be modified as Federal and State regulations and DOE policies change or as conditions warrant.

4. GOALS

The goal of this management plan is to sustain the health, function, and native diversity of the Site's natural communities. Where the health, function, or diversity have been degraded, the goal is to restore them to natural conditions. The overall approach to managing ecological resources will be at the ecosystem level. Ecosystems are natural systems composed of interconnected plant and animal communities and the physical environment they inhabit. Resource management at this level is vital to sustain and preserve the ecosystem as a functioning whole. When an individual species or plant community is designated as rare and imperiled, the management goals will include specific protection of that species and its habitat, or maintenance and management of the rare community, in addition to the ecosystem management approach.

The DOE has demonstrated a desire to implement ecosystem management at its facilities (CRS 1994). In close cooperation with DOE, RFFO, a series of resource management goals has been established that are designed to protect the important ecological resources at the Site. The Ecological Monitoring Program of the Draft Rocky Flats Environmental Technology Site Integrated Environmental Monitoring Plan (Integrated Monitoring Plan) (K-H 1997) (see Appendix B) was developed to include certain data quality objectives (DQOs), which will be used to assess the success of the program in attaining these goals. The program's management goals include:

- Practice good stewardship of all ecological resources at the Site.
- Maintain the quality and quantity of existing natural communities, including protection of native species, ecosystem functions, and soil quality (i.e., erosion protection).
- Improve the quality of plant and animal communities that have been degraded through past and present impacts. A major component of this goal is reduction or elimination of non-native species (i.e., noxious weeds and feral animals). Other actions are re-vegetation of disturbed areas and revitalization of plant communities through controlled burning.
- Mitigate forthcoming impacts that are the result of clean-up efforts at the Site. Relatively small changes in the timing, location, and methods of specific projects can greatly reduce the impact on natural communities. Procedures are in place for NEPA reviews and for project-specific assessments and clearances by ecology staff for ecological concerns (see Appendix A). Compliance with these procedures must be emphasized and encouraged.

- Protect the populations and habitat of federally listed threatened and endangered species, and other species designated as species of concern (Appendix C). Species will be protected in accordance with applicable federal or state regulations. In addition, other species that have been designated by DOE or stakeholder organizations as species of special concern will be similarly protected.

Overall, this management plan will ensure compliance with federal and state environmental laws. These laws include, but are not limited to, the Migratory Bird Treaty Act (MBTA; USC 1973a), the Endangered Species Act (ESA; USC 1973b), the Fish and Wildlife Coordination Act (FWCA; USC 1958), the Federal Noxious Weed Act (FNWA; USC 1975), the Bald and Golden Eagle Protection Act (BEPA; USC 1978), the Colorado Nongame, Threatened and Endangered Species Conservation Act (NTECA; CO 1991), the Clean Water Act (CWA; USC 1977), and NEPA (USC 1970). Executive Orders 11990, Protection of Wetlands (EO 1977a), and 11988, Floodplain Management (EO 1977b) also must be complied with to ensure wetland protection.

5. MANAGEMENT OVERVIEW

5.1 MANAGEMENT PHILOSOPHY

An ecosystem management approach will be used to manage the ecological resources in the Buffer Zone at the Site. This approach will seek to sustain the diversity and productivity of the ecological resources, including the fundamental ecological processes. This will be accomplished through the preservation and active management of individual species, plant communities, animal assemblages, biotic associations, and the abiotic functions that connect the natural systems. A sound understanding of the natural communities present, and recognition of the dynamic character of these systems, will be required for success of this approach. Systems monitoring at the landscape, population, and community levels will be required. Because the natural systems are dynamic and complex, some level of uncertainty is inherent. Ecosystem management must therefore adapt to new information and changing management objectives. Finally, ecosystem management recognizes humans as a part of the ecosystem and the effects, good or bad, of human activities on the natural systems of the Site.

5.2 COMPONENTS OF THE ECOLOGICAL RESOURCE MANAGEMENT PROGRAM

A combination of resource protection and conservation measures is in place at the Site. These plans, policies, and procedures provide an integrated approach to the preservation and conservation of Site ecological resources, including protection of sensitive species, preservation of rare plant communities, weed control, wildfire management, wetland conservation, and habitat conservation. This management plan incorporates the various plans and procedures to accomplish integrated management of the Site's ecological resources.

The Natural Resource Compliance and Protection Program (NRCPP), which has operated since 1992, was designed to ensure compliance with such acts as the MBTA, ESA, CWA, FWCA, NEPA, BEPA, FNWA, and NTECA. This management plan incorporates the components of the NRCPP into a comprehensive ecological resource management plan. Site procedures, put in place under the NRCPP to ensure compliance with the acts cited above, include the Migratory Bird Evaluation and Protection procedure (MBTA and BEPA), the Identification and Protection of Threatened, Endangered, and Special-Concern Species procedure (ESA, FWCA, BEPA, NEPA, and NTECA), and the Wetland Identification and Protection procedure (CWA, EO 11990, EO 11988).

In addition to these regulations are DOE policies and orders that require consideration of natural resources during facility planning and real property management. The DOE, RFFO Preble's

Meadow Jumping Mouse Interim Policy (DOE 1995b) requires that work conducted in Preble's meadow jumping mouse habitat must be necessary for protecting or enhancement of natural resources or be necessary to comply with regulatory direction or agreements. DOE, RFFO Policy 9-19 (DOE 1994c) requires implementation of erosion controls and vegetation-stabilization activities at the Site "to preserve the integrity of the site and protect the surrounding environment." DOE Order 4300.1B (DOE 1989a) contains directives on management of natural resources, including soil and water conservation and fish and wildlife management. DOE Order 6430.1A (DOE 1989b) requires consideration of endemic plant and animal species and natural topographic and geologic conditions, among other resources, when selecting sites for new facilities. Under "Construction Facilities and Temporary controls," DOE Order 6430.1A (DOE 1989b) outlines the need to limit disturbance, control drainage and erosion, preserve and protect native flora, conserve topsoil, and re-establish native flora.

Under the NRCPP, ecological resource monitoring has been ongoing, and the need for more formal management and protection plans or programs was recognized. Additionally, during development of the Integrated Monitoring Plan (K-H 1997; Appendix B), an expanded ecological resource management plan was conceptualized. DOE, RFFO acknowledged the need for an integrated plan that deals with all ecological resource concerns in a single forum. After the Ecology section of the Integrated Monitoring Plan was developed, in cooperation with DOE, RFFO, and concerned regulators, it was clear that such a plan would provide the most efficient platform for ecological resource management at the Site. This management plan, therefore, is designed to work in conjunction with existing programs, while supplementing them with additional strategies for areas not specifically addressed in another form. Figure 2 illustrates how the regulatory drivers (federal, state, and DOE) and the plans and procedures in place at the Site work together to ensure compliance with these drivers.

5.3 RELATED ECOLOGICAL RESOURCE PROTECTION AND MANAGEMENT PROGRAMS

The Site-Wide Wetland Comprehensive Plan for Rocky Flats Environmental Technology Site (K-H 1997a) outlines wetlands protection strategies for the Site. The CWA requires protection of wetland resources. If impacts are unavoidable, mitigation is required. The Wetland Plan gives guidance to planning and project personnel on avoiding impacts, or, if impacts are unavoidable, how to proceed with mitigation planning and negotiations with the oversight agencies. These agencies include the U.S. Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA). In certain cases, the U.S. Fish and Wildlife Service (USFWS) will also be involved in wetland mitigation planning and negotiation.

The Integrated Weed Management Strategy for Rocky Flats Environmental Technology Site (K-H 1997b), with its associated annual plan, is a separate component of the NRCPP and supplements the Watershed Management Plan (WMP) (DOE 1993). The weed

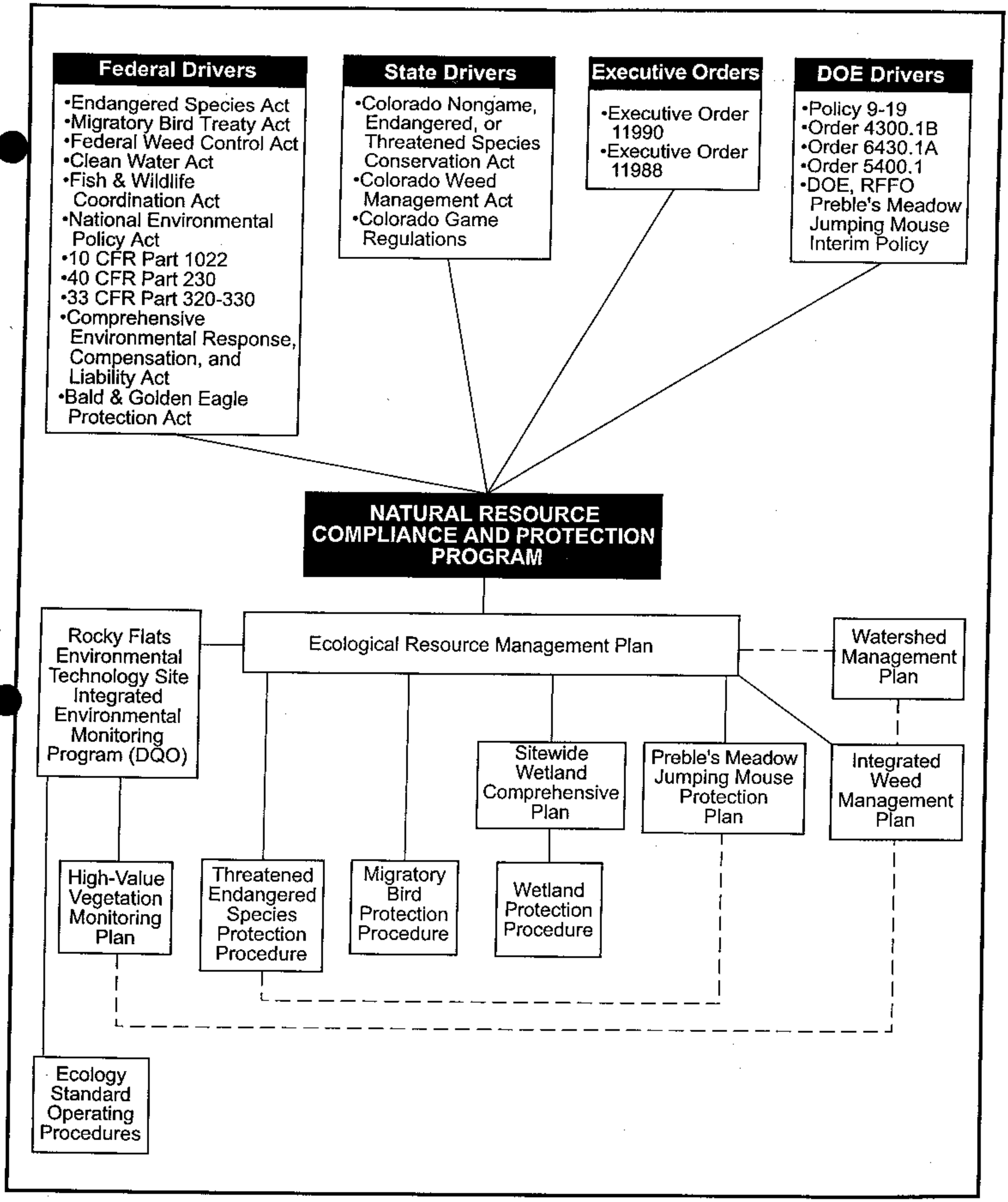

Figure 2. Regulatory drivers and heirarchy of documentation for the Rocky Flats Natural Resource Compliance and Protection Program.

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management strategy ensures Site compliance with the FNWA and state and local noxious weed control regulations. The weed management strategy calls for monitoring the condition of the important plant communities at the Site to determine when and where weed management techniques must be applied for weed control. It further calls for monitoring the results of weed control efforts to ensure success. Monitoring will be performed under the Integrated Monitoring Plan (IMP), Section 5, Ecology (K-H 1997; Appendix B).

Through implementation of these plans, programs, and procedures, DOE, RFFO and its operators anticipate that the ecological resources of the Site will be well protected, and that threats to the ecologically important plant and animal communities will be minimized. The overall result of implementation of this Plan will be improvement of the condition of degraded resources, and preservation of resources of concern to DOE, the regulators and other stakeholders.

5.4 MANAGEMENT TOOLS

In keeping with the DOE policies and goals stated above, this plan provides the framework for ecological resource protection and conservation in the Site Buffer Zone. The primary management tools to be used are:

- Continuation of monitoring under the IMP, Ecology Section 5, to ensure consistent ecological data collection. This program will provide the basis for management strategy evaluation and revision, and will be updated annually based on empirical data.
- Communicating with the USFWS and the Colorado Division of Wildlife, and any other appropriate agencies, with regard to the management of threatened and/or endangered species, including but not restricted to delineating areas of critical habitat on Site lands and participation in recovery efforts as appropriate.
- Controlling access to the Buffer Zone. Site security, maintenance, and monitoring personnel should be the only individuals granted routine access to the Buffer Zone. Driving off designated roads should be strictly prohibited. Access to critical habitat or closure of such critical habitat areas may be coordinated with appropriate Site organizations to protect these areas.
- Preventing uncontrolled releases of hazardous chemicals or radioactive waste into the Buffer Zone. Current Site procedures are adequate to cover this eventuality. However, during the time of accelerated clean-up, compliance with these procedures must be emphasized.

- Performing a NEPA impact assessment for any project to be conducted at the Site. While many specific details regarding future remediation actions are uncertain at this time, NEPA review of projects provides the vehicle for evaluating project alternatives and the effects of those alternatives on the Buffer Zone ecosystem. Reassessment may be made when more details become available.

- Rehabilitating areas altered by human activity to restore natural conditions and prevent erosion, soil loss, and siltation of watercourses. Rehabilitation actions may include removal of constructed features, restoration of natural gradients, replacement of topsoil, revegetation with native species, or other methods of restoring natural appearances to altered areas.

- Performing assessment surveys and developing protective strategies in compliance with the resource protection procedures referenced in Section 3 and included in Appendix A. This includes maintenance of internal communications with involved project personnel.

- Maintaining lists of threatened, endangered, candidate, and special-concern species that occur or have potential to occur at the Site. These "search lists" will aid in identifying species for which there may be special management concerns. The current lists are included in Appendix C.

- Using native plant species whenever revegetation is required within the Buffer Zone. When feasible, reclamation seed mixes and transplant materials will contain genetic material from the local Boulder/Golden areas.

- Protection of wetlands in accordance with the Site-Wide Wetland Comprehensive Plan (K-H 1997a).

- Controlling weeds to ensure the continued success of native plant communities in accordance with the Site Integrated Weed Control Strategy (K-H 1997b). Management techniques may include cultural, mechanical, biological, or chemical controls.

- Managing grassland fires to mimic natural cycles of burning and succession. Wildfires (i.e., naturally occurring fires or accidental fires created by humans) will be suppressed where possible. Prescribed fires (i.e., planned fires set under controlled conditions) will be used to control weeds, minimize the build-up of fuels, and restore the vigor of the native species within the Buffer Zone grasslands.

- Controlling the populations of animals when natural processes are not satisfactory. Should animal populations reach levels that are detrimental to the natural ecosystem, interfere with required human activity or the Site mission, or pose a safety concern, population control actions may be

necessary. These actions may include trapping and removal, fencing, modifying human activities, or as a last resort, extermination, as permitted by the CDOW and/or USFWS.

In addition to these management actions, special situations may arise where additional actions are required to preserve or protect the ecological resources of the Buffer Zone. The Preble's meadow jumping mouse, for example, is a species of special concern to federal and state regulators. The additional actions to be taken to ensure the continued success of this species at the Site are discussed in Section 6, and specified in detail in Appendix D.

Extensive field studies have been conducted within the Site Buffer (RMRS 1996a,b; DOE 1992, 1994d, 1995a, 1996; K-H 1996a,b; CNHP 1994, 1995; Weber 1974). These studies provide baseline information for future comparisons. The ongoing ecological monitoring program (K-H 1996a; K-H 1997), provides the means by which these comparisons can be made. These comparisons will be used to judge the overall effectiveness of management activities in meeting the goals of this ecological management plan.

In the event that adverse effects are detected during the monitoring of ecological resources, and to the extent that these changes are determined to be outside the expected range of normal variability, additional management actions must be considered to conserve the affected resource.

6. MANAGEMENT OF SITE-SPECIFIC ECOLOGICAL RESOURCES

This plan is directed at all ecological resources of the Site Buffer Zone. Several of these resources are unique or otherwise of special interest. Specific attention will be paid to species or plant communities of special concern. These species and communities have been designated as such based on the USFWS list of Threatened and Endangered Species (USFWS 1994), the USFWS list of candidate species for listing (USFWS 1996), the USFWS list of bird Species of Management Concern (USFWS 1995a), and the Colorado Natural Heritage Program (CNHP) ranked list of Rare and Imperiled Animals, Plants and Natural Communities (CNHP 1996a). Also included are species listed under the Colorado Nongame, Threatened and Endangered Species Conservation Act, and others designated by the Colorado Division of Wildlife (CDOW; CO 1991) as species of special concern. Species from all these lists that occur or may occur at the Site are listed in Appendix C.

Each of the ecological resources designated as being of special interest is discussed in the following sections.

6.1 THREATENED AND ENDANGERED SPECIES

6.1.1 Species Descriptions

Species in danger of extinction have been designated by the USFWS as threatened or endangered under the authority of the Endangered Species Act (see Appendix C for species lists). These species receive stringent federal protection from harm. In situations where Site activities may affect threatened or endangered species, DOE, RFFO must consult with the USFWS.

Two federally listed threatened or endangered species have been observed at the Site. American peregrine falcons (*Falco peregrinus*), federally listed as an endangered species, are observed seasonally at the Site. A pair of peregrine falcons has nested in the Flatirons, a few miles to the northwest, for several years. This species uses the Buffer Zone as casual foraging range during the spring, summer, and fall. Bald eagles (*Haliaeetus leucocephalus*) have been down-listed to threatened. Bald eagles have been observed hunting at the Site. Although appropriate habitat exists for Ute ladies'-tresses (*Spiranthes diluvialis*), a threatened orchid species, no individuals have been recorded at the Site.

6.1.2 Management Concerns

The primary management concern for threatened or endangered species is to avoid impacts on these species. Since these species occur casually at the Site, harassment or other forms of "take," as defined under the Endangered Species Act, might occur. Remediation activities, or other actions that cause habitat destruction, may cause impacts on these species. Specifically, these impacts may include disruption of foraging areas and destruction of perch sites. In addition, withdrawal of habitat and incidental take could result from Site activities.

6.1.3 Monitoring Approach

Methods used to monitor the presence, habitat use, seasonal residence, species densities, and breeding areas, and to gather other pertinent threatened and endangered wildlife data, encompass several techniques. Existing monitoring surveys include:

- Relative abundance surveys, performed on established transects, record all wildlife observed.
- Site-wide surveys along established roads record all threatened and endangered species.

- Site-specific project location surveys record the presence or absence of threatened or endangered species and confirm locations of wetlands within project areas.
- Migratory bird surveys record bird species along established transects.

In addition to these formal surveys, fortuitous sightings of any threatened or endangered species are recorded. Monitoring data will be used to assess Site impacts on threatened and endangered species, and to design mitigation actions.

6.1.4 Management Strategies

Monitoring for the presence of threatened or endangered species is an essential first step to management and protection of the species. Up-to-date monitoring data will help to expedite projects by providing current data to support management decisions. The alternative to ongoing monitoring would be special monitoring for each case, which could delay projects for as much as a year. Monitoring will take the form of routine wildlife and plant surveys, as well as site-specific threatened and endangered species surveys. Current procedures call for work-site assessments for all outdoor activities at the Site.

Avoidance of the species, when present, will eliminate the potential for take occurring due to Site activities. Minimization of habitat impacts due to remediation, construction, and maintenance activities will be the primary management method used for these species. Should a threatened or endangered species become resident at the Site, a species-specific protection plan, such as the Bald Eagle Protection Plan (DOE 1994) already effective at the Site, will be developed. The protection plan will specify protective actions required for the species.

6.2 SPECIAL-CONCERN SPECIES

6.2.1 Species Description

Special-concern species include those listed in Appendix C. These have been designated on the basis of their rare or imperiled status, as listed by the USFWS, CDOW, CNHP, and others. Except as discussed in other sections, this group of species does not currently have the specific regulatory protection of state and federal statutes.

Special-concern wildlife species that have been documented at the Site (RMRS 1996a,b; EG&G 1995; DOE 1992; ESCO 1993) include eastern short horned lizards (*Phrynosoma douglassii brevirostra*), which occupy the xeric mixed grasslands and portions of the mesic mixed grasslands at the Site. Northern goshawks (*Accipiter gentilis*), white-faced ibis (*Plegadis chihi*), and Baird's sparrows (*Ammodramus bardii*) are occasional visitors to the Site. Western burrowing owls (*Athene cunicularia hypugea*) have been observed in the short grassland, mesic mixed grassland, and xeric mixed grassland. Ferruginous hawks (*Buteo regalis*) are fall and winter residents of the Site and the surrounding vicinity, although no nesting of this species has been confirmed. Loggerhead shrikes (*Lanius ludovicianus*) are suspected to breed in shrublands on the Site and are most commonly observed where grasslands adjoin woodlands and shrublands. The Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a species of particular concern at the Site, is known to occupy riparian corridors and impoundment margins at the Site. This species is discussed in more detail below (Section 6.4).

Three plant species found at the Site are listed as rare and imperiled by the state natural heritage program (CNHP 1996). Although these species have no statutory protection, forktip threeawn (*Aristida basiramea*), mountain-loving sedge (*Carex oreocharis*), and carrionflower (*Smilax lasioneura*), are listed as rare within the State and globally (Appendix C). Because they are rare within the state, further monitoring is considered prudent.

The forktip threeawn grows in the xeric tallgrass prairie along the railroad grade entering the western edge of the Site (Weber 1974). The mountain-loving sedge is known from an herbarium specimen collected in the early 1970s (Weber 1974). It was found on the grasslands near the old Lindsay Ranch in Rock Creek. The carrionflower is known from recent monitoring in the tall upland shrubland community in Rock Creek.

6.2.2 Management Concerns

The primary management concern for special-concern plant and animal species is to avoid impacts to these species and their habitats. Many of these species are year-round residents at the Site, and are therefore very susceptible to Site activities. Remediation activities, or other actions that cause habitat destruction, will cause the majority of impacts on these species. Specifically, the impacts may include disruption or withdrawal of foraging areas, destruction of

breeding habitat, and destruction of essential cover (i.e., ecosystem damage). Such impacts could have the effect of reducing the population, or reducing the viability of the species at the Site.

Management of the special concern plant species primarily involves actions to ensure that populations at the Site are sustained by preserving the communities in which they grow. The most significant threats to these species are from weed invasions and human disturbance.

Other general concerns include degradation of habitats due to plant litter accumulation, invasion of habitat by feral predatory animals (e.g., feral house cats), surface disturbance (e.g., Site activities or mining) and degradation of water supplies that are essential to survival of the plant communities at the Site.

6.2.3 Monitoring Approach

Methods used to monitor the presence, habitat use, seasonal residence, species densities, breeding areas, and other pertinent special-concern species data include several techniques. Existing monitoring surveys for special-concern species include:

- Relative abundance surveys, performed on established transects, record all wildlife observed.
- Site-wide surveys along established roads record all special-concern species.
- Site-specific project location surveys record the presence or absence of any special-concern species and confirm locations of wetlands within project areas.
- Migratory bird surveys record bird and special-concern species along established transects.

In addition to these formal surveys, fortuitous sightings of any special-concern species are recorded.

Vegetation surveys will record the presence and locations of any special-concern plant species. These species will be monitored as part of the high-value vegetation surveys beginning in the 1997 field season (K-H 1996a). Known populations of the forktip threeawn and carrionflower, and any additional populations discovered, will be mapped and qualitatively assessed. Exact locations where the mountain-loving sedge was originally collected at the Site are unknown. However, should populations of the mountain-loving sedge be located during the 1997 field season, these populations also will be mapped and qualitatively assessed.

Monitoring data will be used to assess Site impacts on special-concern species, and to design mitigative actions.

6.2.4 Management Strategies

Monitoring for the presence of special-concern species is the first step in managing and protecting them. Up-to-date monitoring data will help to expedite projects by providing current data to support management decisions. The alternative to ongoing monitoring would be special monitoring for each case, which could delay projects for as much as a year. Monitoring will take the form of routine wildlife and plant surveys, as well as site-specific special-concern species surveys. Current procedures call for work-site assessments for all outdoor activities at the Site.

Avoidance of special-concern species will eliminate direct impacts due to Site activities. Temporary or permanent reserve areas will be established as required, and elimination or minimization of habitat impacts due to remediation, construction, and maintenance activities will be the primary management method for these species. Should a special-concern species be listed as threatened or endangered, a species-specific protection plan will be developed, specifying protective actions required for the species.

To address other concerns, specific programs will be employed. The Integrated Weed Management Strategy has been designed to control the spread of noxious weed species across the Site. Weed management will include the use of biological controls, fire, herbicides, and other options. This plan benefits species and their habitats by reducing and preventing habitat degradation. If necessary for control of feral animals, an animal control program will be instituted. At present, the Site's native predators effectively control these feral animals.

In addition to specific programs, such mitigative actions as minimizing the size of disturbances, modifying timing to cause the least impact to breeding or wintering populations, and timely revegetation of surface disturbances will be employed.

6.3 COLORADO SPECIES OF SPECIAL CONCERN AND NONGAME SPECIES

Colorado species of special concern, nongame species, and state listed threatened and endangered species (state species) are protected under the Colorado Nongame, Threatened and Endangered Species Conservation Act. These species include plants, invertebrates, small mammals, reptiles, amphibians, and many other animals, in addition to the threatened and endangered species (see Appendix C for species lists). The State list includes federally listed species and a number of others that have been granted special status by the State. The CDOW administers this act and is responsible for issuing the special scientific study and collection permit held by Site ecologists.

Colorado species of special concern, such as long-billed curlews (*Numenius americanus*), are casual visitors to wetlands and grasslands at the Site during migration stopovers. Greater sandhill cranes (*Grus canadensis*) are observed in flight over the Site during spring and fall migrations, but have not been recorded on the ground. Grasslands and wetlands at the Site could provide stopover habitat for cranes. American white pelicans (*Pelecanus erythrorhynchos*) are frequently observed foraging and resting in several impoundments on the Site during the spring and summer seasons. Suitable nesting habitat for pelicans does not exist at the Site. Ferruginous hawks overwinter at the Site and adjacent areas. Swainson's hawks (*Buteo swainsoni*), a species that has nested at the Site during the past several years, are now being tracked closely by CDOW due to recent declines in populations. Nesting areas of any hawks are protected at the Site by establishment of buffer areas to minimize disturbance.

6.3.1 Management Concerns

The primary management concern for Colorado species of special concern and other state species is to avoid impacts to these species and their habitats. Many of these species are resident at the Site, and are therefore very susceptible to Site activities. Remediation activities, or other actions that cause habitat destruction, will cause the majority of impacts on these species. Specifically, the impacts may include disruption or withdrawal of foraging areas, destruction of breeding habitat, and destruction of essential cover (i.e., ecosystem damage). Such impacts could have the effect of reducing the population or reducing the viability of the species at the Site.

Other concerns include invasion and degradation of habitats by exotic weeds, degradation of habitats due to plant litter accumulation, invasion of habitat by feral predatory animals (e.g., feral house cats), and degradation of water supplies that are essential to survival of the plant communities at the Site.

6.3.2 Monitoring Approach

Methods used to monitor the presence, habitat use, seasonal residence, species densities, breeding areas, and other pertinent state species data encompass several techniques. Existing monitoring surveys for state species include:

- Relative abundance surveys, performed on established transects, record all wildlife observed.
- Site-wide surveys along established roads record all state species.
- Site-specific project location surveys record the presence or absence of any special-concern species and confirm locations of wetlands within project areas.
- Vegetation surveys will record the presence and location of any special-concern plant species.

In addition to these formal surveys, fortuitous sightings of any state species are recorded. Monitoring data will be used to assess Site impacts on special-concern species, and to design mitigation actions.

6.3.3 Management Strategies

Monitoring for the presence of state species is the first step in managing and protecting them. Monitoring will take the form of routine wildlife and plant surveys, as well as site-specific special-concern species surveys. Current procedures call for work-site assessments for all outdoor activities at the Site.

Avoidance of any species present will eliminate direct impacts due to Site activities. Temporary or permanent reserve areas will be established as required. Elimination or minimization of habitat impacts due to remediation, construction, and maintenance activities will be the primary management method for these species. Should a state species become listed as threatened or endangered, a species-specific protection plan will be developed specifying protective actions required for the species.

To address other concerns, specific programs will be employed. The Integrated Weed Management Strategy has been designed to control the spread of noxious weed species across the Site. This plan benefits species and their habitats by reducing and preventing habitat degradation. If necessary to control feral animals, an animal control program will be instituted. At present, the Site's native predators effectively control feral animals.

In addition to specific programs, such mitigative actions as minimizing the size of disturbances, modifying timing to cause the least impact to breeding or wintering populations, and timely revegetation of surface disturbances will be employed.

6.4 SPECIAL-CONCERN SPECIES IN NEED OF SPECIAL MANAGEMENT AT ROCKY FLATS

6.4.1 Preble's Meadow Jumping Mouse

The Preble's meadow jumping mouse is protected under the Colorado Nongame, Threatened and Endangered Species Conservation Act as a species of special concern. This act is administered by the CDOW. This subspecies is of particular concern at the Site, because it is under consideration for listing as a threatened or endangered species, under the Endangered Species Act, by the USFWS. The special interest in preserving this species resulted in a petition to list it. The final response to this petition is pending.

Several DOE, RFFO directives require protection of the Preble's meadow jumping mouse at the Site. The Preble's Meadow Jumping Mouse Interim Policy (DOE 1995b) affords protection to known and potential Preble's meadow jumping mouse habitat at the Site, with the most stringent protection applied to known habitat. DOE, RFFO is also cognizant of the Memorandum of Agreement between the State of Colorado and the Department of the Interior concerning programs to manage Colorado's declining native species (USFWS 1995b), and is aware that one of the target species is the Preble's meadow jumping mouse. In light of the regional concern for this subspecies, DOE, RFFO has been working with the CDOW and USFWS to develop a collaborative action plan for the mouse. Studies (DOE 1996, K-H 1996b,c) are being conducted to gather data in support of such a plan. A detailed plan for the protection of the species and its habitat at the Site is included as Appendix D.

Preble's meadow jumping mice have been recorded in all major drainages of the Site: Rock Creek, Walnut Creek, Woman Creek, and Smart Ditch. Jumping mice at Rocky Flats are apparently restricted to riparian areas, selecting multi-strata vegetation with abundant herbaceous cover (K-H 1996c). Monitoring of these areas is discussed in Section 6.7.3. The Site's Preble's meadow jumping mouse populations are frequently found in association with coyote willow, and recent studies have produced a better understanding of population centers.

6.4.2 Management Concerns

DOE is voluntarily committed to the protection of known and potential habitat, and maintenance of a healthy, reproducing population of Preble's meadow jumping mice at the Site (DOE 1995b). Habitat for this subspecies has been protected since 1993 through informal internal policies.

DOE, RFFO acknowledges that certain Site activities may impact Preble's meadow jumping mouse habitat, and therefore the mice. These may be routine maintenance activities, construction, and remediation-related activities, including:

- Remedial actions that require surface disturbance or water treatment
- Spill control actions that may require water diversion, soil stripping, or other containment and cleanup actions
- Watershed management improvements
- Routine ditch maintenance
- Flood control actions
- Dam toe-blanket installation to enhance stability
- Weed management actions.

The above-listed remediation and other actions could affect this subspecies by disrupting or withdrawing foraging areas, destroying breeding habitat, and reducing the extent of essential cover (i.e., ecosystem damage). Such impacts could reduce the population or the viability of the subspecies at the Site.

Woman Creek and Walnut Creek have well-documented Preble's meadow jumping mouse populations (ESCO 1993; K-H 1996c). Some of the population centers for the subspecies are in locations that may be impacted by remediation activities; specifically, adjacent to the Operable Unit 5 Landfill in Woman Creek, and around the Operable Unit 6 ponds (A- and B-Series) in Walnut Creek. These two areas contain habitat for the majority of the individuals that have been recorded in these two creek drainages. Remediation planning in these areas must consider potential impacts to the subspecies and its habitat.

Other general concerns for the survival of the subspecies at the Site include:

- Invasion and degradation of habitats by exotic weeds
- Potential degradation of habitat due to plant litter accumulation or invasion of habitat
- Depredation of the subspecies by feral predatory animals (e.g., feral house cats)
- Degradation of water supplies that are essential to survival of the plant communities at the Site
- Fragmentation of their habitat, which may prevent movement between critical habitat units.

6.4.3 Monitoring Approach

Monitoring the habitat and sampling the population will provide the data necessary to verify that these goals are being met. General habitat quality and condition will be monitored no more frequently than every two years, according to the process set forth in the Integrated Monitoring Plan (K-H 1997). Preble's meadow jumping mouse populations will be monitored no less than every two years. More frequent monitoring will be avoided to minimize habitat damage from over-sampling. Management decisions will be made based on data collected through this monitoring program. Appropriate corrective measures will be employed to maintain the quality of the habitat, and to protect populations of Preble's meadow jumping mice and other species in these areas.

Site-specific habitat and population monitoring (before, during, and after remediation) will provide the data to develop management and protection strategies. Up-to-date monitoring data will help to expedite projects by providing current data to support management decisions. The alternative to ongoing monitoring would be special monitoring for each case, which could delay projects for as much as a year.

6.4.4 Management Strategies

At this time, no disturbance or construction is planned in either Rock Creek or Smart Ditch. Field activities are restricted to such actions as ecological monitoring and water monitoring in these areas. These activities will continue, with emphasis on low-impact monitoring practices.

In other locations where complete protection is not possible, all feasible measures, with emphasis on minimization of impacts, must be employed to protect the subspecies and its habitat. Special consideration of the critical life-cycle time periods of pre-hibernation (August and September) and post-hibernation (May and June) must be made in planning activities that may disrupt or destroy essential habitat. Planning for some activities also will have to consider the timing of the hibernation season (nominally September through May).

In addition to continued monitoring of the mouse and the plant communities that provide its habitat, certain measures will be used to mitigate impacts in the Woman Creek and Walnut Creek drainages:

- Consultation with concerned stakeholders and regulators during the planning phases of the remediation activities, prior to the start of any actions, to help develop mitigation strategies
- Minimization of the size of the surface disturbance associated with cleanup
- Minimization of impacts to, or disruption of, water sources that support essential habitat units for the mouse

- Scheduling of disruptive activities to coincide with hibernation, reducing stress on the subspecies
- Scheduling of disruptive activities to avoid critical pre- and post-hibernation periods
- Consideration of a relocation program for at-risk individuals in areas where impacts are unavoidable
- Reclamation and restoration of any plant communities impacted or destroyed by remediation actions
- Possible reintroduction of "refugees," or their offspring, into restored habitat.

6.5 MIGRATORY BIRDS

The Migratory Bird Treaty Act, a multi-national agreement for protection of migratory bird species, protects all migratory birds found within the United States. The USFWS has enforcement and permitting authority for this act. "Take" of migratory birds is strictly prohibited. Take is defined as collecting or killing birds, their nests, eggs, and young. Possession of migratory birds, or their parts, nests, eggs, and young is strictly prohibited unless the proper federal permits are in place. The USFWS has issued limited-use permits for possession of migratory birds, eggs, and nests (a scientific collection permit), and for nest removal (a nest removal permit) to the Site.

More than 185 species of migratory birds have been recorded at the Site since 1991. This species group as a whole is very sensitive to physical disturbance, as well as to chemicals, pesticides, and loss of habitat. Declines in species diversity and abundance of individuals is one of the first indications of environmental stress. The most sensitive group of migratory birds that use the Site, the neo-tropical migrants, are represented by more than 100 different species. Neo-tropical migrants are Western Hemisphere birds that breed north of the United States/Mexico border, and winter south of the border. Due to loss of habitat and other human-induced stress factors, these species are declining at a rate that concerns biologists worldwide.

The shrublands, grasslands, and creek-bottom woodlands all provide important nesting habitat. Many of the buildings within the Industrial Area also provide well-used nesting sites for some species. Waterfowl and shorebirds are represented by more than 45 different species at the Site.

Some bird species using the Site are especially sensitive to habitat loss, stress, and environmental degradation. Such species have suffered declines in numbers to the extent that several are listed on the USFWS list of bird Species of Management Concern (USFWS 1995a). All migratory birds receive protection under the Migratory Bird Treaty Act, and many are protected under additional acts as well.

6.5.1 Management Concerns

The primary management concern for migratory birds is to avoid impacts to these species, their nests, and their habitats. Several of these species are year-round residents at the Site, and a large number are breeding-season residents. Migratory birds, therefore, are very susceptible to Site activities. Remediation activities, or other actions that cause habitat destruction, will cause the majority of impacts on these species. Specifically, impacts may include disruption or withdrawal of foraging areas, destruction of breeding habitat, and destruction of essential cover (i.e., ecosystem damage). Such impacts could reduce the population or the viability of the species at the Site.

Other general concerns include invasion and degradation of habitats by exotic weeds, degradation of habitats due to plant litter accumulation, invasion of habitat by feral predatory animals (e.g., feral house cats), and degradation of water supplies that are essential to survival of the plant communities at the Site.

6.5.2 Monitoring Approach

Methods used to monitor the presence, habitat use, seasonal residence, species densities, and breeding areas, and to gather other pertinent special-concern species data, encompass several techniques. Existing monitoring surveys for migratory birds include:

- Relative abundance surveys, performed on established transects, record all wildlife observed.
- Site-wide surveys along established roads record unusual species.
- Site-specific project location surveys require searches for bird nests and young that may be impacted by activities within project areas.
- Migratory bird surveys record bird species along established transects.

In addition to these formal surveys, fortuitous sightings of any special-concern bird species are recorded.

6.5.3 Management Strategies

Monitoring for the presence of migratory birds is the first step in managing and protecting these species. Up-to-date monitoring data will help to expedite projects by providing current data to support management decisions. The alternative to ongoing monitoring would be special monitoring for each case, which could delay projects for as much as a year. Monitoring will take the form of routine surveys, as well as site-specific migratory bird surveys.

Avoidance of the species, when possible, will eliminate direct impacts due to Site activities. Work schedules will be modified when active bird nests are present that would be impacted by the activities. Large-scale surface disturbances will be conducted outside the breeding season to reduce potential impacts to breeding birds. Elimination or minimization of habitat impacts due to remediation, construction, and maintenance activities will be the primary management method for these species. Timely revegetation of surface disturbances will reduce the amount of time the habitat is unavailable to the species.

If necessary, feral animals will be controlled. At present, the Site's native predators effectively control feral animals, and other measures appear unwarranted.

6.6 WILDLIFE REGULATED AS GAME SPECIES BY THE STATE OF COLORADO

In addition to threatened and endangered species, rare and imperiled wildlife and plants, migratory birds, and state-protected non-game species, game species also inhabit the Site. Many of these are economically important species, while others are indicator organisms, or are aesthetically important. Game species are managed under specific game regulations by the CDOW. These species groups must be managed and protected to maintain the natural ecological balance in the ecosystems. Any actions involving management of state-regulated species must be authorized by CDOW.

6.6.1 Management Concerns

The primary management concern for game species is to avoid impacts to these species and their habitats. Most of these species are year-round residents at the Site, and are therefore very susceptible to Site activities. Remediation activities, or other actions that cause habitat destruction, will cause the majority of impacts on these species. Specifically, the impacts may include disruption or withdrawal of foraging areas, destruction of breeding habitat, and destruction of essential cover (i.e., ecosystem damage). Such impacts could have the effect of reducing the population or viability of the species at the Site.

Other general concerns include invasion and degradation of habitats by exotic weeds, degradation of habitats due to plant litter accumulation, invasion of habitat by feral predatory animals (e.g., feral house cats), and degradation of water supplies that are essential to survival of the plant communities at the Site.

6.6.2 Monitoring Approach

Methods used to monitor the presence, habitat use, seasonal residence, species densities, and breeding areas, and to gather other pertinent special-concern species data, encompass several techniques. Relative abundance surveys, performed on established transects, record all wildlife observed. Site-wide surveys along established roads also record these species. Site-specific project surveys record land use within the project areas. Game species are also recorded when encountered during migratory bird surveys. In addition to these formal surveys, fortuitous sightings of any game species are recorded.

6.6.3 Management Strategies

Monitoring for the presence of these species is the first step in managing and protecting them. Up-to-date monitoring data will help to expedite projects by providing current data to support management decisions. The alternative to ongoing monitoring would be special monitoring for

each case, which could delay projects for as much as a year. Monitoring will take the form of routine surveys, as well as fortuitous observations.

Avoidance of the species, when possible, will eliminate direct impacts due to Site activities. Elimination or minimization of habitat impacts due to remediation, construction, and maintenance activities will be the primary management method for these species. Timely revegetation of surface disturbances will be employed to reduce the amount of time the habitat is unavailable to the species.

Populations of these species will be allowed to maintain themselves by natural processes. Should any populations become so large that they damage the range, or cause other substantial problems, trapping and relocation or other population controls may be considered.

6.7 RARE AND UNIQUE PLANT COMMUNITIES

Certain plant communities have been identified by the CNHP as needing protection because of their rarity. The basis for their inclusion in this plan are the CNHP list of Rare and Imperiled Plant Communities, or the document prepared by CNHP for the Site, entitled Natural Heritage Resources of the Rocky Flats Environmental Technology Site and Their Conservation (CNHP 1995). These plant communities do not receive statutory protection, but the DOE policies cited above require responsible stewardship of these resources. Figure 3 shows all plant communities identified and mapped at the Site. Many communities occur only as small units embedded within other similar communities. Not all communities will be specifically managed, but all will be managed in association with other similar or contiguous communities as a part of the ecosystem management approach.

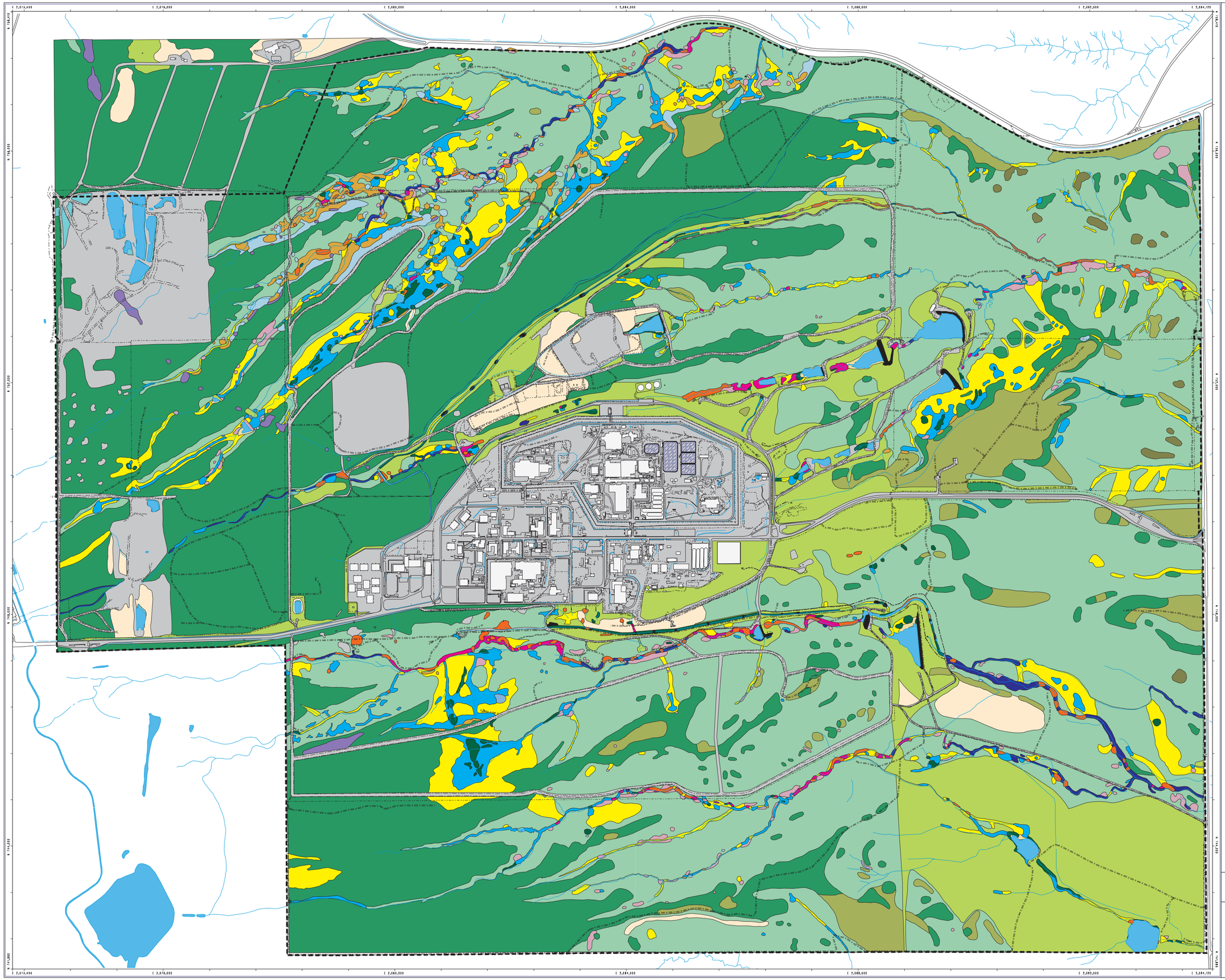
6.7.1 Xeric Tallgrass Prairie

The xeric mixed grassland unit selected for specific habitat conservation and management at the Site is the xeric tallgrass prairie (Figure 3). This plant community has suffered disturbance and destruction throughout most of its former range. The Site unit is one of the largest xeric tallgrass prairie units remaining in the U.S. Vigilant management of this unit has become necessary in recent years because of the threat of degradation through invasion of exotic weeds, suppression of fire, and lack of grazing.

Identification of this community at the Site is based on the presence of big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), prairie dropseed (*Sporobolus heterolepis*), Indian-grass (*Sorghastrum nuntans*), and/or switchgrass (*Panicum virgatum*). In general, only big bluestem and little bluestem occur very commonly or abundantly at Rocky Flats. These five species are considered to be tallgrass prairie relicts. When they are found in the xeric mixed grassland community with a combined cover of approximately 10 percent or more, the community is classified as xeric tallgrass prairie. The soil under the xeric tallgrass prairie is visibly cobbly on the surface and considered to be a sandy clay loam. This vegetation community covers the high, rocky pediment on the western third of the Site. The xeric tallgrass prairie community unit was selected for special conservation efforts at the Site because of its nationwide rarity.

6.7.1.1 Management Concern

The primary management concern for the xeric tallgrass prairie is sustaining the species diversity, genetic diversity, cover, and productivity of the native plant species in the community. Preservation of the animal populations that use and help sustain the community is also of concern. Direct and immediate threats to the community are from exotic weeds that are replacing the native species, and from human disturbances such as



Rocky Flats Environmental Technology Site Vegetation Map

LEGEND

- Riparian Woodland
- Leadplant Riparian Shrubland
- Wet Meadow/Marsh Ecotone
- Short Upland Shrubland
- Willow Riparian Shrubland
- Annual Grass/Forb Community
- Xeric Tallgrass Prairie
- Ponderosa Woodland
- Reclaimed Mixed Grassland
- Mesic Mixed Grassland
- Savannah Shrubland
- Tall Upland Shrubland
- Short Marsh
- Xeric Needle and Thread Grass Prairie
- Short Grassland
- Disturbed and Developed Areas
- Open Water
- Riprap, Rock, and Gravel Piles
- Mudflats
- Tree Plantings
- Tall Marsh

Standard Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Rocky Flats boundary
- Paved roads
- Dirt roads

DATA SOURCE:
Vegetation map data provided by PTI Environmental Services Ecology Group.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95

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N

Scale = 1 : 7200
1 Inch represents 600 feet

250 0 500 1000 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

Rocky Flats Environmental Technology Site

Prepared by:

RMRS

Rocky Mountain Remediation Services, L.L.C.
Geographic Information Systems Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 98-0208

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mining and other destructive activities that irrevocably destroy this non-renewable ecological resource. Lack of fire, a natural process to which prairie communities are adapted, is also a concern. Fire helps to stimulate growth of the native species, control weeds, reduce plant litter buildup, and recycle nutrients.

6.7.1.2 Monitoring Approach

Monitoring of the xeric tallgrass prairie consists of species richness inventories, noxious weed and rare and imperiled species mapping, photographic documentation, and qualitative assessment surveys to document the condition of the prairie and characteristic species. In addition, controlled burns and weed control efforts will be monitored quantitatively to determine the effectiveness of the management efforts with regard to targeted species and the native species. Specific details on the monitoring approach are found in the High-Value Vegetation Survey Plan for the Rocky Flats Environmental Technology Site (High-Value Vegetation Plan) (K-H 1996a). Wildlife within this community will be monitored as described in previous sections.

6.7.1.3 Management Strategies

Management of the xeric tallgrass prairie may involve the use of any of the following techniques:

- Controlled burns
- Weed control
- Revegetation and reclamation
- Access restriction
- Protection from disturbance
- Grazing, haying (although the long-term cost of managing grazing animals may be prohibitive).

Education of stakeholders, project proponents, and Site management with regard to the value and irreplaceability of this resource will also be an essential step in the management strategy.

6.7.2 Tall Upland Shrubland

The tall upland shrubland comprises stands of hawthorn (*Crataegus erythropoda*), choke-cherry (*Prunus virginiana*), and occasionally wild plum (*Prunus americana*) (see Figure 2). Tall upland shrubland is found primarily on north-facing slopes above seeps and along streams

in the Rock Creek drainage, with small occurrences in the other drainages. This community may be unique, having had no other units identified outside the Rocky Flats vicinity. This community is important to the resident mule deer population. Mule deer are highly reliant on tall upland shrubland for fawning cover, winter thermal cover and browse, and summer shade and isolation cover. A number of rare bird species (e.g., blue-gray gnatcatchers [*Polioptila caerula*] and chestnut-sided warblers [*Dendroica pensylvanica*]) occupy this community as well. Some units of tall upland shrubland also provide habitat for the rare Preble's meadow jumping mouse.

6.7.2.1 Management Concerns

The primary management concerns for the tall upland shrubland are sustaining the species diversity, genetic diversity, cover, and productivity of the native plant species in the community. Preservation of the animal populations that use and help sustain the community is also of concern. The most immediate concern in the tall upland shrubland is the invasion of exotic weeds that dominate the understory of the shrubland in some locations. Additionally, one species of particular concern is diffuse knapweed (*Centaurea diffusa*), which may be killing portions of the shrubland where the accumulated dead plants have buried the shrubs. Preservation of the alluvial groundwater flows that sustain the tall upland shrubland is also of concern. The restriction of the community to wetland edges and stream channels indicates its reliance on groundwater flows for its continued existence. Protection from and suppression of wildfires, along with protection from disease and insect infestations, are also management concerns in the tall upland shrubland community.

6.7.2.2 Monitoring Approach

Monitoring of the tall upland shrubland will consist of species richness inventories, noxious weed and rare and imperiled species mapping, photographic documentation, and qualitative assessment surveys to document the condition of the shrubland and characteristic species. Specific details on the monitoring approach are found in the High-Value Vegetation Plan (K-H 1996a). Wildlife within this community will be monitored as described in previous sections.

6.7.2.3 Management Strategies

Management of the tall upland shrubland may involve the use of any of the following techniques:

- Weed control
- Treatment for disease or insect infestation
- Revegetation and reclamation

- Access restriction
- Protection from disturbance.

If limited grazing should be introduced to the Site in the future, measures will be taken to protect this community from excessive trampling by livestock. Preservation of groundwater flows is essential for preservation of the community. Resolution of groundwater issues regarding the preservation of the tall upland shrubland also will be necessary. Education of stakeholders, project proponents, and Site management with regard to the value and irreplaceability of this resource will be an essential step in the management strategy.

6.7.3 Great Plains Riparian Woodland Complex

In addition to being an ecologically sensitive area in its own right, riparian habitat is also classified as wetland. Wetlands are protected under the Clean Water Act. The U.S. Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA) have jurisdiction over wetlands and wetland impacts at the Site. Riparian areas are well known for the diversity of plant and animal species they support. The Great Plains riparian woodland complex at the Site is a combination of three vegetation community classifications: leadplant-dominated (*Amorpha fruticosa*), coyote willow–dominated (*Salix exigua*) riparian shrubland, and riparian woodland. Great Plains riparian woodlands are found primarily along the drainage bottoms on Site (see Figure 2). This complex is characterized by stands of plains cottonwood (*Populus deltoides*), peach leaf willow (*Salix amygdaloides*), Siberian elm (*Ulmus pumila*), and silver poplar (*Populus albus*). Shrub species include chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpos occidentalis*), coyote willow, leadplant, and others.

Great Plains riparian woodland complex is important habitat for a different songbird association than the grasslands, and shares some species with the tall upland shrubland. Several of the bird species that use the Great Plains riparian woodland complex as foraging and nesting cover are rare species (e.g., savannah sparrow [*Passerculus sandwhichensis*]). This community unit is also seasonally important to the resident mule deer herd as shelter, forage source, and fawning grounds. Large cottonwood trees embedded within this unit provide nesting habitat for several raptor species, including great horned owls, red-tailed hawks, Swainson's hawks (a state "at-risk" species), and American kestrels. The riparian woodland complex supports the greatest number of Preble's meadow jumping mice at the Site, as discussed in Section 6.4, and is considered typical habitat for this species. The majority of monitoring, protection, and management of Preble's meadow jumping mouse habitat will occur in this community.

6.7.3.1 Management Concerns

The primary management concerns for the great plains riparian woodland complex are sustaining the species diversity, genetic diversity, cover, and productivity of the native plant species in the community. Preservation of the animal populations that use and help sustain the community is also of concern. Threats to the great plains riparian woodland complex are from exotic weeds that are replacing the native species, and from human disturbances. Preservation of streamflows required to sustain the community is also of key importance. Future potential grazing pressures are also a management concern.

6.7.3.2 Monitoring Approach

Monitoring of the great plains riparian woodland complex will consist of species richness inventories, noxious weed and rare and imperiled species mapping, photographic documentation, and qualitative assessment surveys to document the condition of the woodland complex and characteristic species. In addition, controlled burns and weed control efforts will be monitored quantitatively to determine their effectiveness with regard to targeted species and the native species, should they be used in this community. Specific details on the monitoring approach are found in the High-Value Vegetation Plan (K-H 1996a). Wildlife within this community will be monitored as described in previous sections.

6.7.3.3 Management Strategies

Management of the great plains riparian woodland complex may involve any of the following techniques:

- Weed control
- Revegetation and reclamation
- Tree or shrub removal
- Access restrictions
- Protection from disturbance
- Implementation of the Site Wetland Identification and Protection Procedure and the Wetland Comprehensive Plan.

If limited grazing is introduced to the Site in the future, measures will be taken to protect this community from excessive trampling by livestock. Preservation of streamflows at rates necessary for tree and shrub growth is essential for preservation of the community. Resolution of water balance issues regarding the preservation of the great plains riparian woodland

complex will be necessary. Education of stakeholders, project proponents, and Site management with regard to the value and irreplaceability of this resource will be an essential step in the management strategy.

6.7.4 High-Quality Wetlands (Rock Creek and Antelope Springs/Apple Orchard Springs Complexes)

Wetlands are protected under the Clean Water Act. The U.S. Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA) both have jurisdiction over wetlands and wetland impacts at the Site. Certain high-quality wetlands have been selected for specific conservation efforts at the Site. These are the wetlands with the largest contiguous areas, and the most complex plant associations. All other wetlands at the Site will be protected, as well, in accordance with federal law.

The Rock Creek wetlands are a large, seep-fed wetland complex extending along the north-facing slopes below the southernmost escarpment of the Rock Creek basin. The Antelope Springs/Apple Orchard Wetland Complex encompasses a predominantly wet-meadow, short-marsh, and tall-marsh community mosaic in the upper Woman Creek drainage basin. These are also seep-fed wetlands that depend on groundwater discharge for their continued existence.

Predominant vegetation in these wetlands includes cattails (*Typha sp*.) and bulrush (*Scirpus sp*.) in the tall-marsh community, Nebraska sedge (*Carex nebraskensis*) and Baltic rush (*Juncus balticus*) in the short-marsh community, and prairie *cordgrass (Spartina pectinata*), redtop (*Agrostis stolonifera*), showy milkweed (*Asclepias speciosa*), and Missouri iris (*Iris missouriensis*) in the wet-meadow community.

These wetlands support a variety of terrestrial and aquatic organisms. Portions of these wetlands have been designated as prime Ute Ladies'-tresses (*Spiranthes diluvialis*) habitat. Other parts support sensitive amphibian species and waterfowl. Many predatory mammals and bird species depend on these areas for hunting and foraging, because of their high prey-species productivity.

6.7.4.1 Management Concerns

The primary management concern for the high-quality wetlands is sustaining the species diversity, genetic diversity, cover, and productivity of the native plant species in the community. Preservation of the animal populations that use and help sustain the community is also of concern. The management concerns for the wetland communities are primarily the invasive exotic weeds that are replacing the native species, and human disturbances. Artificial suppression of fire is also a concern. Fire helps to stimulate growth of the native species,

controls weeds, reduces plant litter buildup, and recycles nutrients. Preservation of the alluvial groundwater flows that support the wetlands at the Site are also of key importance.

6.7.4.2 Monitoring Approach

Monitoring of the high-quality wetlands will consist of species richness inventories, noxious weed and rare and imperiled species mapping, photographic documentation, and qualitative assessment surveys to document the condition of the wetlands and characteristic species. In addition, controlled burns and weed control efforts will be monitored quantitatively to determine the effectiveness of the management efforts with regard to targeted species and the native species. Specific details on the monitoring approach are found in the High-Value Vegetation Plan (K-H 1996a). Wildlife within this community will be monitored as described in previous sections.

6.7.4.3 Management Strategies

Management of the high-quality wetlands may involve any of the following techniques:

- Controlled burns
- Weed control
- Grazing (if economically feasible)
- Revegetation and reclamation
- Access restrictions
- Protection from disturbance
- Implementation of the Site Wetland Identification and Protection Procedure and the Wetland Comprehensive Plan.

Monitoring groundwater flows is essential for preservation of the community. Resolution of water and mineral rights issues regarding the preservation of the wetlands will be necessary. Education of stakeholders, project proponents, and Site management with regard to the value and irreplaceability of this resource will be an essential step in the management strategy.

6.8 OTHER COMMUNITIES OF IMPORTANCE

6.8.1 Mesic Mixed Grassland

Mesic mixed grassland (see Figure 2) is characterized by western wheatgrass (*Agropyron smithii*), and blue grama grass (*Bouteloua gracilis*). For classification purposes, if western wheatgrass and blue grama grass form an understory beneath non-native species, then the grassland is classified as mesic mixed grassland. Other common species include green needlegrass (*Stipa viridula*), Canada bluegrass (*Poa compressa*), and Kentucky bluegrass (*Poa pratensis*). The mesic grassland has a more solid turf appearance, in comparison to the bunchgrass appearance of the xeric mixed grasslands. Soils are clay loams and do not have the cobbly surficial appearance typical of xeric mixed grassland soils. Most hillsides at the Site are considered mesic mixed grassland.

The quality of these grasslands varies considerably across the site. The mesic mixed grassland on the western side of the site has been, and continues to be, significantly degraded by diffuse knapweed (*Centaurea diffusa*). Mesic mixed grassland on the eastern portion of the Site has been degraded by weed species such as Japanese brome (*Bromus japonicus*), alyssum (*Alyssum minus*), and musk thistle (*Carduus nutans*), more than those on the western edge.

Mesic mixed grasslands constitute one of the largest contiguous community units at the Site. Often, the size and isolation of the community unit make it very important to some wildlife species, in addition to its essential role as a foraging habitat. A wide variety of grasslands birds breed and forage in this community. Small mammals are abundant and diverse, and provide a suitable prey base for a variety of avian and mammalian predators. Many of the species supported by this community are rare or of special concern.

6.8.1.1 Management Concerns

The primary management concern for the mesic grasslands is sustaining the species diversity, genetic diversity, cover, and productivity of the native plant species in the community. Preservation of the animal populations that use and help sustain the community is also of concern. Direct and immediate threats to the community are from exotic weeds that are replacing the native species, and from human disturbances such as mining and other destructive activities. Lack of fire, a natural process to which prairie communities are adapted, is also a concern. Fire helps to stimulate growth of the native species, controls weeds, reduces plant litter buildup, and recycles nutrients.

6.8.1.2 Monitoring Approach

Monitoring of the mesic grassland consists of noxious weed mapping and photographing, to document the condition of the prairie and characteristic species. In addition, controlled burns

and weed control efforts will be monitored quantitatively to determine the effectiveness of these management efforts with regard to targeted and native species. Rare or imperiled species encountered during monitoring also will be recorded and mapped. Specific details on the monitoring approach are found in the High-Value Vegetation Plan (K-H 1996a) and the IMP (K-H 1997). Wildlife within this community will be monitored as described in previous sections.

6.8.1.3 Management Strategies

Management of the mesic grasslands may involve any of the following techniques:

- Controlled burns
- Weed control
- Grazing, haying (if economically feasible)
- Revegetation and reclamation
- Access restriction
- Protection from disturbance.

Education of stakeholders, project proponents, and Site management with regard to the value of this resource will also be an essential step in the management strategy.

6.8.2 Reclaimed Grasslands

Reclaimed grasslands are not considered to be a high-value plant community, but because of the large Site area composed of this community (see Figure 2), management of its ecological resources is still important. The reclaimed grasslands are located primarily in the southeastern corner of the Site and around the Industrial Area. The majority are formerly cultivated agricultural fields, which were re-seeded with a mixture of smooth brome (*Bromus inermis*) and intermediate wheatgrass (*Agropyron intermeduim*). Those surrounding the Industrial Area are previously disturbed sites that were planted with smooth brome and wheatgrasses. These species dominate the reclaimed grasslands even after 25 years. Compared to the native grasslands and communities at the Site, the reclaimed grasslands have little plant diversity. Mirroring the plant community, the animal community is also limited in diversity. Some grasslands birds, such as the western meadowlark and vesper sparrow, occur in limited numbers in season. Small-mammal numbers and diversity are also low. Mule deer are seldom recorded in this habitat, except where it abuts other habitats.

6.8.2.1 Management Concerns

The primary management concern for the reclaimed grasslands involves restoration of the native plant communities to these areas. The process of natural succession, by which disturbed areas naturally return to a native state, is an extremely slow one (witness the limited species diversity in these areas after 25 years). Maintaining a vegetative cover and preventing disturbance in these areas is important to prevent wind and water erosion. The lack of native species diversity (both plant and animal) is of concern, regarding the sustainability of the community should adverse environmental conditions arise. Prevention of weed infestations in the reclaimed grasslands is of major concern. Management to assist the natural recovery of the reclaimed grasslands back to a sustainable mesic mixed grassland with the species diversity, genetic diversity, cover, and productivity of the native plant species in the community is a desirable long-term goal.

6.8.2.2 Monitoring Approach

Monitoring in the reclaimed grasslands will be primarily fortuitous, with no specific monitoring planned. Occasional weed monitoring and photographic documentation may be conducted to determine if any problems exist. Permanent transects located in the reclaimed grasslands may be re-sampled to evaluate the progress of grassland succession to a more native state. Wildlife within this community will be monitored as described in previous sections.

6.8.2.3 Management Strategies

Management of the reclaimed grasslands may involve any of the following techniques:

- Controlled burns
- Weed control
- Grazing, haying (if economically feasible)
- Revegetation and reclamation
- Access restriction
- Protection from disturbance
- Restoration to a native mesic grassland community in the future.

7. BUFFER ZONE RESPONSIBILITIES

As landowner, DOE, RFFO is ultimately responsible for all decisions on land use and land management at the Site. DOE, RFFO relies on the Site operator to carry out the day-to-day land management. Several organizations have responsibilities involving various aspects of the Buffer Zone. These organizations will be involved with ecological resource management decisions in the Buffer Zone.

The responsibility of implementing this management plan resides with the Site operator. Management strategies will be developed by the Kaiser-Hill Ecology Group, and will be discussed with all involved parties, to ensure that new strategies will not hamper essential Site operations. Organizations that will be involved in this management plan, and their responsibilities regarding the Buffer Zone, are presented in Table 1.

Other organizations, such as Plant Power and Facilities Maintenance, may be consulted when management decisions will affect facilities for which they are responsible. Such instances could include installation of powerline protection for migratory birds, Buffer Zone road maintenance, mechanical weed control, or other activities that would require their cooperation. In all cases, the management actions must be cooperative efforts among all involved parties.

TABLE 1. BUFFER ZONE RESPONSIBILITIES BY ORGANIZATION

Organization	Responsibilities
DOE, RFFO	
Office of Chief Counsel	Advise on compliance issues Help the decision process on compliance and land use
Communication & Economic Development	Public information on Buffer Zone events Education programs Public tours
Government Operations: Contracts and Assessment Management Division	Real estate management Mineral rights issues Water rights issues Mining Operations interface Adjacent landowner relations
Environmental Compliance	
Compliance Division	Oversight and approval of policy and operations in the Buffer Zone
Liaison Division	Natural Resource Trustee functions Ensure compliance with environmental regulations regarding ecological resources, soil, water, and air NEPA compliance Oversight of Ecology Program Responsible for ensuring “Best Management Practices” for resources Interfaces with regulatory agencies Site-wide EIS document
Program Planning & Integration: Program Liaison Division	Program planning oversight for Environmental Restoration activities, some of which will occur in the Buffer Zone
Kaiser-Hill Team	
Ecology and NEPA	
Ecology (PTI)	Identify ecological concerns in the Buffer Zone Establish protection and management plans Ensure compliance with ecological statutes and regulations Monitor wildlife, plants, and plant communities Ecological monitoring and compliance report Road closures and revegetation strategies Technical support to DOE, RFFO on compliance issues, and other ecological concerns
NEPA (Labat Anderson)	Perform NEPA assessment of all Buffer Zone activities
Environmental Restoration Projects (RMRS)	Facility management of Buffer Zone Authorization of Buffer Zone activities
Logistical Support (DynCorp)	Maintenance of roads and structures in the Buffer Zone

	Logistical support to ecological management functions (e.g., weed control)

8. SUMMARY

This document describes the plan of action for conserving the ecological resources within the Rocky Flats Environmental Technology Site (Site) Buffer Zone. Responsibilities for implementation of this management plan have been identified, assumptions specified, and goals determined. Within the Buffer Zone, a variety of communities exist, ranging from xeric tallgrass prairie to riparian woodlands. These communities provide habitat for numerous rare species, and in some cases, the communities themselves are rare. The goal of this management plan is to sustain the health, function, and native diversity of the Site's natural communities. Where the health, function, or diversity have been degraded, the goal is to restore the community to natural conditions. This plan also ensures compliance with federal and state environmental laws.

An ecosystem management approach will be used to manage the ecological resources in the Site Buffer Zone. This approach will seek to sustain the diversity and productivity of the ecological resources, including the fundamental ecological processes. This will be accomplished through the preservation and active management of individual species, plant communities, animal assemblages, biotic associations, and the abiotic functions that connect the natural systems.

Specific management concerns have been identified for plant communities and species of concern. In addition to general ecological resource management concerns, this plan outlines specific conservation actions for the Preble's meadow jumping mouse. Monitoring will be required to ensure success of this management approach. This management plan specifies the type and extent of monitoring to be used for each species group or plant community of management concern. The plan allows for flexibility in dealing with a dynamic natural ecosystem.

A combination of resource protection and conservation measures is in place at the Site. A number of plans, policies, and procedures provide an integrated approach to preserving and conserving the Site's ecological resources. These provide for protection of sensitive species, preservation of rare plant communities, weed control, wildfire management, wetland conservation, and habitat conservation. This management plan incorporates the various plans and procedures, and works in conjunction with them to accomplish integrated management of the Site's ecological resources.

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Appendix A

Ecological Procedures

This file is intentionally not attached here as an appendix to save space. A copy of the current procedures can be found in the "Procedures" section of this page.

Appendix B

Excerpt from: Rocky Flats Environmental Technology Site Integrated Monitoring Plan – Section 5, Ecology

This file is intentionally not attached here as an appendix because this version was superseded. A copy of the current Integrated Monitoring Plan can be found in a different section of this site.

Appendix C

Special-Concern Species Lists

This file is intentionally not attached here as an appendix to save space. Current lists can be found in the annual reports posted in other sections of this site.

Appendix D

Preble's Jumping Mouse Protection Plan for Rocky Flats Environmental Technology Site

This file is intentionally not attached here as an appendix because this version of the Preble's mouse protection plan was superseded. A copy of the current Plan can be found in the "Plans" section of this page.