U.S. Department of Agriculture
U.S. Forest Service
Grand Mesa, Uncompahgre and Gunnison National Forests

GRAND VALLEY RANGER DISTRICT

HUNTER RESERVOIR ENLARGEMENT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Cooperating Agency:
DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineer District, Sacramento
Colorado/Gunnison Basin Regulatory Office

JUNE 2007

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LIST OF ACRONYMS AND ABBREVIATIONS

aka ..... also known as
APE ..... area of potential effect
ARNI ..... Aquatic Resources of National Importance
ASL ..... above sea level
ASTM ..... American Association for Testing and Materials
ATV ..... All Terrain Vehicle
AUM ..... Animal Unit Months
BA/BE ..... Biological Assessment/Biological Evaluation
BA ..... Biological Assessment
BBS ..... Breeding Bird Survey
BE ..... Biological Evaluation
BLM ..... Bureau of Land Management
BO ..... Biological Opinion
BOCC ..... bird species of conservation concern
BOR ..... Bureau of Reclamation
CDM ..... Camp, Dresser and McKee
CDOW ..... Colorado Division of Wildlife
CDPHE ..... Colorado Department of Public Health and Environment
CERCLA ..... Comprehensive Environmental Response, Compensation and Liability Act
CEQ ..... Council on Environmental Quality
CFR ..... Code of Federal Register
cfs ..... cubic feet per second
COE ..... Army Corps of Engineers
COGCC ..... Colorado Oil and Gas Conservation Commission
CRCT ..... Colorado River Cutthroat Trout
CRI ..... Colorado River No. 1
CRN ..... Colorado River native
DAU ..... Data Analysis Units
DEIS ..... Draft Environmental Impact Statement
DMG ..... Division of Mining
DOW ..... Division of Wildlife
EIS ..... Environmental Impact Statement
EO ..... executive order
EPA ..... Environmental Protection Agency
ESA ..... Endangered Species Act
FEIS ..... Final Environmental Impact Statement
FS ..... Forest Service
FSH ..... Forest Service Handbook
FSM ..... Forest Service Manual
FLPMA ..... Federal Land Policy Management Act
FV ..... functional value
FWS ..... Fish and Wildlife Service
GIS ..... geographic information system
GLO ..... General Land Office
GMM ..... Grand Mesa Method

GMU ..... Game Management Units
GMUG ..... Grand Mesa, Uncompahgre and Gunnison National Forests
GPS .....Global Positioning System
Grand Mesa Method .....Grand Mesa Wetland Function and Value Assessment
HCI.....habitat capabilities index
IRA.....Inventoried Roadless Area
IV .....index value
JD .....Jurisdictional Determination
LAU .....Lynx Analysis Unit
lbs.....pounds
LCAS .....Lynx Conservation Assessment and Strategy
LRMP.....Land and Resource Management Plan
M&I.....Municipal and Industrial
MCB.....Monitoring Colorado's Birds
MIS .....Management Indicator Species
mm .....millimeter
MOU .....Memorandum of Understanding
MSDS.....Material Safety Data Sheets
NAGPRA .....Native American Graves Protection and Repatriation Act
NEPA .....National Environmental Policy Act
NFS .....National Forest System
NFSR.....National Forest System Road
NHPA.....National Historic Preservation Act of 1966
NSO..... No Surface Occupancy
OAHP.....Office of Archaeology and Historic Preservation
PCPRP.....Plateau Creek Pipeline Replacement Project
PFA .....post-fledging area
PLS.....Pure live seed
PMF.....probable maximum flood
PPN ..... Pikes Peak Native
RARE.....Roadless Area Review and Evaluation
RGL.....Regulatory Guidance Letter
RO..... Reverse Osmosis
ROD..... Record of Decision
SEO.....State Engineer's Office
SHPO .....State Historic Preservation Officer
SPCC..... Spill Prevention, Control, and Countermeasure
SPM ..... Semi-Primitive Motorized
State ..... State of Colorado
STATSGO .....State Soil Geographic Database
TDS.....total dissolved solids
TESS .....Threatened, Endangered, and Sensitive Species
TWI.....total weighted index
USDA.....United Stated Department of Agriculture
Ute Water.....Ute Water Conservancy District
WIF ..... weighted index value
WF ..... weight factor
WWE .....WestWater Engineering

EXECUTIVE SUMMARY

The Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG) and the Army Corps of Engineers (COE), Colorado/Gunnison Basin Regulatory Office, acting on behalf of the District Engineer, of the COE Sacramento District, as Cooperating Agencies, are evaluating a proposal from Ute Water Conservancy District (Ute Water) to reconstruct and enlarge Hunter Reservoir on the Grand Mesa National Forest, 21 miles southeast of the town of Collbran, Colorado, in Mesa County. The reservoir is operated under a Forest Service (FS) special–use authorization and administered by the Grand Valley Ranger District.

Authorizing Actions

The Federal Land Policy and Management Act (43 U.S.C. 1761) gives the FS the authority to issue or deny authorizations for water storage facilities on National Forest System (NFS) lands, while also protecting natural resources.

Under Section 404 of the Clean Water Act, a Department of the Army Permit (404 Permit) for the project is necessary. Construction of the dam would mean discharge of "dredge or fill material into the waters of the United States," necessitating the 404 permit. The COE would oversee the 404 Permit process and is a cooperating agency in this Environmental Impact Statement (EIS). A critical element of their concern is the impacted wetland, especially the two acres of fen. Fen are wetlands with organic soils dependent on direct contact with mineral enriched groundwater for nutrients and consistent moisture. The participation of the COE in the EIS means that, in addition to the general requirements of the National Environmental Policy Act (NEPA), the EIS will be prepared in accordance with the Corps' regulations for NEPA implementation (33 Code of Federal Regulations {CFR} 325, Appendices B and C).

Decision Framework

The FS needs to determine whether to authorize the reservoir enlargement. Under the Proposed Action, Hunter Reservoir would increase from 19 surface acres to approximately 80 surface acres. The water storage capacity of the facility would be increased from 110 acre-feet to 1,340 acre-feet. Rebuilding the earthen dam would increase the embankment by 26 feet to create a 37-foot-high embankment and would additionally bring the dam into safety compliance with the requirements of the Office of the State Engineer.

The Chief, Colorado/Gunnison Basin Regulatory Office, acting on behalf of the District Engineer, is the responsible COE, Sacramento District official identified to make decisions regarding this proposal. The responsible official will review the Proposed Action, alternatives to that action and all mitigation proposed to offset impacts to "waters of the United States, including wetlands" associated with the Proposed Actions. The responsible official will make the following decisions:

- Whether to issue a Department of the Army permit for the Proposed Action or an alternative(s) to the Proposed Action.

- What compensatory mitigation will be implemented to mitigate unavoidable impacts to "waters of the United States, including wetlands" as regulated under Section 404 of the Clean Water Act.

Purpose of and Need for the Action

The purpose and need for the Hunter Reservoir enlargement project is to provide a portion of Ute Water's projected municipal water demand. Over the next 40 years, demand is expected to increase by two and a half times the current amount. The Proposed Action is only one of several actions that Ute Water will need to pursue to meet its future demand for municipal water in their service area.

Public Involvement

The FS issued a scoping notice on July 29, 2005, for the Hunter Reservoir Enlargement Project, seeking comments on the proposal. Wetland concerns raised during this scoping period prompted the FS to determine that an EIS would be required. A Notice of Intent to Prepare an EIS appeared in the *Federal Register* on Wednesday, October 26, 2005 (pg. 61781 Vol.70, No. 206). The notice described the Proposed Action and asked for comments.

Issues Carried Forward

The enlarged reservoir would result in the year-round or seasonal inundation of approximately 32 acres of wetlands. Although the existing wetland function was already in an altered condition, it was determined that there would be additional effects to remaining wetland function. Issues carried forward included: effects to soils during construction; effects to base and peak flow regime due to continued water management; effects on wildlife, including threatened, endangered and sensitive species; impacts to recreation during and after construction.

Alternatives Considered

Ten alternatives to the Proposed Action were developed by the FS and the COE and then evaluated to determine if they should be carried forward for more detailed consideration in the EIS. Alternatives included other locations for dam construction or enlargement, other water sources, conservation measures, and the No Action Alternative.

Two regulatory standards had to be met in the evaluation of the alternatives -- those provided by the Council on Environmental Quality (CEQ) for implementation of the NEPA process, and those devised by the Environmental Protection Agency (EPA)/COE to guide implementation of the Clean Water Act. NEPA requires that alternatives be *reasonable*, meaning "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." The COE, under the 404(b)(1) Guidelines of the Clean Water Act, requires that "no discharge of dredge or fill material shall be permitted if there is a *practicable* alternative to the proposed discharge, which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." (40 CFR 230.10(a)) "*Practicable*" is defined by the Guidelines as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

All ten alternatives were screened according to four criteria: satisfaction of the project's purpose and need and satisfaction of the three elements of the Guideline's *practicability* standard - cost, technology, and logistics. Any alternative that would meet the COE practicability standard was judged to have also met the NEPA standard of *reasonableness*. The screening process resulted in no alternatives to the Proposed Action that would meet the project's purpose and need and would at the same time satisfy the *practicability* standard. Thus, the No Action Alternative is the only alternative considered in the analysis. A full description of the alternative screening process is presented in Section 2.3.

Environmental Effects

Effects were evaluated for specific resource areas in light of the issues identified in the responses to the Notice of Intent. The resource areas evaluated in this EIS are geology, paleontology and soils, water resources/hydrology, vegetation, wetlands, aquatic wildlife, terrestrial wildlife, special status species, recreation and travel management, grazing, and cultural resources

There are no impacts to geology, paleontology, or cultural resources from the Proposed Action. Soils in the reservoir basin would be removed by the construction of the new dams, and used as fill material. Approximately 88.8 acres of vegetation would be affected by the Proposed Action, including 32 acres of wetland. Existing and new access roads (4.5 acres) would be reclaimed upon completion of the project; however, 84.3 acres of habitat would be permanently affected.

The hydrologic effect of the enlarged reservoir would be the alteration in base and peak flows below the dam in Leon Creek, affecting both stream hydrology and fisheries. During reservoir filling, there would be decreased in-stream flow in the 0.06 mile reach of the stream directly below the dam. This would result in a decrease of aquatic habitat in this reach, causing a negative effect. However, fisheries habitat in the reservoir would be considerably improved by the new reservoir.

Habitat for terrestrial wildlife would be decreased due to the net loss of habitat. Recreation would be affected by the enlargement of the reservoir with the relocation of the snowmobile trail that currently skirts the existing reservoir high water line. Temporary improvements in the Hunter Reservoir access road may increase recreation use in the area during the period of construction. In the long term, recreation may increase due to increased population in the area and improved fishing opportunities.

A significant environmental effect of the enlarged reservoir is the inundation of 32 acres of wetlands, thereby directly affecting wetland function. The national policy regarding wetlands is to prevent any net loss. When such a loss is anticipated, applicants must establish that the impact cannot be avoided, that reasonable efforts have been made to minimize impacts through project design and construction, and finally, that a plan for compensation of unavoidable wetland impacts is in place*.

Design Features

Several design features that provide key environmental protections are included as part of the Proposed Action. These design features were identified by the FS and the COE to avoid or minimize environmental effects to specific resources. They include: air quality and stormwater permitting, preparation of an Erosion and Sediment Control Plan, a Stream Diversion Plan, a

Noxious Weed Management Plan, a Traffic Control Plan, a Health and Safety Plan, and reclamation practices. These measures are expected to eliminate or reduce impacts associated with aspects of the project.

Compensation of Unavoidable Wetland Impacts or Mitigation Plan

This EIS includes a plan for compensation of unavoidable wetland impacts. The compensation plan is included in Appendix B as the Conceptual Wetland Mitigation Plan.

The Mitigation Plan was developed over the last two years by COE and FS specialists. The essence of the plan is a systematic assessment of the wetland function that would be affected and then a strategy for replacement of that function. The functional assessment was conducted in accordance with the direction of COE Regulatory Guidance Letter (RGL) 02-2*. The resulting Grand Mesa Method (GMM) allows functional assessment of existing wetlands and a comparison of existing resource values and thus helps identify potential mitigation opportunities (WWE 2005*b*). The GMM provides a relative assessment of wetland quality, which when multiplied by the acreage of the wetland provides the functional value of the wetland. Twenty existing wetlands were evaluated and detailed in Appendix A. When compared with high quality reference sites, Hunter Reservoir wetland had a relatively low quality rating. The Proposed Action would result in the loss of wetland functional value that would be replaced with compensatory mitigation in the vicinity of Hunter Reservoir and at other locations on the Grand Mesa National Forest.

The FS has proposed two sites to serve as compensatory mitigation for the inundation of wetland by the Hunter Reservoir enlargement. These sites are described in Section 3.3, Wetlands. The first mitigation site is the existing access road to Hunter Reservoir (NFSR 280), which would be realigned to avoid wetlands along Leon Creek. The degraded areas along the creek would be re-vegetated and the wetland enhanced. The second site involves the relinquishment of existing privately held reservoir rights on FS lands. Wetland would be constructed and existing high quality wetland protected. Together, these actions would equal or exceed the functional value of the wetland lost from the reservoir enlargement.

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and the COE would not issue a Department of the Army permit for the Proposed Action. This alternative is required by NEPA as a baseline for estimating the environmental effects of the action alternatives.

* COE. 2002. U.S. Army Corps of Engineers, Regulatory Guidance Letter. Guidance on Compensatory Mitigation Resource Impacts under the COE Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, December 24, 2002, No. 02-03.

1.0 INTRODUCTION

Ute Water Conservancy District (Ute Water) is proposing to rebuild and increase the size of the dam that impounds Hunter Reservoir; enlarging the surface area of the reservoir from its current 19 acres to approximately 80 acres. The water storage capacity of the facility would be increased from the current 110 acre-feet to 1,340 acre-feet. This Environmental Impact Statement (EIS) analyzes the environmental effects on National Forest Systems (NFS) lands of the dam reconstruction and reservoir enlargement and associated access needs.

Hunter Reservoir is approximately 11 miles south of the Vega State Recreational Area, in Sections 27 and 34 of Township 11 South, Range 93 West, 6th Principal Meridian. It is approximately 21 miles upstream from the town of Collbran, Colorado. Figure 1-1 shows the location of the existing reservoir. The project area for this Proposed Action is in Mesa County, Colorado, entirely on NFS lands administered by the Grand Valley Ranger District of the Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG).

Rebuilding the earthen dam would increase the embankment by 26 feet to create a 37-foot high embankment and would additionally bring the dam into safety compliance with the requirements of the Office of the State Engineer. Dam safety inspection reports by the State Engineer list multiple safety issues at the site, including erosion along the spillway channel, seepage on the downstream toe and soft areas on the downstream embankment.

Ute Water provides domestic water to more than 82,000 Grand Valley residents, over half the population of Mesa County. The Ute Water service area includes most of the Grand Valley surrounding the City of Grand Junction, Colorado, and extends from east of the Town of Palisade to within five miles of the Colorado-Utah state line. The enlargement of Hunter Reservoir is part of Ute Water's long-term plan to meet the growing water demand in its service area.

In 1998, the Bureau of Land Management (BLM) prepared the Plateau Creek Pipeline Replacement Project EIS to address the impacts of constructing a new pipeline to bring water from Ute Water's terminal reservoirs, Jerry Creek Reservoirs No. 1 & 2, to the treatment plant (BLM 1998). Much of the information developed for and used in that EIS has bearing on this EIS and will be referenced. In particular, the Programmatic Biological Opinion developed by the Fish and Wildlife Service (FWS) for the pipeline EIS provides the mitigation for impacts on the endangered fish of the Colorado River from developments in the Ute Water system. Net depletions to the Colorado River basin of 3,000 acre-feet per year were calculated using worst-case assumptions. This calculation includes projected water demands through the year 2045 (FWS 1998). Ute Water has paid depletion fees for up to 3,195 acre-feet of new depletion as described in the BO. Ute Water is well within the allowable new depletion under the 1998 BO, including the Hunter Reservoir Project. Also, a detailed water demand study of Ute Water was commissioned by the BLM providing a range of expected demands over a 50-year period (Pearse & Associates 1995). This study also evaluated the benefits of Ute Water's conservation program. As of 2007, consumption on a per capita basis has dropped about 15% since 1996 (Tolen 2007).

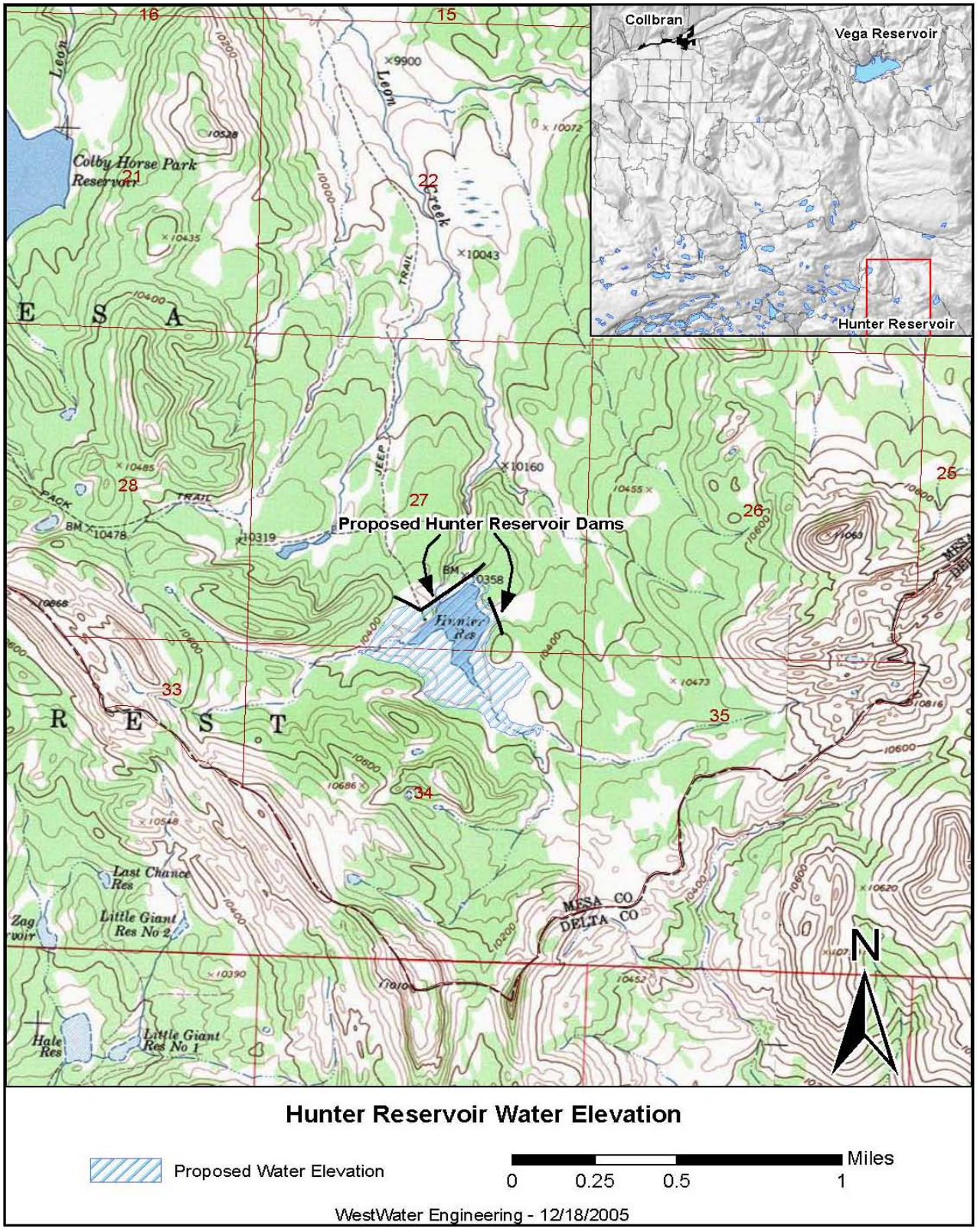

Figure 1-1. Location of the Proposed Hunter Reservoir Enlargement

The Proposed Action is described in Chapter 2 of the EIS. Chapter 3 includes a description of existing conditions in the project area and has an analysis of the impacts of the Proposed Action.

1.1 Background

Hunter Reservoir, which was originally called Kirkendall Reservoir, has been a water storage site since the early 1900s when L.B.C. Kirkendall and others constructed the reservoir under an easement issued by the General Land Office (GLO), pursuant to the Act of March 3, 1891, for irrigation of their property. Forest Service (FS) and GLO records indicate that, although plans at the time were to construct a reservoir covering approximately 64.5 acres, construction on the reservoir between 1907 and 1933 resulted in a reservoir that covered only 19 surface acres. (A detailed history of the reservoir site is included in EIS project files.)

In 1931, the private property served by the Kirkendall Reservoir water was sold to Mr. E. Ray Hunter of Collbran, Colorado. At that time, the reservoir began to be called Hunter Reservoir. Over a period of several decades, there were discussions of enlarging the reservoir to its planned size; however, the enlargement never occurred. Some maintenance was done on the dam, including replacement of the outlet works in 1990.

In 1998, Ute Water acquired the water rights for the reservoir from the then holders of the water rights. In August 2001, the Office of the State Engineer completed an inspection of the dam, which indicated that there was seepage at the downstream slope and toe of the dam and the overall condition required maintenance and improvement. These conditions, if not repaired, could cause the dam to fail. Because of the work the State Engineer's Office (SEO) required to bring the dam into compliance (SEO 1988) and because Ute Water had additional water rights that could be stored in the reservoir with an enlargement, Ute Water started discussions with the FS about the possibility of enlarging the reservoir. Ute Water subsequently submitted an application to the FS in 2004.

1.2 Ute Water's Mission

Ute Water was formed by decree of the District Court of Mesa County, Colorado, on April 4, 1956, as a political subdivision of the State of Colorado (State) in accordance with the Water Conservancy Act of 1937. The District was established to provide domestic water service to rural and urban areas of the Grand Valley. According to the court decree that established the District, Ute Water is required to provide domestic water service to any customer in the district who is capable of paying for the service.

The mission of Ute Water, as clearly documented in numerous brochures and publications, grows out of the terms of the original decree and includes three fundamental principles:

- To provide the quantity of water necessary to meet customer demand;
- To provide the highest quality drinking water to its customers; and
- To provide water at the lowest cost to its customers.

This mission is similar to that of most other municipal water suppliers in Colorado.

1.3 Purpose and Need for the Proposed Action

The purpose and need for this project is to provide a portion of Ute Water's projected municipal water demand.

Ute Water's customer base of more than 82,000 residents represents over half the population of Mesa County and continues to grow at a rapid pace. Its service area extends from east of the Town of Palisade to within five miles of the Colorado-Utah state line. Under the decree that established Ute Water, its mission is to provide its customer base with a reliable, cost effective, high quality water source. The enlargement of Hunter Reservoir is part of Ute Water's long-term plan to serve that mission.

To provide enough water to meet demand, Ute Water must first own water rights. Under Colorado water law, water rights are decreed in specific locations; and, in order to develop those water rights, one must be able to show that they hold those rights. Water rights are used as a means for the State to administer the use of water. Colorado uses the prior appropriation doctrine for managing water rights. This doctrine in its simplest form says that he who first puts water to beneficial use or begins diligently planning to use that water has the first right to it. This is known as "first in time is first in right." For the Proposed Action, Ute Water paid the previous holder for the right to develop the water rights to Hunter Reservoir in this particular location.

Alternatives carried forward in this EIS must meet the requirements of Plateau Creek Pipeline Record of Decision (ROD). The ROD authorized a new pipeline from Ute Water's treatment plant to the Jerry Creek Reservoirs. This pipeline was sized to meet Ute Water's projected needs up to 2045. Therefore, Ute Water is developing additional sources of reliable, cost effective, high quality water in the Plateau Valley that can be transported in this pipeline to the treatment facility.

This Proposed Action will meet the intent of the 2004 Memorandum of Understanding (MOU) between the Rocky Mountain Region of the FS and the State, which says, in part, that the State and the FS agree to explore creative ways to assure continued operation of water use facilities on NFS lands while protecting aquatic resources, that conflicts are best avoided by careful advance planning and a spirit of cooperation, and that reauthorization of existing water facilities will be done in cooperation and collaboration with the holders of the permits and with other parties such as local governments, tribes, and state and federal agencies as appropriate.

1.4 Decision Framework

The Forest Supervisor of GMUG is the Responsible FS official identified to make decisions for this proposal. Given the purpose and need, the Responsible Official will review the Proposed Action, other alternatives and mitigation measures in order to make the following decisions:

- Whether or not to authorize the proposal to rebuild the earthen dam at Hunter Reservoir and conduct road improvements, thereby enlarging the storage capacity of the reservoir.
- What compensatory mitigation sites will be implemented?

The decision framework acknowledges that activities may occur during the life tenure of the permit for operations and maintenance of the reservoir.

The Chief, Colorado/Gunnison Basin Regulatory Office, acting on behalf of the District Engineer, is the responsible U.S. Army Corps of Engineers (COE), Sacramento District official identified to make decisions regarding this proposal. The responsible official will review the Proposed Action, alternatives to that action and all mitigation proposed to offset impacts to "waters of the United States, including wetlands" associated with the proposed actions. The responsible official will make the following decisions:

- Whether to issue a Department of the Army permit for the Proposed Action or an alternative(s) to the Proposed Action.
- What compensatory mitigation will be implemented to mitigate unavoidable impacts to "waters of the United States, including wetlands" as regulated under Section 404 of the Clean Water Act?

Under Section 404 of the Clean Water Act, the COE, a cooperating agency in this EIS, will require a Department of the Army Permit (404 Permit) for the construction of the dam. Construction of the dam will mean discharge of "dredge or fill material into the waters of the United States," necessitating a 404 permit. More importantly, the enlarged reservoir will inundate 32 acres of wetlands, including two acres of fen. The national policy (Executive Order No. 11990) regarding wetlands is to prevent any further net loss. When such a loss is anticipated, applicants must establish that the impact cannot be avoided, that reasonable efforts have been made to minimize impacts through project design and construction, and finally, that a plan for compensation of unavoidable wetland impacts is in place. The decision by the COE on Ute Water's 404 Permit will rely on analysis in this EIS of the wetlands lost because of the dam construction and the compensation proposed to offset that loss. Further information about the laws and regulations guiding this EIS, such as the 404 Permit, are provided below.

1.5 Relationship to Policies, Plans, Regulations, Guidance and Laws

Environmental protection and management is guided by many laws, regulations and executive orders. Following is a description of the legal and regulatory framework that guides the GMUG in the determination of a proposal such as the Hunter Reservoir enlargement project.

- Title V, Federal Land Policy and Management Act of October 21, 1976 (43 U.S.C. 1761-1771). Title V of the Federal Land Policy and Management Act (FLPMA) authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse National Forest System lands. FLPMA directs the United States to receive fair market value unless otherwise provided for by statute and provides for reimbursement of administrative costs in addition to the collection of land use fees (43 U.S.C. 1764(g)).
    a. Except in designated Wilderness Areas, Alaska, and specifically excepted situations, FLPMA is the only authority for all forms of use involving:
        (1) Transportation, distribution, or storage of water.

- Organic Administration Act of June 4, 1897, as Amended (16 U.S.C. 475). This act contains the initial, basic authority of watershed management on National Forest System

lands. The purpose for the establishment of National Forests, as stated in the act, includes securing favorable conditions of water flows. This act also authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the National Forests. This is the basic authority for authorizing use of National Forest System lands for other than rights-of-way under FLPMA.

- Watershed Protection and Flood Prevention Act of August 4, 1954, as Amended. (68 Stat. 666; Pub.L. 83-566; 16 U.S.C. 1001). This act authorizes the Secretary of Agriculture to cooperate with the states and their political subdivisions and local public agencies in preventing watershed damages from erosion, floodwater, and sediment, and in furthering the conservation, development, utilization, and disposal of water. The act also authorizes the Secretary to cooperate with other federal, state, and local agencies in making investigations and surveys of the watersheds of rivers and other waterways as a basis for planning and developing coordinated programs, and to pursue additional works of improvement on the 11 watersheds authorized by the Flood Control Act of December 22, 1944, as amended.

- Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344). This series of laws was written to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Section 101). Congress sought to sustain the integrity of water quality and aquatic habitat so that waters of the United States will support diverse, productive, stable aquatic ecosystems with a balanced range of aquatic habitats. All issues are framed by the intent of Congress to improve and preserve the quality of the Nation's waters (540 F2.d 1023; 543 F2.d 1198; 612 F2.d 1231; 97 S.Ct 1340; 97 S.Ct 1672). States have authority over water rights (Section 101g).

  The FS must comply with federal, state and local water quality laws and rules, coordinate actions that affect water quality with States, and control non-point source pollution like anyone else (Section 313).

  The FS must apply Best Management Practices, considering local factors, to control non-point source pollution and meet water quality standards (Sections 208, 303, and 319). State-classified water uses, and the water quality they need, must be sustained to comply with the anti-degradation policy, unless States decide that vital economic and social development justify impacts (40 CFR 131.12).

  Waters of the United States include perennial and intermittent streams, lakes, wetlands, and their tributaries. Aquatic ecosystems are waters of the United States that serve as habitat for interrelated and interacting communities and populations of plants and animals (40 CFR 230.3).

  Section 404, in concert with other provisions, provides rigorous criteria to control discharges of pollutants, by direct placement or runoff, into waters of the United States (40 CFR 230.11). The FS must strongly pursue options that avoid crossing, coming near, or discharging material into special aquatic sites before choosing a course of action that does so (40 CFR 230.10a). Special aquatic sites are sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle-pool complexes (40 CFR 230.3).

Section 404 sets a no-impairment rule for waters of the United States. This rule is met if mandatory Best Management Practices (33 CFR 323.4) are applied and stream health is not degraded beyond that allowed by applicable nationwide permits. Roads that meet conditions of nationwide or regional general 404 permits or qualify for exemption from a permit must use mandatory Best Management Practices to protect water quality, extent of waters, and aquatic ecosystems (Section 404(f)(1); 33 CFR 330, Appendix A; 40 CFR 230.7). If such permit conditions and exemption criteria are not met, an individual permit is required (40 CFR 230).

Impacts to flow patterns, temperature, dissolved oxygen, sediment, and pollutant levels must be controlled (33 U.S.C. 1311 and 1314; 843 F2.d 1194; 753 F2.d 759). Compliance is based on standards and protection of uses, not Best Management Practices (Anderson 1987, Whitman 1989). Physical features needed to support existing uses for anti-degradation include substrate, cover, flow, depth, pools, and riffles (40 CFR 131.10, 230.10, and 230.11).

- National Forest Management Act of 1976. (16 U.S.C. 1600-1602, 1604, 1606, 1608-1614). This act substantially amends the Forest and Rangeland Renewable Resources Planning Act of 1974. The act strengthens the references pertaining to suitability and compatibility of land areas, stresses the maintenance of productivity and the need to protect and improve the quality of soil and water resources, and avoids permanent impairment of productive capability of the land.

- The National Environmental Policy Act (NEPA) of 1969 (16 U.S.C. 4321 et seq.). This act sets forth requirements to consider the environmental impact of proposed actions; identify adverse environmental effects which cannot be avoided; consider alternatives to the Proposed Action; consider the relationship between local short-term uses and long-term productivity; and identify any irreversible and irretrievable commitments of resources.

Executive Orders:

- Executive Order (EO) 11990 of May 24, 1977: This order requires each agency to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Regulations:

- Title 36, Code of Federal Regulations, Part 251, Subpart B. This subpart provides direction for special uses management on NFS lands, including guidance pertaining to the special-use application process; terms and conditions of use; rental fees; fee waivers; termination, revocation, suspension, and modification of existing authorizations; and permit administration.

- Title 40, Code of Federal Regulations, Sections 1500 through 1508.28. This regulation directs the FS to apply environmental analysis to environmentally significant decision points during NEPA activities.

Forest Service Manuals, Handbooks and Plans:

- Forest Service Manual (FSM) 2520 – Watershed Protection and Management. This manual has the objective of protecting NFS watersheds by implementing practices designed to maintain or improve watershed condition, which is the foundation for sustaining ecosystems and the production of renewable natural resources, values, and benefits. This manual includes, among other things, FS policy for Riparian Area Management (FSM 2526) and Floodplain Management and Wetland Protection (FSM 2527).

- FSM 2541 – Special Use Authorizations for Water Development. Special-use authorizations that involve water storage, transmission, or diversion facilities on NFS lands (FSM 2729) authorize occupancy of the land only for the specific development purpose. In no case does the United States necessarily relinquish any water right it may have, or waive the right to use such water. Include stipulations in the authorizing documents to ensure the quantities of water needed to fulfill purposes of the National Forest and for environmental needs will be maintained in-stream. Clearly inform the permittee that the authorization does not confer any legal right to the use of the water, nor does it provide a basis for acquiring such a right as against the United States.

- Forest Service Handbook (FSH) 2509.25 – Water Conservation Practices Handbook, Rocky Mountain Region Amendment 2509.25-2006-1, dated May 5, 2006. This handbook contains proven watershed conservation practices to protect soil, aquatic, and riparian systems. If used properly, the watershed conservation practices will meet applicable Federal and State laws and regulations, including State Best Management Practices. The watershed conservation practices translate legal provisions and scientific principles into solid, common sense stewardship actions that support continued sustainable resource use. The watershed conservation practices cover five areas: hydrologic function, riparian areas and wetlands, sediment control, soil quality, and water purity. Each watershed conservation practice consists of a management measure, a set of design criteria used to achieve the specific management measure, and guidance for monitoring and restoration.

- FSM 2700 – Special Uses Management: The objectives of the special-uses program are: 1) to manage special uses of NFS lands in a manner which protects natural resource values, and public health and safety, consistent with the Forest land and resource management plans; and 2) to administer special uses based on resource management objectives and sound business management principles.

- FSM 2720 – Special Uses Administration: More specifically at 2729.1, states: "Issue authorizations for the impoundment, storage, transmission, or distribution of water under the appropriate provisions of the Federal Land Policy and Management Act of October 21, 1976 (43 U.S.C. 1761), The Act of October 27, 1986, or if in wilderness, under the Wilderness Act of September 3, 1964."

- FSH 2709.11 – Special Uses Handbook. This handbook gives guidance on processing special use applications, as well as issuing and administering authorizations. The objectives of the special use process, as stated in the handbook, are: 1) provide timely responses to proponents and applicants requesting use of NFS lands; 2) provide a consistent decision-making process for special use applications.; 3) ensure that

authorizations to use and occupy NFS lands are in the public interest (36 CFR part 251, subpart B); and 4) ensure that authorizations to use and occupy NFS lands comply with Forest land and resource management plans.

- FSM 7700 Transportation System, Chapter 7731.16 – Permits**.** Permits may be required to authorize the use of existing National Forest System roads (NFSRs). Permits may fulfill the requirements of an order or authorize a use that an order or regulation restricts. Permits include conditions for road use and for the protection and management of National Forests.

  1. Commercial Use. In order to ensure investment sharing and performance of road maintenance, forest officers may implement systems for authorizing commercial use of NFSRs. Issue a road order pursuant to 36 CFR 261.54 requiring that commercial use not otherwise authorized by a contract, agreement, easement, license, or special-use permit be authorized by permit only. Include appropriate investment sharing and maintenance requirements and rules of use as terms of the permit.

  2. Oversize Vehicles. In order to protect the safety of road users and public investment in roads and bridges, use permits to authorize the movement of oversized vehicles when vehicle use is not otherwise authorized by agreement or easement.

  3. Other Use. Issue permits, or a letter of permission, to authorize an act or omission that would otherwise be a violation of a regulation in effect on a road.

- Land and Resource Management Plan for the GMUG Forests (FS 1983 as amended 1991, 1993):

  - Forest Direction Goals (III-3), including but not limited to the following:
    - Improve fisheries habitat.
    - Manage surface uses to maintain water quality above federal, state and local standards.
    - Increase water supply, while reducing soil erosion and stream turbidity.
    - Protect the water quality in streams, lakes, riparian areas and other water bodies.

  - Forest Direction, including but not limited to the following:
    - Maintain aquatic habitat in at least its current condition with stable or improving trends. Improve aquatic systems to an over-all upward trend (III-26).
    - Manage habitat for needs of macro invertebrate and fish indicator species on all perennial steams, which provide potential fisheries. Manage waters capable of supporting self-sustaining trout populations to provide for these populations (III-27).
    - Locate and construct all roads to maintain the basic natural condition and character of riparian areas. (III-50)
    - Provide adequate road and trail cross drainage to reduce sediment transport (III-74).

  - A Management Prescription of 6B is assigned to the Hunter Reservoir project analysis area. It has the following prescription direction (III-145-150):
    - Emphasis is on maintaining soil and vegetation condition and providing forage for livestock production.

- Manage for livestock grazing, using intensive grazing systems and managing for mid-seral range conditions in the area of Hunter Reservoir.
- Design and implement management activities to blend with the natural landscape.
- Dispersed recreational opportunities vary between semi-primitive non-motorized and roaded natural experiences one half mile from the road, depending on the type of road surface.
- Motorized vehicles are restricted to roads where needed to protect soils, vegetation and special wildlife habitat.
- Provide adequate forage to sustain big-game population levels as stated in the Statewide Comprehensive Wildlife Management Plan.
- Manage forests to provide a high level of forage production, wildlife habitat and diversity.

- The Grand Mesa National Forest Travel Plan
  - NFSRs 280 and 262 are open to full sized motorized vehicles. These are the roads accessing Hunter Reservoir.

- Roadless Area Conservation Rule
  - The Roadless Area Conservation Rule (the "Roadless Rule") established in 2001 is a nationwide prohibition generally limiting, with some exceptions, timber harvest, road construction and road reconstruction within the 1979 RARE II inventory areas until a new roadless inventory has been done.

This EIS has been prepared in accordance with the NEPA and implementing regulations. The scope of the analysis is limited to the specific activities identified in Chapter 2.0 of this EIS.

1.6 Public Involvement

On July 29, 2005, the FS issued a scoping notice for the Hunter Reservoir Enlargement Project, seeking comments on the proposal (FS 2005*a*). The notice was also sent to at least 30 organizations and private parties and ten governmental agencies. Prior to the scoping notice, a news release inviting scoping comments appeared in the *Grand Junction Daily Sentinel* on Saturday May 28, 2005. A legal notice for the project appeared in the same paper on Friday, May 27, 2005. Wetland concerns prompted the FS (2005*b*) to issue a Notice of Intent to Prepare an EIS, dated October 18, 2005 (GMUG 2005a).

The Notice of Intent (GMUG 2005b) appeared in the *Federal Register* on Wednesday, October 26, 2005 (pg. 61781, Vol.70, No. 206), describing the Proposed Action and asking for comments. Comments on the project proposal were solicited from the public and governmental agencies (COE 2005). A total of 11 comments were received in response to the public notices. In addition to public scoping, the project was reviewed by FS specialists who also commented on the project and its potential impacts. The responses were reviewed, analyzed and summarized to represent the issues and concerns of the respondents and are included in the project record. The following section identifies and describes the issues carried forward for analysis.

1.7 Issues Carried Forward for Analysis

Issues described below are based on a review of comments received during the public scoping period and on FS specialists' knowledge of resource values in the project area and their understanding of laws and regulations governing activities on NFS lands. Most of these issues will be used to formulate alternatives to the Proposed Action, to guide the analysis of environmental effects, or to develop mitigation and monitoring measures. However, it was determined that some of the issues would not be analyzed in the EIS. Those issues and the reasons for not carrying them forward for analysis in the EIS are described below in Section 1.8.

1.7.1 Soils

Dam reconstruction would directly impact areas of soil within the landscape where construction activities would be occurring. The soil in those areas would be altered by heavy equipment, affecting densities, infiltration rates, natural horizonation and overall productivity. These disturbed areas may experience erosion until they are stabilized.

1.7.2 Water Resources

The change in water storage and water management may affect the base flow and peak flow conditions below Hunter Reservoir.

Dam reconstruction, road grading and leveling and placement of stream crossings would produce temporary increases in sedimentation and erosion downstream in Leon Creek.

1.7.3 Wetlands

Year-round or seasonal inundation of approximately 32 acres of wetlands, including two acres of fen, would diminish the wetland function.

1.7.4 Wildlife (including Aquatic Wildlife)

Sedimentation resulting from dam reconstruction and road construction, use and maintenance may reduce water quality and affect fish populations and aquatic habitat.

Operation and maintenance of the reconstructed dam and enlarged reservoir may affect fisheries downstream and the aquatic environment by altering stream flow patterns and by changing the water temperature.

1.7.5 Special Status Species (Threatened/Endangered/Sensitive/MIS)

Reconstruction and operation and maintenance of the dam and an enlarged reservoir may affect fish and wildlife habitat of special status species, such as federally listed and FS sensitive species. Please refer to Section 3.8 of this report, Special Status Species for lists.

1.7.6 Recreation and Transportation

Enlarging Hunter Reservoir would necessitate relocating a portion of the Leroux Snowmobile Trail (#742) along the southwest side of Hunter Reservoir.

Project activities may affect locations of dispersed campsites.

Project construction activities may make NFSRs 262 and 280 temporarily inaccessible.

Temporary improved access could temporarily change the recreational opportunity spectrum (increase recreation use) classification of the Hunter Reservoir area.

Temporary improved access to Hunter Reservoir may cause the expectation and desire for continued improved access.

1.8 Issues Not Carried Forward for Analysis

1.8.1 Social and Economic Resources

Enlargement of the reservoir would affect the supply of water available to Mesa County residents for domestic use and would affect the quality of life. This issue was not carried forward since it was treated in the EIS on the Ute Water Plateau Creek Pipeline Replacement Project (PCPRP).

1.8.2 Health and Safety

Substantial renovation of the dam is required by the State Engineer to address long-standing issues with regard to the safety of the existing dam and the potential for failure or overflow. This issue was not addressed because the GMUG has authority to authorize such modifications as needed under the terms of the existing special-use authorization.

1.8.3 Air Quality

The Proposed Action and alternative would generate fugitive dust and emissions from construction vehicle exhaust. None of the dust or emissions would create air quality conditions outside the normal range of variability found in the project area so the issue of air quality was not carried forward.

1.8.4 Visual Quality

Construction activities at the dam site and along the access road would produce surface disturbance that would have a short-term effect on visual quality in the foreground. However, the project activities would not affect visual quality in the long-term and this issue was not carried forward for analysis.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Ute Water proposes to use existing decreed and conditional water rights at Hunter Reservoir and a transferred conditional right from a site on Leon Creek to expand the reservoir. The existing dam impounds a 19-acre reservoir, which contains Ute Water's existing 110 acre-foot water right at that site. Ute Water proposes to enlarge the dam to impound an inundated surface area of approximately 80 acres with a water storage of 1,340 acre-feet, comprised of the company's existing right of 110 acre-feet (July 28, 1902), a conditional right of about 582 acre-feet (July 24, 1952) and an additional 648 acre-feet transferred from a conditional right Ute Water holds at another potential reservoir site on Leon Creek, the Big Park site (September 17, 1970).

2.1 Proposed Action

The Proposed Action is for the FS to authorize the use of NFS lands allowing Ute Water to enlarge Hunter Reservoir by increasing the size of the dam. The design and proposed construction of the enlarged dam are described below.

Enlargement Design and Construction: The existing dam is a homogeneous, gravelly clay embankment founded on glacial drift soils placed across East Leon Creek. Currently, it has a vertical height of 11 feet with a crest elevation at 10,367 feet. Its crest width is 8 feet and its length is 412 feet. The proposed enlarged dam would increase the vertical height by 26 feet to a total of 37 feet with a crest elevation at 10,393 feet. The new crest width would be 18 feet and the crest length would be 1,098 feet.

The new reservoir would also include two saddle dams: the west saddle dam, an embankment located immediately west of the new dam, and the east saddle dam, located in a topographic saddle 600-700 feet east of the new dam. The saddle dams would have vertical height less than 20 feet and crest lengths less than 570 feet (See Figure 2-1). Figure 2-2 shows the Proposed Action and the extent of the new reservoir.

The current foundation soils of the enlarged embankment and the two saddle dams consist of glacial till overlying Uinta formation sandstone and claystone. The proposed saddle dams and enlarged embankments would be constructed using material drawn from on-site borrow areas that would ultimately be inundated. The upstream slope of the dam would be surfaced with a layer of riprap comprised of basalt boulders. The riprap would be taken from basaltic scree located just south of the reservoir and processed on-site. A new outlet works would include replacement of the existing 18-inch outlet conduit with a 24-inch conduit.

A clay blanket cutoff would be located on the face of the dam upstream of the existing embankment. The cutoff would extend into the bedrock or to an elevation of 10,314 feet, whichever is reached first. It is intended to minimize seepage, reduce pressure on the dam itself, and eliminate the soft soil conditions identified on the downstream toe of the embankment.

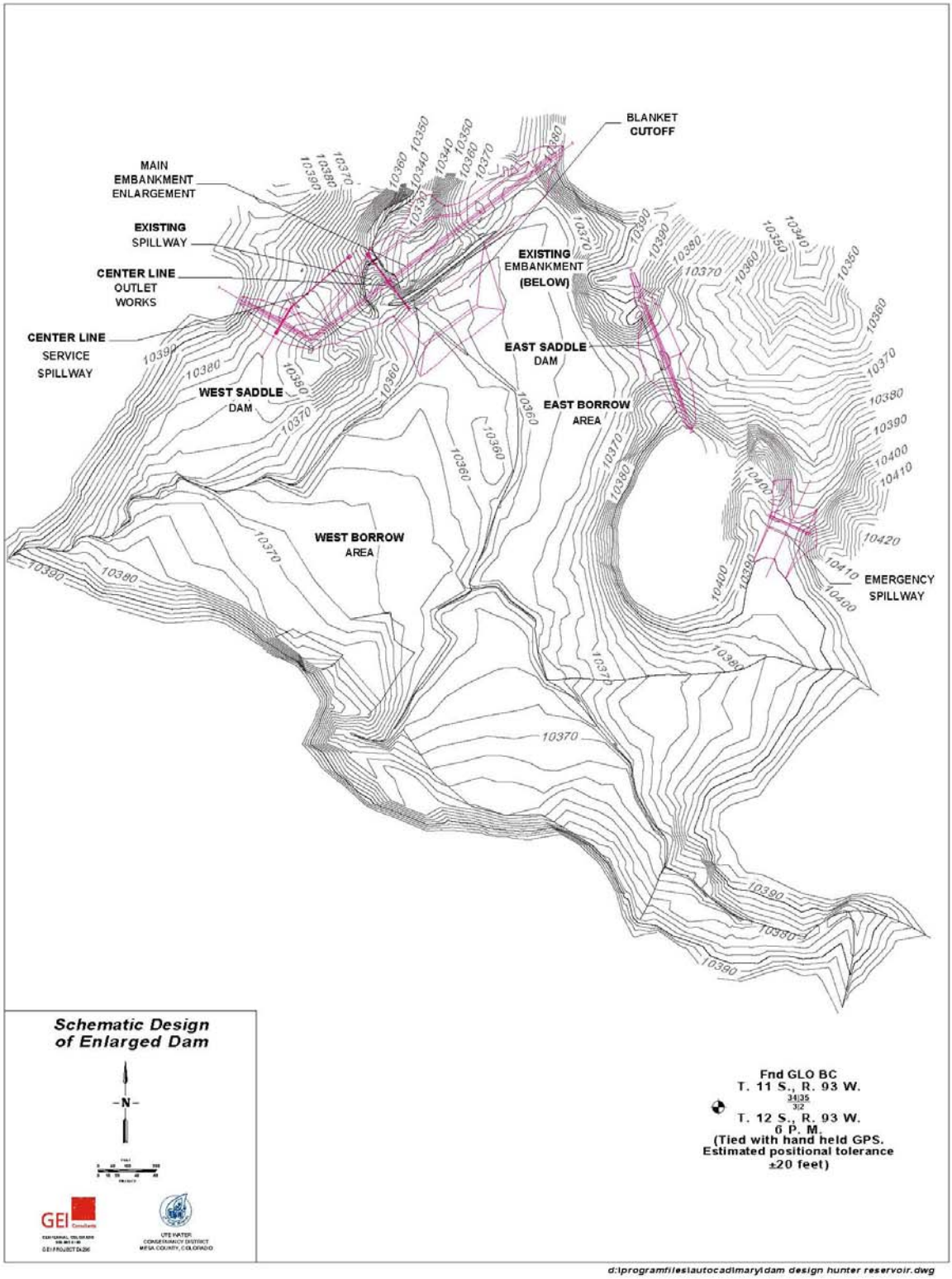

Figure 2-1. Hunter Reservoir, Schematic Design of Enlarged Dam

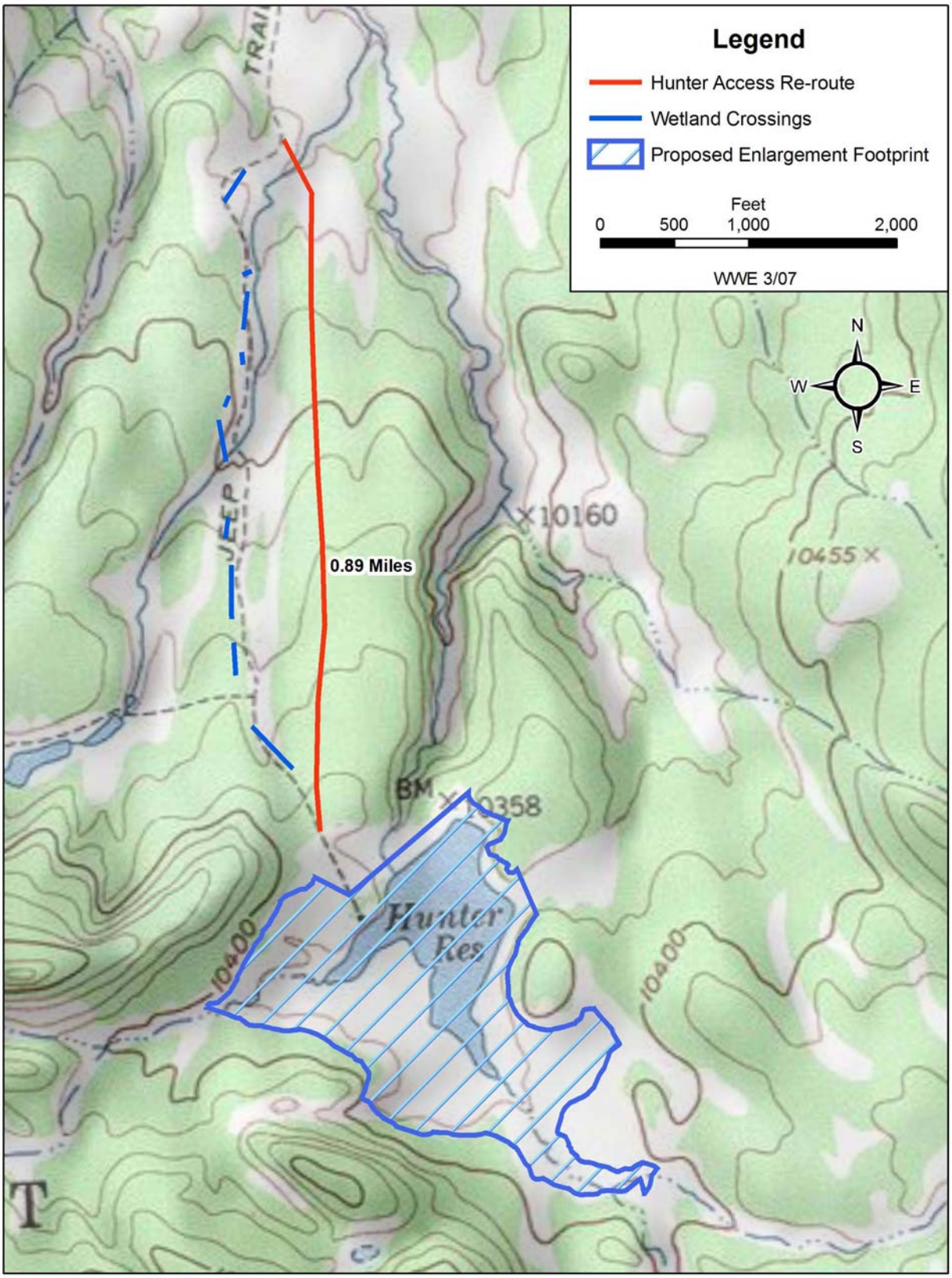

Figure 2-2. Location of Proposed Action and Approximate Location of Access Road

The new dam would have two spillways, a replacement service spillway and a new emergency spillway. The new service spillway would control normal pool and pass routine floods downstream. Set in the west saddle dam, the spillway would establish normal pool at 10,386.5 feet elevation and would pass excess water down a conduit into an impact basin below the face of the dam. The emergency spillway would be a new feature, located in a topographic saddle about 1,600 feet southeast of the dam, with a concrete control beam at 10,388 feet elevation, 1.5 feet above normal pool. The emergency spillway is set away from the main embankment to discharge floodwater into a drainage basin just east of East Leon Creek, preventing erosion of the dam due to overtopping.

The enlarged embankment would have an internal drainage system to reduce pore pressures and to prevent internal erosion of embankment and foundation materials. The principal system element would be toe drains in the embankment and saddle dams to collect and convey seepage flows to the downstream side of the embankments. The toe drains would be 4-inch drainpipes surrounded by filter material.

Most materials for the construction would be derived from the borrow areas and the nearby basalt scree described above. However, road surface gravels and filter drain materials (crushed rock and sand), as well as cement, would be delivered to the site. Concrete would probably be mixed and placed on site.

Because of Hunter Reservoir's elevation and snow cover, the season during which construction activities could take place is very short, extending from sometime in July until late September. The short construction season means that dam enlargement and construction of associated features would require two summers for completion. Access to the site is long and slow, taking up to four hours for a round trip by motorized vehicle. An on-site work camp would be established at Hunter Reservoir because of the time-consuming commute and the need to maximize working time at the site.

Some of the area to be inundated has trees. All trees below 10,393 feet elevation would be cleared and slash disposed of, as authorized, prior to construction to reduce debris in the reservoir and the potential for blocking spillways.

Operation and Maintenance: The existing dam fills from springs and from annual snowmelt in the 1.5 square mile basin that drains into the reservoir (see Section 3.3). The gate is closed in late fall or spring. The estimated average annual water yield from snowmelt in the basin of 2,593 acre-feet assures that the reservoir usually fills in less than two months. After filling, the basin's flow passes through the reservoir into East Leon Creek. In general, the natural flow is captured by the reservoir only during the spring period of highest basin flows produced by snowmelt.

The proposed enlarged reservoir, at 1,340 acre-feet, would take longer to fill but would be within the capacity of the basin. Closing the gate in late fall would result in the reservoir's filling by late June. However, calls on water by senior downstream rights would, in some years, limit the filling to the senior rights held by Ute Water at Hunter Reservoir, 692 acre-feet. It's estimated that the reservoir would be constrained to 692 acre-feet about half the time (refer to Section 3.3, Water Resources for flow information.)

The reservoir normal pool (the reservoir's storage capacity of 1,340 acre-feet) would be maintained until releases are required to meet demands in the Ute Water system. Releases would be based on the need for irrigation in the summer and, increasingly over time, for domestic consumption. Throughout the winter, the minimum water storage, or dead pool, of at least 27 acre-feet of water would remain in the reservoir (GEI 2005a). This is the amount of water that would remain below the outlet pipe, unable to flow out.

Ute Water personnel or lessees would make periodic visits to the reservoir as needed to open or close the outlet gate, monitor stream flow and pool level, clear obstructions in the spillways and monitor dam condition, checking for seepage, rodent burrows and unwanted vegetation. Weeds would be monitored and eliminated for several years after construction of the dam to ensure that no noxious weed seeds were introduced during construction.

Road Improvements: Currently, the 11-mile access route from Vega Reservoir to Hunter Reservoir is made up of two NFSRs, NFSR 262, from Vega Reservoir up Leon Creek to East Leon Creek, and NFSR 280, up East Leon Creek to the reservoir. The current road management objectives state that both roads are classified as high clearance, four-wheel drive roads and direct the FS to maintain as much of the high clearance character as possible. The roads have frequent stream crossings. However, NFSR 262 is predominantly two-wheel drive pickup truck clearance during times when existing conditions are dry, with the road turning to high clearance four-wheel drive at roughly the Ranger Creek crossing. NFSR 280 is essentially a four-wheel drive high clearance road to the furthest reaches south, where the road terminates just prior to the Hunter Dam. Currently, there are certain locations that even the most experienced four-wheel drive enthusiast would find difficult, limiting travel to mostly all-terrain vehicles. In addition, most of NFSRs 262 and 280 are usually impassable during spring run-off due to high water crossings. In order to allow passage of the heavy equipment needed to construct the dam and the trucks that would carry crushed rock, cement or concrete and other material to the work site, substantial temporary and permanent improvements to the roads would be required at 26 separate points, all of them on the last six miles of the route.

Proposed road improvements and maintenance during reservoir enlargement would be the sole responsibility of Ute Water. A road improvement plan would be submitted to the FS 30 days in advance of work and approved in writing. Road improvements would include reconstructing steep approaches to creek crossings to provide a more gradual lead-in to the drainages, improving cross drainage by constructing rolling dips and lead-out ditches within and adjacent to the current road prism, removing extreme dips and bumps, applying rocks to perpetual soft areas of the road, defining and hardening small stream crossings, and relocating portions of the road upslope out of wetland areas.

The last 4,683 feet of NFSR 280 (0.89 mile) would be relocated to correct current wetlands impacts. The new road would leave Leon Creek and approach Hunter Reservoir in an upland location just east of Leon Creek (Figure 2-2). The existing road in the creek bottom would be re-vegetated, barricaded from vehicles and fenced off from cows. The new road would not be removed upon completion of the project but would be left in generally passable condition. Final location of the last 4,683 feet would be approved in the field by the FS. The road standard for this route would be Traffic Service Level D, which includes a road width ranging from 14 to 16 feet and the average total clearing, including the road, 22 feet. The road would have a native

surface with surface drainage structures and roadbed stabilization shown on a plan and profile drawing. The design shall show grades, structures, cross sections and alignments for the route, as well as estimated quantities of timber clearing acreage, seeding acreage, volumes of excavation, log deck locations, slash disposal areas, etc.

Cattle guards would be installed in the allotment boundary fence on NFSR 262 according to FS standards.

2.2 No Action Alternative

Consideration of the No Action Alternative is required by CEQ regulations (40 CFR 1502.14). FS would not permit the enlargement of Hunter Reservoir. The dam would not be enlarged, no access road improvements would be constructed, and no wetlands would be inundated. Selection of the No Action Alternative would not authorize occupancy of the NFS lands other than their current authority. All activities and natural processes currently permitted or occurring would continue. No additional mitigation or monitoring would be required as part of this alternative other than meeting Forest Plan directions, standards and guidelines. If the No Action Alternative was selected for all or parts of the Hunter Reservoir Enlargement, then Ute Water would still have to address the safety concerns of the State Engineer's Office.

2.3 Alternatives Considered but Not Carried Forward

This section describes the process by which preliminary alternatives to the Proposed Action were developed and then evaluated to determine if they should be carried forward for further and more detailed consideration in the EIS. Two regulatory standards have to be met when evaluating the preliminary alternatives to the Proposed Action – (1) those provided by the Council on Environmental Quality (CEQ) for implementation of NEPA and (2) those devised by the Environmental Protection Agency (EPA) and the COE to guide implementation of the Clean Water Act when discharge of dredge and fill material into the waters of the United States is under consideration.

In all EISs, the development and evaluation of preliminary alternatives to the Proposed Action is guided primarily by CEQ Regulations that define the NEPA process (40 CFR 1502.14). In general, the guidance requires an EIS to rigorously explore and objectively evaluate all reasonable alternatives, whether or not they are within the jurisdiction of the lead agency. "Reasonable alternatives" are those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." (NEPA's Forty Most Asked Questions. CEQ. Federal Register. March, 23, 1981.) For alternatives that have been eliminated from detailed study in the EIS, a brief discussion of the reasons for their elimination should be included in the document. The regulations require the inclusion of a No Action Alternative whether or not it is a reasonable alternative.

Because Ute Water's proposed reservoir enlargement requires a permit from the COE "to excavate or discharge dredge and fill material in to the waters of the United States," the Proposed Action is subject to the 404(b)(1) Guidelines of the Clean Water Act, as well as those of the CEQ. The Guidelines state that "no discharge of dredge or fill material shall be permitted if

there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." (40 CFR 230.10(a)) "Practicable" is defined by the Guidelines as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

The 404(b)(1) Guidelines on alternatives that ought to be considered are somewhat more developed than those of the CEQ, defining "practicable" in terms of cost, technology, and logistics and including as well the tie to "project purposes." For that reason and because the Guidelines definition of "practicable" is arguably the same as CEQ's "reasonable," the remainder of this examination refers to the preliminary alternatives in terms used by the Guidelines.

2.3.1 Discussion of Purpose and Need

As described in Section 1.3, the purpose of the Proposed Action is to provide a portion of the water supply that Ute Water will need to meet the ongoing growth in water demand. Under the decree that established Ute Water, its mission is to provide its customers with a reliable, cost effective, high quality water source. The enlargement of Hunter Reservoir is part of Ute Water's long-term plan to serve that mission.

The Ute Water service area extends from east of the Town of Palisade to within five miles of the Colorado-Utah state line and includes more than 82,000 Grand Valley residents. This customer base represents well over half the Mesa County's 2005 population of 130,662. As part of the Plateau Creek Pipeline Replacement Project EIS (Plateau Creek EIS), a study of water demand in the Ute Water service area was conducted, evaluating a range of expected demand over a 50-year period (Pearse & Associates 1995). That study examined five potential growth paths for Mesa County's population, projecting 2045 population totals for the county from a low of 211,105 to as high as 976,006. The future growth path that most closely follows the long-term historical growth rate for Mesa County (a 2.18% annual rate of growth) yields a 2045 population of 303,238, more than twice the 2005 estimated population of 130,399.

The projection for growth of the Ute Water service area that was based most closely on long-term trends used an annual growth rate of 2.58%. This resulted in a projected 2045 population in the service area of 197,000. This would be almost two and a half times the current population of the service area. This rate of growth in demand requires Ute Water to continuously develop new sources of water and to have those new supplies be available in a timely fashion.

In addition to supplying a sufficient quantity of water, Ute Water must provide water that meets a minimum water quality standard. As part of the effort to permit the Plateau Creek Pipeline, the environmental consultant on that project, Camp, Dresser and McKee (CDM), performed water quality modeling to estimate future Total Dissolved Solids (TDS) and hardness concentrations that would likely be available at the treatment plant. The water quality modeling is fully documented in a Water Resources Technical Memorandum (CDM 1997) to the Plateau Creek Pipeline Replacement Project EIS. The modeling indicated that in the year 2045 Ute Water's high quality mountain water standard include the following:

a. The water is in compliance with the Safe Drinking Water Act of 1996;
b. TDS must be lower than a concentration of 300mg/L for 70% of the time; and
c. Hardness ($CaCO_3$) must be less than 200 mg/L for 85% of the time.

Any new supplies to the system must meet these criteria to be considered of sufficient quality.

The purpose and need for the project is constrained by one additional condition. Ute Water's treatment plant is located on Rapid Creek near the Town of Palisade and below the mouth of Plateau Creek. Any new supplies must be deliverable to this treatment plant. Effectively, this means that new supplies must be located in the Plateau Creek drainage or must come out of the Colorado River itself.

2.3.2 Preliminary Alternatives

On July 29, 2005, the FS issued a scoping notice for the Hunter Reservoir Enlargement Project, seeking comments on the proposal. Wetland concerns prompted the FS to issue a Notice of Intent to Prepare an EIS, which appeared in the *Federal Register* on Wednesday, October 26, 2005 (pg. 61781 Vol.70, No. 206). The notice described the Proposed Action and asked for comments. In addition to public scoping, the project was reviewed by FS specialists who commented on the project and its potential impacts.

The principal issue identified during scoping and the issue that necessitated an EIS was the proposed project's year-round or seasonal inundation of approximately 32 acres of wetlands, including two acres of fen. This issue prompted the development of an initial list of preliminary project alternatives that could possibly avoid the loss of wetlands and fen. The process by which sites were evaluated for wetland and fen is described in further detail in Appendices A and B. Following is a list of those alternatives.

The Proposed Action – This is the enlargement of Hunter Reservoir as described in Section 2.1.

Big Park Reservoir - The Big Park dam site would be located on Leon Creek in Section 5, R. 93 W., T. 11 S., 6th Principal Meridian, approximately six miles upstream from Vega Reservoir and five miles downstream from Hunter Reservoir (see Figure 2-3). Ute Water has a conditional right to 5,650 acre-feet of water at the Big Park site, with a priority date of September 17, 1970. Big Park Reservoir is a decreed location for dam construction. A ditch approximately 7,755 feet long (1.45 miles) would carry water from Big Park Creek south to the reservoir.

A reservoir at the Big Park site would have an earth embankment dam, constructed in a fashion similar to an enlarged Hunter Reservoir but on a much larger scale. Total surface area of the reservoir would be 123 acres but, because of its relative depth, the impoundment would hold up to 5,650 acre-feet of water.

East Leon Creek Reservoir - The East Leon Creek dam site is located in Section 27, R. 93W., T.11S., 6th Principal Meridian, about one-half mile downstream of Hunter Reservoir on East Leon Creek and approximately 10 miles north of Vega Reservoir (see Figure 2-3). Ute Water has conditional water rights in the Leon Creek watershed, the same rights available to enlarge Hunter Reservoir

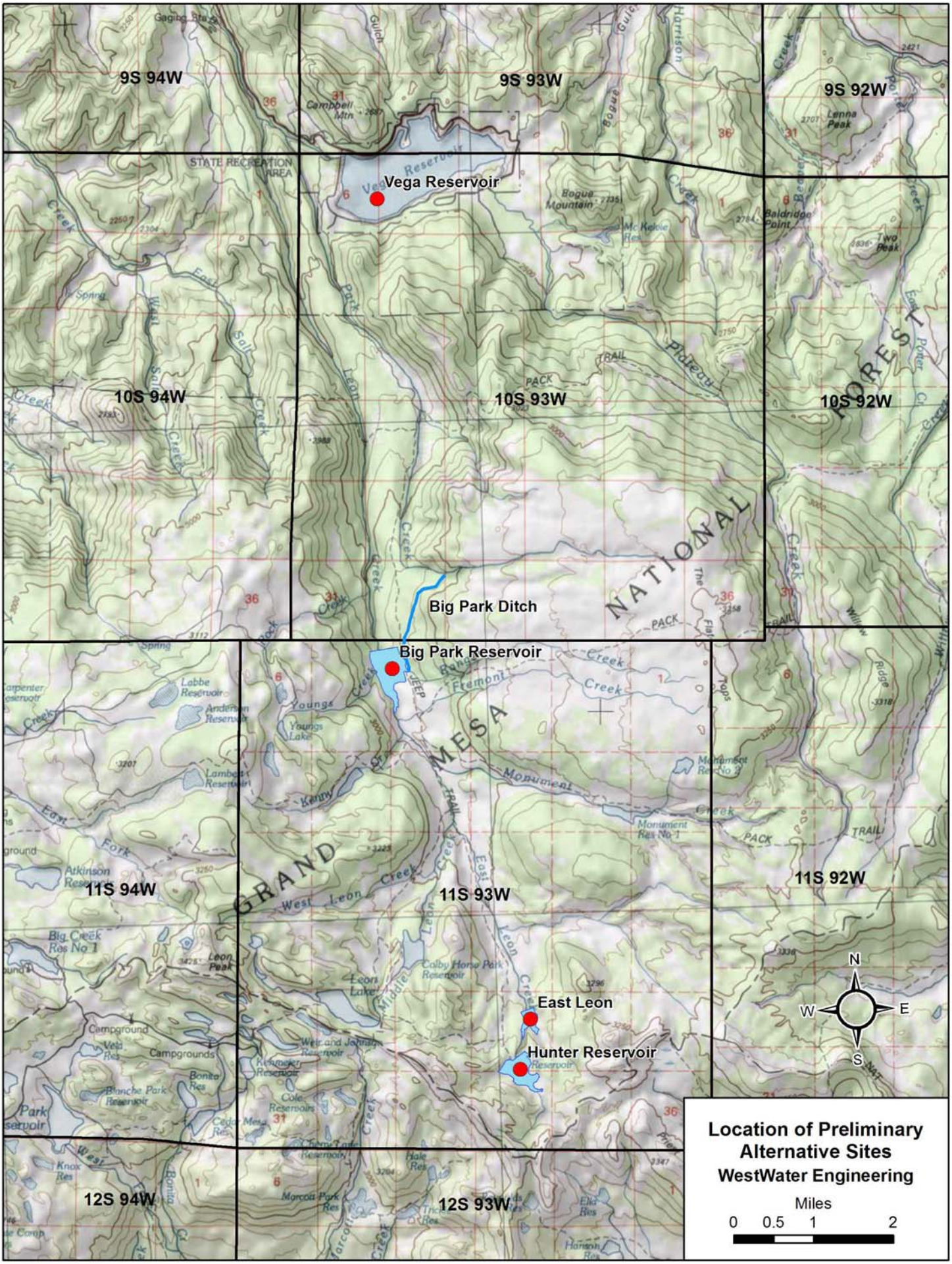

Figure 2-3. Location of Alternative Reservoir Sites

The East Leon Creek site is located at the mouth of a small valley that East Leon Creek passes through below the existing Hunter Reservoir dam. The topography at the site dictates that a dam constructed there be a roller-compacted concrete dam in order to pass the potential maximum flood in the valley over the dam. Surface area of the reservoir would be 33 acres and the capacity of the impoundment would be 1,354 acre-feet, about the same size as an enlarged Hunter Reservoir (Tolen 2005).

Vega Reservoir - Vega Dam is about 10 miles east of the town of Collbran (Figure 2-3). It was constructed across the channel of Plateau Creek, forming a reservoir with a total capacity of 33,800 acre-feet and an active capacity of 32,980 acre-feet. The reservoir stores surplus flows of Plateau, Leon, and Park Creeks. The Leon and Park Creek flows are brought to the reservoir through the 2.7-mile-long Leon-Park Feeder Canal. Most project water from Plateau, Leon, and Park Creeks, including both storage and direct flow, is released from Vega Reservoir and delivered by the Southside Canal. Some water is released into Plateau Creek for diversion by downstream ditches.

If Vega Reservoir had excess capacity, the water that Ute Water proposes to store in Hunter Reservoir could be allowed to flow down Leon Creek, then through the Leon-Park Feeder Canal, and be stored instead in Vega Reservoir.

Enlargement or construction of another reservoir - Within the Plateau Creek watershed, there are a number of reservoir sites that might be used by Ute Water for enhancement of their raw water supply in place of Hunter Reservoir. The sites include existing reservoirs that could be enlarged like Hunter Reservoir, and other sites, such as Big Park and East Leon, where new dams and reservoirs could be constructed. Ute Water has been evaluating the legal, economic and technical feasibility of many of these sites for some time. During the 2006 field season, WestWater Engineering (WWE) performed a survey of these existing and potential reservoir sites, evaluating the biological values associated with the sites. The survey culminated in an evaluation of the potential of the sites as preliminary alternatives to the Hunter Reservoir enlargement.

Groundwater: Under this alternative, Ute Water would increase its raw water supply by accessing groundwater in the Plateau Creek watershed. Development of groundwater resources would limit surface disturbance to the area required for the well pads and could potentially use existing water courses to convey water to Plateau Creek and on to the Ute Water treatment facility.

Delivery System Improvements: Raw water is delivered by pipe from Ute Water's final storage site at Jerry Creek reservoirs to the treatment plant. From the plant, treated water travels through an extensive delivery system. Deteriorating pipe, damaged pipe, improperly installed pipe, or other faulty equipment could produce loss of significant amounts of water. Upgrading and improving the delivery system could be a potential means of reducing the demand for new water supplies, possibly offsetting the need for an enlarged Hunter Reservoir.

Reduced Water Consumption through Conservation: Like delivery system improvements, conservation on the part of Ute Water's customers could reduce the demand for new water supplies and potentially offset the need for an enlarged Hunter Reservoir. Programs to educate

the public, to promote the use of more modern plumbing, and to promote the use of restricted flow showerheads and more efficient watering systems would all work toward reducing water use and thus slow the rate of growth in demand for water.

Colorado River Pump Station - Under this alternative, increased water would be removed from the Colorado River and processed through the Ute Water treatment plant on Rapid Creek.

No Action Alternative - Under the No Action Alternative, the FS would not permit the enlargement of Hunter Reservoir. This alternative is required by NEPA as a baseline for estimating the environmental effects of action alternatives. Refer to Section 2.2.

2.3.3 Evaluation Methodology

Evaluation of preliminary alternatives to the Proposed Action involved a screening process. Preliminary alternatives were screened according to four criteria: Does the alternative meet the project's purpose and need and does the project satisfy the three elements of the of the 404(b)(1) Guideline's practicability standard, that the alternative would be "available and capable of being done after taking into consideration cost, existing technology, and logistics."

The project's purpose and need is described above in Section 1.3 and 2.3.1. In addition to meeting Ute Water's need for continuing growth in water supply, water quality is a critical element of the purpose and need. Additionally, the requirement that the new water supply be treated at the Rapid Creek plant necessitated that the search for alternative supplies be limited to the Plateau Creek drainage or the Colorado River itself.

The existing technology criterion is straightforward. Is the scientific and engineering capability needed to implement the preliminary alternative currently available? Has it been proven to minimize the risk of failure? No extreme or extraordinary technical effort must be required to overcome conditions at a site.

The logistics criterion is broader and less easily defined. It refers generally to the legal, institutional, and political constraints beyond the District's control, like the Bureau of Reclamation's management framework for Vega Reservoir, but also includes a planning horizon. Ute Water must *continuously* bring on new water supplies over the next 40 years. Any proposal that is so speculative in nature that it would have a planning horizon of ten or more years, would be considered logistically impracticable. Although some preliminary alternatives may be technically feasible, they must at this time be considered speculative if they could not be accomplished for many years because legal and institutional impediments must be overcome and the requisite planning, engineering and design work must be done.

The cost criterion has two elements, both of which would have to be met for an alternative to be judged practicable. The *total cost* of the project must be within the ability of Ute Water to finance it and the *unit cost* of supplying the water must be in line with its value as domestic water. The Plateau Creek Pipeline EIS described the upper limit of Ute Water's ability to pay for a project as $35 million (PCP EIS D-7). Adjusted for inflation, the 2006-updated value of that figure is $46 million. Projects estimated to have a present value in excess of that amount could not be financed by Ute Water. Additionally, if a preliminary alternative was within the financial

capacity of Ute Water but had an estimated unit cost greater than $5,775 an acre-foot (the maximum that Ute Water could pay for developing raw water and still meet its other costs), the alternative would be judged not practicable because unit costs would be greater than any return.

The results of the evaluation of the initial list of preliminary alternatives are summarized in Table 2.3. Preliminary alternatives were evaluated first against the Purpose and Need criterion. If an alternative did not meet that criterion, it received no further evaluation. Those that met the Purpose and Need criterion were then evaluated for their technical feasibility. If an alternative did not meet the technical feasibility criterion, it received no further evaluation. Those that did meet that criterion were then evaluated for logistical and economic feasibility. As Table 2.3 shows, the Proposed Action is the only alternative that satisfied all the criteria. The remaining potential alternatives were then removed from further consideration as alternatives considered in the EIS. The No Action Alternative and Colorado Pump Station Alternative were removed because they do not meet the Purpose and Need Criterion. The Delivery System Improvements and Conservation alternatives were removed because they do not meet the Existing Technology Criterion. The Groundwater, Construction of New Reservoirs, Enlargement of Other Reservoirs and Vega Reservoir were removed because they do not meet the Logistics Criterion. Finally, the Big Park and East Leon Reservoirs were removed because they do not meet the Cost Criterion of the Practicability Test. Each of the potential alternatives is discussed in more detail below.

Table 2.3 Practicability Screening for Preliminary Alternatives

Alternative	Purpose and Need	Practicability Test		
		Existing Technology	Logistics	Cost
Hunter Reservoir				
Big Park Reservoir				No
East Leon Reservoir				No
Vega Reservoir			No	
Enlargement of another reservoir			No	
Construction of a new reservoir			No	
Groundwater			No	
Delivery System Improvements		No		
Conservation		No		
Colorado River Pump Station	No			
No Action	No	Required Alternative in NEPA analysis.		

No Action Alternative - Under the No Action Alternative, the FS would not permit the enlargement of Hunter Reservoir. By definition, this alternative does not meet the Purpose and Need criterion because it would provide no additional water. However, this alternative is

required by NEPA as a baseline for estimating the environmental effects of action alternatives and is carried forward in the analysis.

Colorado River Pump Station - Under this alternative, increased water would be removed from the Colorado River and processed through the Ute Water treatment plant on Rapid Creek. Water quality modeling done for the Plateau Creek EIS showed that this alternative would fail to meet the established TDS and the hardness criteria (Appendix C, Tables C-2 and C-3: Plateau Creek Pipeline Replacement Project Draft EIS, (BLM 1997) Bureau of Land Management, Grand Junction, Colorado. It thus fails to satisfy one of the central requirements laid out in the project's purpose and need, that the additional water supplied to the Ute Water system meet the described minimum quality standard. For this reason, it was not carried forward for further analysis

Reduced Water Consumption through Conservation - As part of the Plateau Creek EIS, a study of water demand in the Ute Water service area was conducted, evaluating a range of expected demand over a 50-year period (Pearse & Associates 1995). This study thoroughly evaluated the effects of Ute Water's conservation program on demand and found that the program was already reducing demand. Further gains in conservation technology would be required before further reduction would be possible. The Proposed Action is intended to meet demand in excess of that which is already being achieved by current and future water conservation measures in the Ute Water service area as described in the water demand study. Because no additional technologies exist that would produce a sizable reduction in water consumption, this alternative was determined to be not technically feasible.

Delivery System Improvements - This alternative would include improvements to the delivery system that would reduce the water loss in transit to the treatment plant and then to the domestic customer, effectively offsetting some of the need for increasing water supply. The alternative was not carried forward because the technologies to reduce water loss are already being used by Ute Water and thus any potential gains to water supply are already being achieved.

Groundwater - Under this alternative, Ute Water would increase its raw water supply by accessing groundwater in the Plateau Creek watershed. The alternative was not carried forward because Ute Water does not own any rights to develop groundwater and would need to prepare extensive augmentation plans to develop effective groundwater rights. The alternative was thus not carried forward for this logistical reason. In addition, it should be noted that there does not appear to be any undeveloped proven groundwater source that could meet Ute Water's ongoing need for supply expansion.

Enlargement or construction of another reservoir - Beyond the reservoir sites that are identified by name, there are other potential reservoir sites in the Plateau Creek watershed where existing reservoirs might be enlarged or new reservoirs constructed that would potentially enable Ute Water to meet its water supply objectives. All the sites were removed from further consideration as potential alternative sites. None of them were judged to be feasible because they all represented logistical impediments to the *timely* delivery of water. Ute Water does not currently own the water rights, does not own the reservoir site, does not hold the permit for a reservoir at the site, has not done the site engineering studies that would be required, or has not begun the permitting process necessary for reservoir enlargement or construction at any of the

sites. Any combination of these factors would be sufficient to push actual delivery of new water to the Ute Water system ten years or more into the future, the planning horizon in which supplies under consideration now would have to become available.

Vega Reservoir - The Vega Dam alternative did not pass the screening criterion for logistical feasibility because of institutional constraints. The Bureau of Reclamation (BOR) constructed and manages Vega Reservoir as part of the Collbran Project (Project). The Project was authorized by Congress in 1952 for a variety of purposes including, irrigation, domestic, municipal and industrial (M & I), stockwater, fish and wildlife, and hydropower. However, final costs (and consequently storage space) were not allocated for municipal, industrial, or domestic uses. Because of this only water for irrigation, fish and wildlife, and hydropower can be stored or utilized in Project facilities. However, there is a legal means to accomplish carriage (including storage) of non-project domestic and M & I through Project facilities. Congressional authorization would be required in order for water, other than that which the Project was authorized and costs allocated for, to be stored in Vega Reservoir. Upon authorization by Congress, BOR, Collbran Water Conservancy District (Reclamation's managing entity for the Project), and Ute Water would be required to enter into contracts delineating responsibilities related to use of the storage space (Bledsoe 2006). Additionally, this water could only be stored when space was available and would be the first spilled when the reservoir fills. This could impair Ute Water's ability to manage its water for domestic purposes as needed. Therefore, at this point, using Vega Reservoir to store additional water for domestic use is not logistically feasible.

East Leon Creek Reservoir - The East Leon Creek reservoir would cost an estimated $30 million to construct, almost seven times what the Hunter Reservoir enlargement would cost, because of its roller-compacted concrete construction. With a total storage of only 1,354 acre-feet, the cost per acre-foot of water storage created would be about $22,157, about four times as great as the Hunter Reservoir enlargement's unit cost. While this alternative is within Ute Water's capacity to finance, it fails the economic criterion on the basis of its cost per acre-foot of water developed.

Big Park Reservoir - The Big Park reservoir also fails to satisfy the economic criterion. With an estimated total cost of $45 million, the unit cost of the water stored there would be $7,965 per acre-foot. While the total cost is just within the capacity of Ute Water to finance, the unit cost of the water stored there is well above the $5,775 per acre-foot maximum that would allow Ute Water to break even.

The Proposed Action - The Hunter Reservoir enlargement was also evaluated against the criteria and, as expected, it satisfied all the criteria. It meets the requirements of the Purpose and Need, as it was designed to, and is technologically and logistically feasible. Its total estimated construction cost of $4.5 million is within Ute Water's financial capacity and the resultant unit cost of water storage, an estimated $3,358 per acre-foot, is quite a bit less than the $5,775 maximum.

Because none of the preliminary alternatives to enlargement of Hunter Reservoir satisfied all of the criteria, the EIS will include in its analysis only the Proposed Action and the No Action Alternative.

2.4 Summary of Impacts of the Proposed Action

Section 3.0 describes the existing conditions, environmental consequences and mitigation of Hunter Reservoir Enlargement. The primary impact is the inundation of approximately 32 acres of wetlands within the high water line of the expanded Hunter Reservoir. Implementation of the Proposed Action would result in the removal of existing soils, vegetation and wildlife habitat in the construction area. The topography would change somewhat where excavated soils and rocks would be used for fill and the improved dam, rip-rap and access. Improvement to the road would increase wetland function and stream stability in areas where the current road now parallels Leon Creek near the reservoir. The Proposed Action would result in minimal cumulative impacts as described in Section 3.15.

2.5 Design Criteria

The following environmental protections are included as design features of the Proposed Action. These design features were derived from law, regulations, policy or were identified by the FS or COE to avoid or minimize environmental effects to specific resources. Design Criteria should be considered integral to the analysis of effects in Chapter 3.

Also, as a way to lessen environmental impacts, the GMUG would review the current Environmental Management System with Ute Water and contractors. This system strives to minimize or avoid environmental impacts through accountability.

The list below shows the design features by resource category. This section includes both measures required by law and regulation and those devised by Ute Water and the FS to minimize the environmental impacts of the Proposed Action.

Air

1. Air quality will be maintained by permitting of all regulated air pollution sources through the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division, assuring compliance with all federal and state standards.
2. Such additional methods and devices as are reasonable to prevent, control and otherwise minimize atmospheric emissions or discharges of air contaminants will be used, including:
   - No burning of cleared materials, combustible construction materials and rubbish.
   - A dust-preventive treatment or water will periodically be applied to access and haul roads to minimize dust.

Noise

1. Noise pollution will be minimized by compliance with applicable laws and regulations regarding the prevention, control and abatement of harmful noise levels.

Geology

If the talus slopes on the south side of the reservoir rim are used as a source of borrow materials, the reclamation plan should ensure that the slope is not undercut or over steepened to create a potentially unstable slope.

Historical and Archaeological Resources, and Paleontology

1. All employees of Ute Water, contractors, subcontractors or other parties associated with the project will be instructed that, upon discovering evidence of possible prehistorical, historical or archeological objects, work will cease immediately at that location and the engineer will be notified, giving the location and nature of the findings. The FS will be notified immediately. Care will be exercised so as not to disturb or damage artifacts or fossils uncovered during excavation operations.
2. Equipment operators will be informed that the removal, injury, defacement or alteration of any object of archaeological or historic interest is a federal crime and may be punishable by fine and/or imprisonment.
3. During project implementation, in the unlikely event of an inadvertent encounter of Native American remains or grave objects, the Native American Graves Protection and Repatriation Act (NAGPRA) requires that all activities must cease in their discovery area, that a reasonable effort be made to protect the items found or unearthed, and that immediate notification be made to the agency Authorized Officers as well as the appropriate Native American group(s) (IV C.2). Notice of such a discovery may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions may also require compliance under provisions of the National Historic Preservation Act of 1966 (NHPA) and the Archaeological Resources Protection Act.

Water/Hydrology

1. Implementation of Best Management Practices as described in the soils section below would minimize effects, such as sedimentation, from the construction activities on East Leon Creek.
2. Hydrologic monitoring and modeling could be conducted before modification of the dam to more completely understand how the operation and maintenance of the new dams would affect flows in East Leon Creek. Monitoring could include flow monitoring, precipitation measurements, and repeated measurements of the five cross sections established by WWE in the summer of 2006 to document and understand periodic stream channel change (See Appendix C).

Soils

1. A Stormwater Management Plan will be prepared and submitted to the FS with applicable state standards. The Plan will describe how wastewater from general construction activities, such as drain water collection, drilling, grouting or other construction operations will not enter flowing or dry watercourses without the use of approved turbidity control methods. More descriptions cover how wastewaters discharged will contain the least concentration of settleable material possible and will meet all conditions of the permit.
2. Sediment and erosion controls will be installed prior to work involving site clearing, stripping and stockpiling topsoil, excavation and earthwork. The sediment and erosion controls will be maintained and repaired during the course of construction.
3. A Stream Diversion Plan will be developed prior to any construction activity. The plan will describe small diversion dams located in each of the drainages and diversion ditches used to cause the flows on the perimeter of the site into the existing East Leon Creek drainage or across the saddle located southeast of the existing dam.

4. Excavated materials or other construction materials will not be stockpiled or wasted near or on stream banks, lake shorelines or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse itself.
5. At road intersections with existing drainages that cannot be easily carried by use of a temporary culvert, crossings will be established. The approaches to any crossing will be armored by placing a minimum 8-inch depth of 1- to 3-inches of clean crushed rock, 14-feet wide for a distance of 20 feet on each side of the drainage to minimize siltation, bank rutting and erosion. Crossings will be constructed perpendicular to the flow line. When access is no longer needed, any temporary culverts and associated fill would be removed. Hardened low water fords shall be left in place. Silt fences or appropriate sediment control devices will be used to prevent siltation into existing drainages, ponds or associated riparian areas.
6. Refueling or lubricating and storage of hazardous materials, chemicals, fuels, etc., will only take place in designated locations that are more than 100 feet from wetlands and other water bodies or drainages.
7. Soil disturbing actions will be avoided during long periods of heavy rain or wet soils to prevent excessive rutting and mobilization of sediment during runoff events.
8. Cross-drain spacing on roads will conform to the following chart:

Maximum Cross-Drain Spacing (feet) based on Soil Types*

Unified Soil Classification – ASTM D 2487				
Road Grade (%)	ML, SM Extra. Erodible Silts-sands with little or no binder (decomposed granite.)	MH, SC, CL Highly Erodible Silts-sands with moderate binder	SW,SP,GM,GC Mod. Erodible Gravels + fines & sands with little or no fines	GW,GP Low Erodible Gravels with little or no fines
1-3	600	1,000	1,000	1,000
4-6	300	540	680	1,000
7-9	200	360	450	670
10-12	150	270	340	510
13-15	120	220	270	410

ML: Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
SM: Silty sands, sand-silt mixtures
MH: Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
SC: Clayey sands, sand-clay mixtures
CL: Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays
SW: Well-graded sands and gravelly sands, little or no fines
SP: Poorly graded snads and gravelly sands, little or no fines
GM: Silty gravels, gravel-sand-silt mixtures
GC: Clayey gravels, gravel-snad-clay mixtures
GW: Well-graded gravels and gravel-sand mixtures, little or no fines
GP: Poorly graded gravels and gravel-sand mixtures, little or no fines

9. During road re-construction, initial clearing operations will fully contain material on-site and not allow material to move into wetlands or into the riparian zone. Excess excavated material and construction debris developed along roads near streams will be disposed of in an area outside of the riparian area and floodplain.
10. Upon completion of construction, Ute Water will re-grade, prepare a seed bed and reseed temporary road improvements.

11. Any new road construction will be designed to avoid excessive grades (greater than 12%) for distance in excess of 200 feet.

Reclamation

A comprehensive reclamation plan by Ute Water will be submitted and approved by the FS prior to construction.

1. Seed
   - Grass seed will be from the same or previous year's crop. When available, certified weed-free seed will be provided. All seed will be free of prohibited noxious weeds (as defined by the State), and will contain no greater than 1% other weeds.
   - All sites will be seeded with the following mixture

Species	Application Rate lbs/acre PLS*
Mountain Bromegrass	5
Slender Wheatgrass	3
Thickspike Wheatgrass	3
Canby Bluegrass	3
Blue Wildrye	3
American Vetch	2
TOTAL	19

*PLS – Pure live seed.

   - Seed will be furnished and delivered premixed in the indicated proportions. Seed bag tags, or the equivalent, will be provided for each delivery of seed. Tags will show the guaranteed percentages of purity, weed content, germination, net weight, date of seed testing and date of shipment.

2. Seedbed Preparation
   - A minimum of 6 inches of topsoil, borrowed on-site, will be placed over all areas disturbed during construction, including the bottom of the reservoir. The seeding will be limited to those areas of disturbance above the normal pool elevation
   - Topsoil will not be placed in water or while frozen or muddy conditions exist.
   - Topsoil will be compacted with a CAT D6 bulldozer or larger to the appropriate tilth, density, consistency and friability to provide a suitable growth medium for sprouting and seedling survival.
   - All areas will be graded to drain. The maximum slope steepness will be 3H:1V unless otherwise shown on the project drawings or approved in writing by the project engineer.
   - The final surface of the topsoil will be graded to a relatively smooth surface using mechanical or hand raked methods. There will not be any localized low spots that will allow water to accumulate.
   - The seedbed will be prepared by contour-cultivating 4- to 6-inches deep with a harrow or disc. All other areas that have been disturbed or compacted by equipment will be scarified to receive seed.

3. Seed Application

   - Seeding will be accomplished between September 1st and October 30th. No seeding will take place when soils are frozen or excessively wet or dry.
   - Seed will be drilled one half to one inch deep following the contour. In areas that cannot be drilled, seed will be broadcast at 1.5 times the application rate and covered one half to one inch deep with a harrow or drag bar. Seed will be applied within ten days following soil preparation.

4. Mulch

   - Certified weed free straw mulch will be inspected and bound with twine as regulated by the Weed Free Forage Act, CRS Title 35, Article 27.5 and administered by the Colorado Department of Agriculture. Mulch will be accompanied by a certificate of compliance as defined in the rules and regulations of the aforementioned Act.
   - A uniform depth of certified weed free straw mulch will be applied to all seeded areas. Mulch will be applied at the rate of 2,000 lbs/acre.
   - Following application of mulch, tackifier will be applied in a slurry with water and wood fiber to all mulched areas. Tackifier will consist of a free flowing, non-corrosive powder produced from the natural plant gum of *Plantago isularos* (Desert Indianwheat). The powder will conform to the following requirements:

Protein content	16 +/- 0.2%
Ash content	2.7 +/- 0.2%
Fiber	4.0 +/- 0.4%
PH 1% solution	6.5 – 8.0

5. Monitoring and Completion of Reclamation

   - All seeded areas will be maintained in good condition, reseeding and mulching if and when necessary, until a good, healthy, uniform growth is established over the entire area seeded and until vegetation is established.
   - On slopes, washouts will be prevented by an approved method. Any washout that occurs will be re-graded and reseeded and the reseeded area will be maintained until vegetation is established.
   - An area will be considered to be satisfactorily reclaimed when: a) Soil erosion resulting from the operation has been stabilized and b) A vegetative cover at least equal to that present prior to disturbance and a plant species composition at least as desirable as that present prior to disturbance has been established.
   - Areas not demonstrating satisfactory reclamations as outlined above, will be renovated, reseeded and maintained meeting all requirements as specified above.

Vegetation

1. A Noxious Weed Management Plan will be submitted and approved by the FS prior to construction. The plan will outline strategies to preclude the inadvertent introduction, establishment or proliferation of any noxious weed species in the project area. This plan will

include four goals - prevention, treatment, monitoring and cooperative actions - and will provide specific management objectives and specific actions agreed to by Ute Water and approved by the FS.

2. Preventative actions could include the cleaning of vehicles and equipment prior to bringing them into the project area.
3. Weed-free seed mixtures will be used for reclamation and weed surveys will be conducted prior to construction.
4. Treatments will be developed using integrated weed management principles for each species and situation. Treatments may include hand pulling, grubbing, mowing, mulching, seeding, burning, herbicide application and soil management.
5. Monitoring of noxious weeds will be conducted on a scheduled basis to detect new infestations, evaluate prevention and/or treatment success, and identify the need for re-treatment.
6. Ute Water will coordinate their efforts with the USFS to manage noxious weeds.

Wildlife (including Aquatic Wildlife and Special Status Species)

1. Pre-construction surveys will be conducted. If any special status species or habitat is found to be present, Ute Water will coordinate with the FS to determine the most effective means of mitigating or precluding impacts.
2. Design of outlet works and spillway will prevent non-native trout from getting into reservoir. The outlet structure includes a 24-inch diameter pipe which extends approximately 200 feet. Water travels through the pipe at approximately 12 feet/second, which exceeds the velocity that would enable non-native trout to migrate into the reservoir (FWS 2007). The new service spillway inlet structure includes a vertical drop greater than 10 feet, to a 30 inch concrete encased, welded steel pipe over 450 feet long. It emerges in Leon Creek at a location known as the "impact basin" where energy is dissipated. This structure will be a fish passage barrier, at all discharges. The service spillway is a fish passage barrier due to the length of the conduit and the vertical drop in the inlet structure. These design criteria will allow the reservoir to be managed as a native cutthroat fishery.
3. For Canada lynx, no snow compaction above baseline levels would be permitted.
4. For the Colorado River fishes, construction practices which maintain existing stream flows and minimize siltation and pollution will protect these species. Best Management Practices described above for soil and water will meet this objective.
5. Trees will be cut and removed at the reservoir basin after nesting season, August 1.

Visual Resources

1. To limit visual impacts, new roads will be located so they are visually screened (by topography or forest vegetation) from travel ways, when practicable.
2. Locations of work camps will be approved by the FS.

Hazardous Materials and Emergency Response

1. Ute Water will prepare and submit to the FS for approval, a spill prevention and countermeasure plan to include all Federal and State requirements.

2. A Fire/Emergency Response/Health and Safety Plan that addresses the potential for accidents and injuries, and other emergencies will be prepared and submitted to the FS for approval and kept onsite. This plan will be made available to the FS prior to construction and kept on all active locations.

Solid and Sanitary Waste

1. All solid wastes (trash) that result from construction and completion activities will be contained in a metal bear-proof trash cage. All material in the trash cage will be removed from the location and deposited in an approved sanitary landfill.
2. Portable toilets will be provided for construction workers at the construction site and the work camp. These will be maintained and removed by Ute Water as appropriate.

Travel Management and Roads

1. A FS Road Use Permit and Road Improvement Plan will be submitted to the FS in advance and approved in writing a minimum of 30 days before construction begins. The Road Use Plan will include methods for road maintenance and reconstruction.
2. Project-related vehicular traffic will be restricted to approved locations. Operational equipment will be restricted to the road prism and construction site at all times.
3. Mobilization and demobilization of heavy equipment will be scheduled during the week and not on weekends or holidays to avoid high public traffic periods.
4. Management of surface water run-off, soil stabilization and limiting travel to a single, recognized route will be priorities. All stream crossings and soft areas shall be armored and permanently stabilized.
5. Road Maintenance: NFSRs will be maintained according to FS road management objectives. Existing NFSRs currently open for use will also receive pre-haul maintenance depending upon their condition and the needs of the project. Pre-haul maintenance will not include road reconstruction or repairs of an extraordinary nature, but will include maintenance of drainage structures, grading the road surface, corrections to cut/fill failures, spot rock applications and rolling dips, etc. Ute Water will consult with the FS on the degree and manner of preconstruction maintenance, road reconstruction, and ongoing maintenance that will be required.
6. No berms of material will be left on the sides of the roadway during maintenance activities which will impede surface drainage.
7. Construct roads to minimize sediment discharge into streams, lakes and wetlands.
8. Temporary Roads: Roads constructed for temporary access will be guided by the classic principles of temporary road construction and will be consistent with the Watershed Conservation Practices Handbook. In general, these roads are short in length and used where the topography and drainage requirements are minimal and the potential impacts are low. They serve no long-term need as roads; therefore, they will be closed and obliterated after use.
9. Ute will develop and implement a specific Traffic Control Plan prior to commencing construction. The Traffic Control Plan will be approved by the District Ranger.

10. Cattle guards would be installed in the allotment boundary fence on NFSR 262 according to FS Standards.
11. Ute Water will implement traffic control techniques. They include signing and road closures when necessary. Ute Water will furnish, install and maintain all temporary traffic controls, including signage as directed by the FS, which provides Forest users with adequate warning of hazardous or potentially hazardous conditions associated with dam construction activities.
12. Ute water will consult with the FS on the removal of road improvements and the eventual degradation of the roads to their pre-construction condition.
13. Ute Water will consult with the FS to relocate the Leroux Snowmobile Trail (or SP Trail) above the new high-water line of the expanded reservoir, and will install new snowmobile signs around the reservoir.
14. Ute Water would consult with the FS and Colorado Division of Wildlife (CDOW) about scheduling movements of heavy equipment on the roads on days between open seasons for big game hunting.

3.0 EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

The project area lies within the Grand Mesa in the northeastern corner of the greater Colorado Plateau. The Grand Mesa covers an area of over 1,000 square miles in Colorado. The Colorado Plateau is a desert region covering portions of the four-corner states defined by large plateaus, buttes, mountains, steeply incised canyons, and is dissected by the Colorado and Green Rivers. Grand Mesa and Battlement Mesa was essentially one large plateau that was bisected by Plateau Creek, a tributary of the Colorado River, forming two mesas with steep side slopes and narrow canyons. Due to the elevation of these mesas and the geographic position (Yeend 1969), the Grand Mesa is classified as a forested mountain and alpine ecosystem. These mesas rise above the surrounding valleys by about 5,000 feet with a maximum elevation of 11,086 feet above sea level (ASL) on Finch Peak on the east end of Crag Crest. Much of the NFS lands within the Grand Mesa are at the higher elevations (9,000 to 10,000 feet elevations) and are relatively flat. Almost half (48%) of the NFS lands have slopes of less than 15%. The steeper side slopes of the mesas account for about 12% of the NFS lands.

Weathering and movement of the bedrock, basalt flows, and glacial till have resulted in the present topography of incised valleys in the relatively flat Grand Mesa with steep talus slopes of basalt boulders and gentle slopes of colluvium and valley fill deposits consisting of basalt boulders intermixed with sands and clays. Grand Mesa is known as the "largest flat-topped mountain in the world" by local residents.

The topography of the large mesa uplifted between the two valleys provides a climate pattern created by the lifting of moisture-laden air. Depending upon the season, moisture-laden storm systems move across the Grand Mesa from three different directions. There is no well-defined wet season on the Grand Mesa, but the maximum precipitation occurs (generally in the form of snow) in March, April and into May with a secondary spike in precipitation in August and September as a result of summer thunderstorms fed by moisture-laden air coming up from the Gulf of Mexico.

Based on generalized U.S. Geological Survey maps of mean annual precipitation for the Upper Colorado River Basin, the Grand Mesa may receive over 40 inches per year (USGS 2006). The cool Pacific storm fronts that come in from the west during the winter provide considerable snow pack on Grand Mesa with the greatest snow depth readings occurring in April.

Temperatures on the Grand Mesa are correlated to elevation. There is very limited recorded temperature data for the Grand Mesa. The average minimum temperatures for the higher elevations can be expected to range from 0 to 20° F in the winter while the lower elevation valley bottoms to the east and west have average minimum temperatures from around 15 to 30° F in the winter months. The maximum temperatures on the Grand Mesa can be expected to average from 65 to 85° F at the higher elevations in the summer, while the surrounding valley bottoms average 85 to 95° F in those same summer months.

3.2 Geology, Paleontology and Soils

3.2.1 Existing Environment

Geology

The proposed site and its alternatives are regionally located within the Colorado Plateau Physiographic Province, which is generally characterized by dissected plateaus with strong relief (Fenneman and Johnson 1946). The area is located within the Piceance Basin, bounded on the west by the Uncompahgre uplift and on the east by the White River uplift. No faults have been mapped in the area. The stratigraphy of the site consists of the sedimentary rocks of the Uinta formation overlying the Green River Formation. The Uinta is capped by basalt flows, where volcanic magma has cut through the Uinta (dikes and plugs). A basalt dike, trending N 70^{o} E, was mapped south of the Hunter Reservoir. The basalt flows on the Grand Mesa have been dated to be about 9 million years old (Yeend 1969). The basalt cap effectively protects the softer sedimentary rocks below from erosion. This unique landform was formed where uplift and erosion created a plateau that was once a large flat plain. On Grand Mesa, the geology and topography has also been shaped by the movements of ice caps that covered all or portions of the plateau during the past 20,000 years. These ice movements, melting and final retreat of the ice caps left deposits of glacial till in the form of hummocks, moraines, and crevasse fills (all glacial features) across the plateau. The glacial till deposits consist of large basalt boulders, gravel, sand and loams. The retreat of the ice caps left many undrained depressions that formed shallow lakes that have been the sites for most of the reservoirs constructed on the Grand Mesa.

Geologic hazards in the area surrounding Hunter Reservoir include rock fall, landslide, slope stability, debris fan and subsidence. A Geotechnical Investigation (GEI 2005*b*) of the proposed reservoir area was performed in 2005 as part of the design process for the dam reconstruction. It included exploration of the subsurface; evaluation of engineering properties of the subsurface materials to use for construction; development of cross sections to evaluate slope stability, seepage and deformation; and development of geotechnical criteria for design of spillways and outlet works structures and associated reporting. The Hunter Reservoir area is underlain by surface sediments (colluvium and glacial till). No bedrock outcrops were observed within the Hunter Reservoir area. No evidence of existing landslide masses or other features that could be impacted by raising the reservoir level was observed in the area during the investigation. The slopes around the rim of Hunter Reservoir are generally flatter than 3H:1V and should remain stable.

Specific subsurface geology at Hunter Reservoir is as follows: 1) the existing embankment consists of up to 13 feet of interbedded clayey sands and clays; 2) the foundation below the main embankment consists of 5 to 40 feet of glacial till soils overlying bedrock; 3) the foundation below the Saddle Dams consists of about 9 feet of glacial till overlying Uinta bedrock; 4) the foundation below the proposed emergency spillway consists of 7.5 to 13 or more feet of clays and sands overlying weathered bedrock; and 5) the foundation below the proposed service spillway consists of 3 to 10.5 feet of clays and sands overlying weathered bedrock.

Three borrow areas at the proposed site were identified, two for embankment construction materials and one for riprap materials (basalt). The estimated ratio of available materials to required materials is greater than 2.5 for riprap and embankment materials. A suitable borrow

source for filter/drain materials and roadway surface course is not available on site and must be imported from commercial entities (GEI 2005*b*).

Paleontology

The subsurface geology of the proposed site area is mapped as the Uinta Formation (Tweto 1979). The Eocene Uinta Formation is a known producer of scientifically significant fossils, specifically mammal bone and vegetation. No fossils were noted in the geotechnical investigation of the Hunter Reservoir dam site (GEI 2005*b*). Because the Uinta is beneath the basalt and glacial till at the site, it is not exposed in the area and would only be encountered with deep excavations such as a mine, not with excavations needed for a reservoir.

Minerals

The sedimentary rock formations under the basalt cap on the Grand Mesa also contain known oil and gas deposits. The continuous and undisturbed sedimentary formations underlying the basalt cap create a geologic condition that has the potential for further oil and gas reserves to be located throughout the area.

The Colorado Oil and Gas Conservation Commission (COGCC) and the BLM show that no oil and gas wells have been permitted in the area of Hunter Reservoir (Sections 27 and 34, T. 11 S., R. 93 W., 6th P.M.). COGCC reports two non-producing gas wells in the vicinity of Hunter Reservoir, one 3.8 miles northwest and another 2.4 miles southwest of the reservoir. A currently producing oil and gas field resides 7 miles south-southwest of the reservoir. Forest Service records show no pending lease requests for the area.

As depicted in the 1993 GMUG Oil and Gas Leasing EIS (FS 1993), the area to the east of the NFSRs 262 and 280, as well as Hunter Reservoir, is covered by the Discretionary No Leasing stipulation. The rest of the area is covered by No Surface Occupancy (NSO) stipulations, and a small area adjacent to the reservoir is covered by Standard Stipulations.

The State Division of Mining (DMG) shows no mineral or coal permits in the vicinity.

Soils

Soil characteristics develop over geologic time and are determined by the interaction of climate, vegetation, geology, relief and aspect. These factors vary across the geographic area, and therefore, there is a range of soils that occur within the area. The rocks that underlay the top of the Grand Mesa are volcanic basalt, while the parent geology for the side slopes is dominated by sedimentary rock. The differences in parent geology determine the physical nature and property of the soils in the project area. Finer textured soils, including silty-clay loams, clay loams, and clays have developed on shale. These soils transmit water slowly and have high runoff rates. The sandstones tend to develop coarser, sandier soils such as sandy-clay loams, sandy loams, and loamy sands that have higher infiltration rates. As these sandstones and shales erode and move down slope they often mix in a colluvium of silts over sands or clays under loams. The soils on the top of the mesas tend to be well-drained and deep rocky or gravelly loams associated with glacial till.

The soil units at Hunter Reservoir have been mapped and presented in the Grand Mesa-West Elk Soil Survey (FS 1998) as stated in the State Soil Geographic Data Base (STATSGO) (NCSS

1997, State of Colorado 1998). The soils found in the area of Hunter Reservoir are shown in Figure 3.2.1. Table 3.2.1 summarizes the soil characteristics.

The soils that would be directly impacted by the Hunter Reservoir enlargement are Cryaquollis and Borohemists (127), ranging from 0 to 10% slopes. These soils are derived from an alluvium of mixed sources and are deep to very deep. They are poorly drained with a slow permeability, have a moderate available water capacity and potential rooting depth from 20 to 40 inches. Surface runoff is very slow to rapid and the hazard of water erosion is low. These soils are associated with wetland and fen. Other soils units shown in Table 3.2.1 occur in adjacent areas and roads near the project area.

Laboratory testing during the geotechnical investigation of Hunter Reservoir included testing for soil index properties, shear strength, consolidation, hydraulic conductivity (permeability), moisture/density relationships (compaction), corrosive soils, riprap durability, and dispersive clays. The values for these characteristics are to be used during the dam construction to ensure that the integrity of the structures would not be compromised.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action

Geology

The 2005 geotechnical investigation of the proposed reservoir area found no evidence of existing landslide masses or other features that could be impacted by raising the reservoir level. The slopes around the rim of Hunter Reservoir are generally flatter than 3H:1V and should remain stable. Any potential mass movement would be prevented by the Best Management Practices presented in the Design Criteria, Section 2.5.

The topography in the west borrow area would change slightly, as some material from the basalt talus would be used as riprap in the construction process.

Paleontology

No fossils were noted in the geotechnical investigation (GEI 2005*b*). Because the Uinta is beneath the basalt and glacial till at the site, and is not exposed in the area, there is little likelihood of encountering fossils during surface work. However, any excavation during dam construction would encounter bedrock. There is potential for impacting fossil resources if it is necessary to excavate into the underlying bedrock formation. The Design Criteria, Section 2.5 specifies that in the unlikely event that fossils resources are uncovered, the FS would be notified immediately.

Soils

In general, the construction of the reservoir will remove soils to enlarge and deepen Hunter Reservoir. These soils will be used as fill materials for constructing the new dams and access roads. All natural characteristics of the soil will be altered where this occurs. The use of Best Management Practices as described in Section 2.5, Design Criteria, should reduce or prevent erosion and minimize the overall effects that the project would have on the soils in the area.

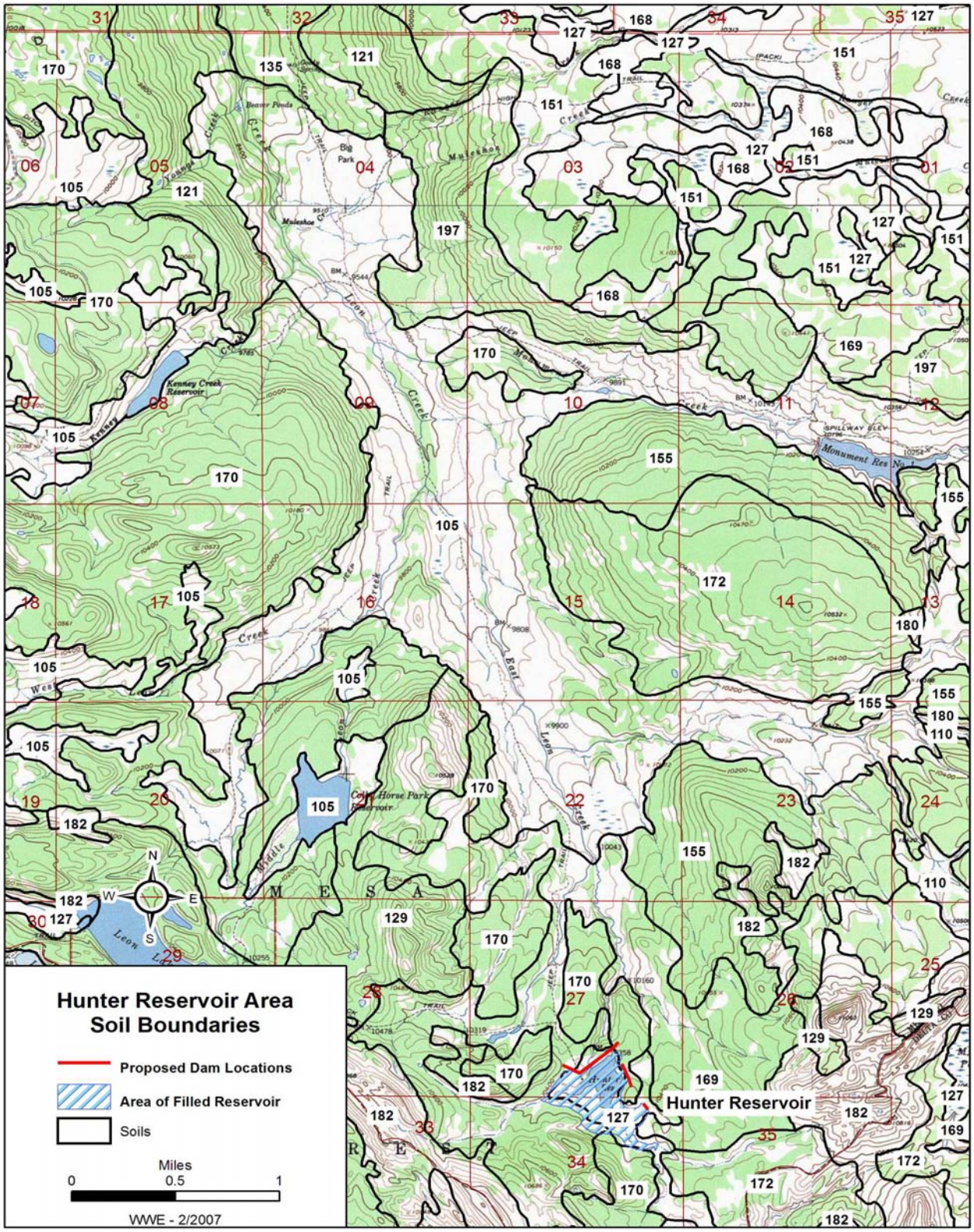

Figure 3.2.1 Hunter Reservoir Soils Boundaries

Table 3.2.1 Summary of Project Area Soil Units

Soil Map Unit	Soil Unit Name	Slope (%)	Landforms	Potential Rooting Depth (inches)	Runoff	Water Erosion Potential	Shrink-swell Potential
127	Cryaquollis and Borohemists	0 - 10	Valley floors, kettles	20 - 40	Very slow to rapid	Low	Low
169	Needleton family – Cryaquollis Complex	0 - 40	Glacial benches, moraines, valley floors, kettles	20 - 40	Very slow to medium	Low	Moderate
170	Needleton-Scout families complex	5 - 40	Slump block benches, mountain slopes	> 60	Medium to very rapid	Low to moderate	Low
105	Booneville, warm – Doughspon complex	5 - 15	Slump block benches, swales	40 - 60	Medium to very rapid	Low	High
121	Clayburn, warm – Booneville-Needleton family complex	25 - 65	Mesa side slopes	>60	Very rapid	Moderate to high	Moderate
197	Wesdy-Muduz complex	10 - 40	Mountain slopes	>60	Rapid to very rapid	Low to High	Moderate
135	Doughspon, dry - Wesdy complex	5-25	Valley floors and side slopes	0 - 60	Medium to very rapid	Low	High

The access road will require grading, leveling and has 26 stream or wetland crossings. Roads improved in the project area will require proper drainage. Leon Creek would be diverted during dam reconstruction activities and there would be temporary increases in sedimentation and erosion downstream in Leon Creek.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and geology, paleontology and soils would not be affected.

3.2.3 Mitigation

No mitigation measures are required for geology, paleontology and soils.

3.3 Water Resources/Hydrology

3.3.1 Existing Environment

Hunter Reservoir is located at the headwaters of East Leon Creek at an elevation of about 10,367 feet (Figure 3.3.1-1). East Leon is tributary to Leon Creek, which is tributary to Plateau Creek. East Leon Creek extends for about four miles from the origin to the confluence with Middle

Leon Creek to form Leon Creek. Hunter Reservoir is the only impoundment on East Leon Creek. Figure 3.3.1-1 shows the East Leon Creek drainage above the confluence with Middle Leon Creek. This total area is approximately 11.04 square miles. Also shown is the area that is tributary to Hunter Reservoir, in the southern portion of the watershed, with an estimated area of 1.63 square miles (GEI 2005*c*).

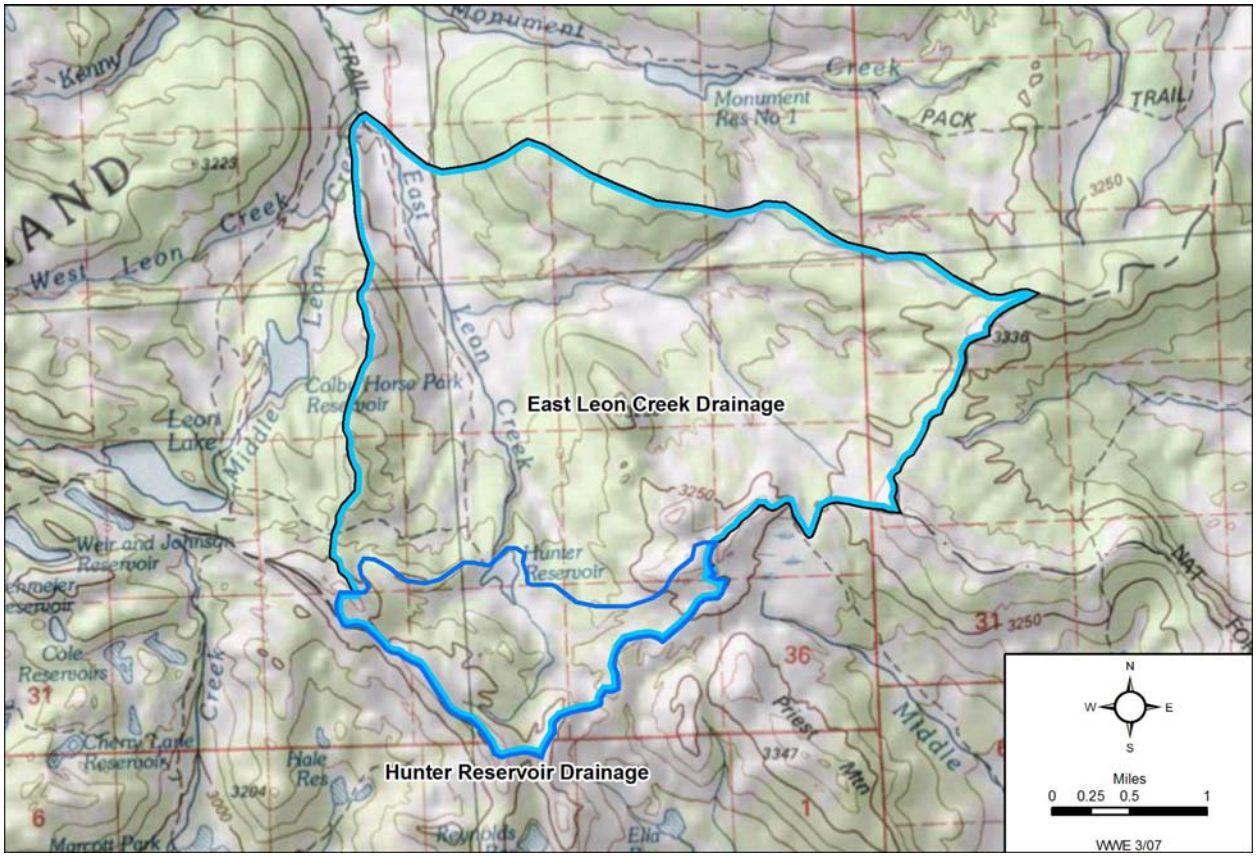

Figure 3.3.1-1 Hunter Reservoir Project Area Watershed

East Leon Creek is typical of many high mountain streams in Colorado in that daily, seasonal and annual discharge can vary significantly. Discharge from small streams of this type is influenced by groundwater and snow-pack conditions, but short duration precipitation events can also have considerable impact on flow levels. Channel morphology of stream is directly influenced by eight major variables including channel width, depth, velocity, discharge, channel slope, roughness of channel materials, sediment load and sediment size (Leopold et al. 1964). Changing any one of these variables could alter channel morphology. The annual hydrograph of this stream has been altered since 1912 when the original Kirkendall Dam was constructed. Water impoundment at East Leon Creek headwaters has altered the natural stream hydrograph.

In the summer of 2006, WWE biologists and hydrologists conducted stream surveys on five cross sections on East Leon Creek at intervals below Hunter Reservoir in order to provide a baseline characterization of the stream. These sections were chosen to capture the incremental influences of each tributary to East Leon Creek before the confluence with Middle Leon Creek (Table 3.2.1). Each of the five cross sections was located directly below the confluence with each respective, unnamed tributary. The final cross section (#5) was located just below the confluence of East and Middle Leon Creeks. The intent of this investigation was to analyze

these cross sections to determine what, if any, effect the enlargement of Hunter Reservoir might have on the hydrologic processes of East Leon Creek below Hunter Creek. Results of stream channel cross sections were generated using WinXSPRO, v. 3.0 (FS 2005) and are provided in Appendix C, and summarized below.

Baseline measurements such as cross sectional geometry, discharge, and measurement of stream substrate were made at each of the five cross sections. The survey identified East Leon Creek as Type B (Rosgen 1994) stream with channel material comprised of clasts (rock particles) ranging in size from fine sand (< 1 mm). to boulder (>256 mm). Dominant channel materials range from cobble (64-256 mm) to boulder (>256 mm) based on field measurements. Type B streams typically are low in sinuosity, moderately entrenched, moderate channel gradient and are riffle and run dominated with infrequently spaced pools. Type B streams also exhibit stability in plan and profile resulting in stable banks, little meandering, and no entrenchment or head-cutting. Appendix C provides the methods and analysis used for the stream survey and the modeling data used to calculate discharge.

No gauges are available on East Leon Creek, so its natural flow regime and a watershed yield were estimated in the process of designing the reservoir enlargement (GEI 2005*c*). While estimating discharge on a daily basis is very uncertain, reasonable long-term estimates are possible on a monthly and annual basis. Physical flows in the ungauged East Leon Creek were calculated by extrapolating gauged data from a nearby watershed with similar characteristics, Cottonwood Creek. Gage data were adjusted for differences in watershed area and in average precipitation. The original estimates were for the Hunter Reservoir drainage area and then those were further extrapolated to include the entire East Leon Creek watershed.

Table 3.3.1-1 shows the estimated average flow rates and water yield for East Leon Creek at Hunter Reservoir and at the confluence with Middle Leon Creek. The estimates are based on data from the period 1953 to 2000. A description of the method of estimation and the data used is included in Appendix C: Watershed Yield and Flow Rates.

Table 3.3.1-1. Estimated Average Natural Flow

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
East Leon Creek at Hunter Reservoir												
acre-ft	114	99	84	72	76	129	131	346	472	427	301	208
cfs	1.85	1.78	1.37	1.21	1.23	2.16	2.14	5.63	7.93	6.95	5.06	3.38
East Leon Creek at Confluence with Middle Leon												
acre-ft	839	829	683	621	579	1006	923	2304	3238	3184	2123	1287
cfs	13.65	13.94	11.10	10.10	10.42	16.36	15.51	37.47	54.42	51.78	34.53	21.63

cfs = cubic feet per second
acre-ft = acre-feet

As expected, the highest average flow rates and greatest monthly yield occur in June and July during the period of snowmelt. Base flow during fall, winter and spring at the Hunter Reservoir dam is estimated to be about 1 to 2 cubic feet per second (cfs) and peak flow from snow melt and runoff is about 6 to 8 cfs. Annual yield for the Hunter Reservoir drainage is estimated at 2,458 acre-feet, ranging from 1,607 to 4,246 acre-feet. The three largest estimated snowmelt flow rates were 59, 58 and 57 cfs. The 100-year instantaneous peak annual flow from snowmelt was

calculated at about 77 cfs. Estimated flow and yield at the confluence of East and Middle Leon Creeks exhibit similar seasonal patterns. Annual average yield is an estimated 17,617 acre-feet, ranging from 12,691 (1977) to 28,847 acre-feet (1997).

Estimates on East Leon Creek (Table 3.3.1-1) are for natural flow, that is to say, with no interception to fill Hunter Reservoir and no releases from the reservoir. Flow of East Leon Creek is interrupted and somewhat decreases from late fall or early spring when the gate is closed until the reservoir fills in May or June and then begins to spill into the creek. The flow in East Leon Creek in May and June is generated solely from groundwater as no water is being released from the reservoir. The gate is opened in late August to allow for late season irrigation at Kirkendall Flats (west of Vega Reservoir) and the reservoir empties in seven to ten days. The additional flow when the gate is opened is 4-5 cfs, bringing the total late-August discharge into the range of discharge occurring in June and July.

Presently, discharge is perennial immediately below the dam even when the gate is closed, and the reservoir filling, with perhaps only a few hundred feet or less of de-watered stream. WWE biologists observed numerous springs or groundwater in the alluvium of East Leon Creek below the reservoir while conducting wetland delineation when the gate was closed.

Calculations show the three sub-basins above Hunter Reservoir gain flow from groundwater at the average annual rate of approximately 0.000371 cfs-foot of thalweg. Applying this factor to stream channel below Hunter Reservoir shows groundwater gain developing the following flows from groundwater in Table 3.3.1-2, Estimated Groundwater Recharge below Hunter Reservoir.

Table 3.3.1-2 Estimated Groundwater Re-charge in E. Leon Creek Hunter Reservoir

Distance (feet)	500	1000	1500	2000	3000	4000	5000	6230.4
Flow (cfs)	0.186	0.371	0.557	0.743	1.114	1.486	1.857	2.314

Water Rights - Ute Water has the right to store 110 acre-feet of water (July 28, 1902) in the existing reservoir and proposes to increase the total storage capacity of the reservoir by an additional 582 acre-feet, based on a conditional water right (July 24, 1952) on Leon Creek watershed. The Proposed Action also calls for transfer of an additional 648 acre-feet to Hunter Reservoir, creating a total storage right of 1,340 acre-feet. The transferred right would be from a conditional storage right (September 17, 1970) Ute Water holds on lower Leon Creek.

3.3.2 Environmental Consequences

3.3.2.1 Proposed Action

Construction of the enlarged reservoir and improvement of the access road to the reservoir would create short-term increases in turbidity and sediment as soil adjacent to the creek is disturbed. Disturbed areas would continue to contribute sediment during snowmelt and summer storms until successful reclamation had been achieved. Implementation of the Soil and Water Design Criteria described in Section 2.5 would minimize this impact.

Sedimentation would temporarily increase in the reservoir after enlargement until it settles in the newly flooded area, and takes on the characteristics of a typical lake bottom (lacustrine

sediment). Over time, organic matter from aquatic organisms would also settle in the bottom and would eventually increase the biological activity in the reservoir. As the plant community on the fringe of the reservoir (referred to as littoral plants) forms, their nutrients and organic content would help to increase the fauna (biological organisms) at the lake-bottom. Eventually, the lake bottom would evolve into a natural lake condition, and the effects of turbidity (see Glossary) would be minimal.

The range in estimated water yield from the Hunter Reservoir drainage over the period 1953 to 2000, 1,607 to 4,246 acre-feet, suggests that the watershed has the physical capacity to fill the reservoir most years. The enlarged reservoir would require a change in the duration and flow rate of water released from the impoundment. Table 3.3.1-3 displays the natural rate of flow at the confluence of East and Middle Leon Creeks and of the flow modified by water management at the enlarged reservoir. A release rate of 5.25 cfs from Hunter Reservoir from July 1 to the end of October is assumed. This rate is slightly above the current estimated average rate of release. The release period would be quite a bit longer than the existing period of release, requiring about 130 days to draw the reservoir down compared to the current seven to ten days.

Table 3.3.1-3. Estimated Average Existing Flow and Modified Flow

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Cubic feet per second (cfs)											
Natural Flow	13.65	13.94	11.10	10.10	10.42	16.36	15.51	37.47	54.42	51.78	34.53	21.63
Modified flow	18.90	12.91	9.47	8.62	9.03	14.10	13.41	32.74	50.30	57.03	39.78	26.88

The same data are displayed in Figure 3.3.1-2, a hydrograph of the estimated existing flow at the confluence and of the flow modified by water management at the reservoir. As the hydrograph indicates, this change in reservoir management would have only a modest effect on stream flow at the confluence with Middle Leon Creek.

Water volume in the enlarged Hunter Reservoir would depend on time of year, in conjunction with the physical and legal availability of water. Local groundwater flow gradients may be altered as a result of increased hydraulic head associated with larger volume of stored water under peak reservoir volume up to 5 months a year. In other words, there would be an increased base flow in the section of the stream directly below the dam to approximately the location of the first tributary (see Appendix C).

Water Rights: Water stored in Hunter Reservoir is subject to the claims of downstream water right holders. The water rights of concern are described in Table 3.3.1-4.

Although the Hunter Reservoir watershed has the capacity to provide 1,340 acre-feet to the reservoir, it is likely that the reservoir would only be able to fill to capacity about half of the time due to downstream water rights. Using the Leon Park Feeder Canal right as a proxy for all downstream senior rights, an analysis of the 48-year period from 1953 to 2000 indicates that the reservoir would not have been able to fill in 23 of the 48 years. This pattern is likely to continue.

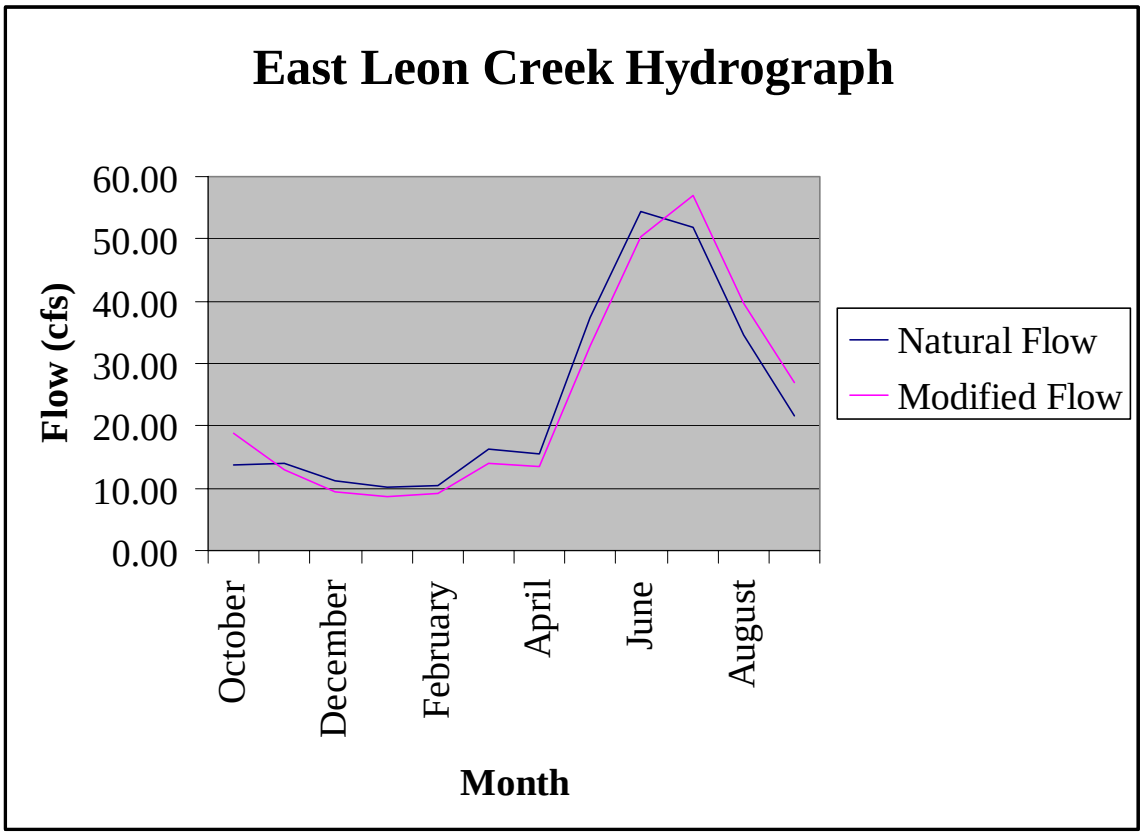

Figure 3.3.1-2. Hydrograph of Estimated Existing Flow and Modified Flow

Table 3.3.1-4 Senior Water Rights on Leon Creek

Location of Water Right	Volume (acre-feet)	Date
Kirkendall Reservoir (aka Hunter)	110.00	07/28/1902
Kirkendall Reservoir (aka Hunter)	582.49	07/24/1952
Leon Park Feeder Canal*	350.00	08/19/1952
Big Park Reservoir	5,650.00	09/17/1970

* Leon Park Feeder Canal provides flow to Vega Reservoir

The fill period will be longer after the reservoir is expanded. When the enlarged reservoir is filling, the downstream reaches of Leon Creek could experience a slightly decreased flow during the months when the gate is closed (the fill period). In particular, the 0.6 mile stream reach immediately below Hunter Reservoir before the confluence with the first significant tributary is likely to experience decreased instream flow by the Proposed Action. Flows may be limited to snowmelt and groundwater discharge. Following snowmelt, groundwater discharges below the dam have been estimated at 0.2 cfs to 1.1 cfs, increasing with distance below the dam (Table 3.3.1-2).

In conclusion, hydrologic alteration of East Leon Creek resulting from the increased capacity of Hunter Reservoir would not likely cause any significant changes to the current hydrologic regime.

3.3.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and water resources/hydrology would not be affected.

3.3.3 Mitigation

No mitigation measures are required for water resources/hydrology.

3.4 Vegetation (includes invasive and non-native species)

3.4.1 Existing Environment

The vegetation patterns of the project area are related primarily to moisture gradients. Vegetation near East Leon Creek is characterized by wetland and riparian types of vegetation, while drier upland areas are vegetated by shrublands and coniferous or deciduous woodlands.

The FS has mapped the ground cover of the Grand Mesa National Forest in considerable detail. Since ground cover consists of water, bare soil, and rock as well as vegetation, the database uses the term cover type rather than vegetation type. Cover types are further refined as to the proportion of each cover found in a given stand. Since the database lists dozens of cover types for the project area, the cover types have been aggregated to describe broad vegetation types likely to be impacted by the Proposed Action. Three types have been defined for the project area – willow/riparian, spruce/fir, and grass/forb/shrub (Figure 3.4.1).

Willow growing along streams (riparian) was separated from cover types containing other species of plants. This category is listed as willow/riparian; near Hunter Reservoir, the willow is almost exclusively planeleaf (*Salix planifolia*), but composition gradually changes to mountain willow (*Salix monticola*) and Geyer willow (*S. geyeriana*) downstream. At the main road crossing on East Leon Creek, Wolf willow (*S. wolfii*) is also found. This category contains a very small amount (less than 0.02 acre) of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) growing along streams.

All cover types containing Engelmann spruce and/or subalpine fir that are not growing along streams were combined into the category spruce/fir, regardless of tree species proportion or density.

All non-riparian areas covered by grasses, forbs and scattered shrubs, including willow, were combined into the category grass/forb/shrub. The non-willow shrub component is usually shrubby cinquefoil (*Pentaphylloides floribunda*). The small patches of willow present may be any of the four species listed above. The order in which the vegetative types are presented (grass/forb/shrub) is not intended to suggest relative percent of cover, but shrub is always the least.

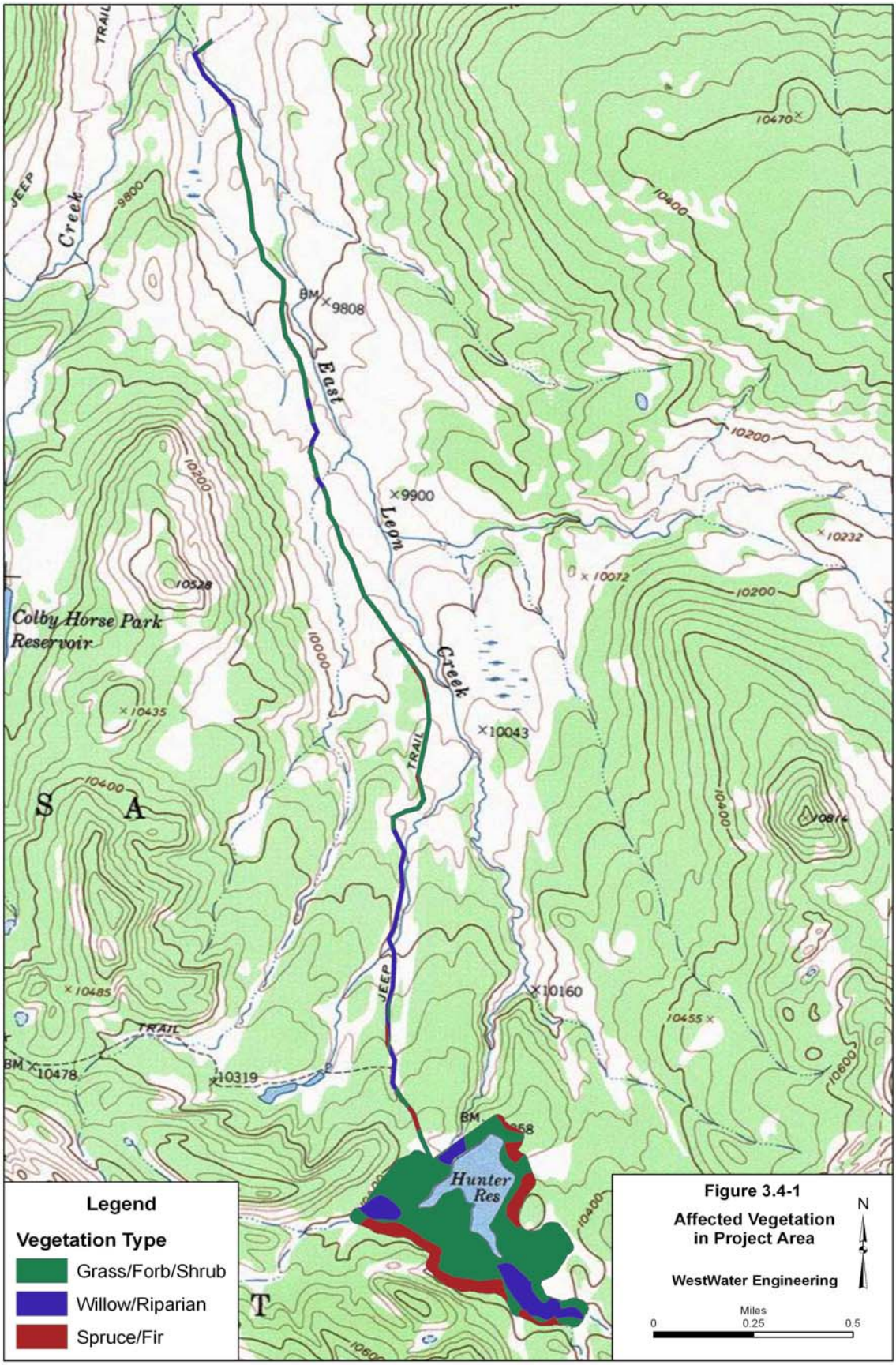

Figure 3.4.1. Affected Vegetation in Project Area

There are extensive wetlands surrounding Hunter Reservoir and smaller wetlands along the existing access road. These wetlands feature a variety of vegetation types, but grass/forb/shrub is the most common followed by willow/riparian. It should be noted that "grass" also includes grass-like wetland plants such as rushes and sedges. Wetland types found at Hunter and along the access road are wet meadows, littoral zone (area between high and low water marks), fen (peatland), and fringe wetlands at stream crossings. Wetlands are described more fully in the Wetlands Section (3.5).

Invasive/Non-native Plants. An inventory of the project area for invasive, non-native species was completed during 2006. Work took place throughout the growing season and covered the Proposed Action area and the existing and proposed access roads. No noxious species were found.

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

Implementation of the Proposed Action would result in the removal of existing vegetation in the action areas.

A summary of the approximate acreage by vegetation type that would be affected is presented in Table 3.4.2.1.

Table 3.4.2.1. Vegetation Types and Acreages Affected by Proposed Action

Vegetation Type	Hunter Reservoir	Existing Access Road	New Access Road
	Acres		
Spruce/fir	17.5	0.3	2.7
Willow/riparian	11.8	1.2	<0.1
Grass/forb/shrub	55.0	0.1	<0.1

A total of 88.8 acres of vegetation would be affected by the Proposed Action. Some vegetation would be restored following successful re-vegetation of the area surrounding the dams, temporary roads, and temporary use areas (4.5 acres). However, approximately 84.3 acres (Table 3.4.2.1) would be permanently inundated by the Proposed Action.

All trees would be removed from within the high water line of the enlarged reservoir. This removal could be treated as a timber sale, with Ute Water as the buyer. Timber value would be determined by the FS using established procedures.

Invasive/Non-native Plants. Several species of non-native plants are present in the project area, including dandelion (*Taraxacum officinale*), smooth brome (*Bromopsis inermis*), orchard grass (*Dactylis glomerata*), and meadow foxtail (*Alopecurus pratensis*). No species listed as noxious were found, but construction activities have the potential to introduce such species. Noxious weeds most likely to occur are musk thistle (*Carduus acanthoides*), chamomile (*Matricaria perforata*), yellow toadflax (*Linaria vulgaris*), Russian knapweed (*Acroptilon repens*), diffuse knapweed (*Centaurea diffusa*), and spotted knapweed (*Centaurea maculosa*). Equipment cleaning and seed specifications as discussed in Section 2.5, Design Criteria, should minimize the spread of noxious weeds**.**

3.4.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and vegetation would not be affected.

3.4.3 Mitigation

No mitigation measures are required for vegetation.

3.5 Wetlands

3.5.1 Existing Environment

Wetlands surround Hunter Reservoir and also occur at road crossings along the reservoir access road. These wetlands feature a variety of vegetation types, but wet meadow is the most common. The project area wetlands are shown in Figure 3.5.1-1.

The delineation of wetlands is an important process in the development of a project like the Hunter Reservoir enlargement To be a wetland, as defined by the COE, according to the *Corps of Engineers Wetlands Delineation Manual, Environmental Laboratory, Vicksburg, MS, January 1987*, an area must have (1) plant species known to occur exclusively or primarily in wetlands; (2) wetland soils characterized by certain features such as dark colors, high organic matter, mottling, or sulfidic odor; and (3) wetland hydrology, or water at or near the soil surface for a certain proportion of the growing season. If any of these factors is absent, an area cannot be designated a wetland.

Wetlands delineation was performed by WWE in 2004 and 2005, and a Jurisdictional Determination Request was filed in November 2005 with the COE (WWE 2005*a*). Onsite reviews of the delineation with COE were held on August 2 and October 6, 2005 (see Figure 3.5.1-2). The COE provided the Jurisdictional Determination on January 27, 2006. Appendix D contains the wetland delineation and COE Jurisdictional Determination.

WWE identified 49 wetland polygons in the existing reservoir area, including 44.6 acres of wet meadow, 6.3 acres of littoral zone and 1.9 acres of fen (Figure 3.5.1-2). Wet meadow is dominated by sedges and rushes, littoral zone is dominated by sedges and pondweed, and fen is dominated by sedges, rushes and mosses. Since fen is generally considered to be less common and possibly more important, additional description is provided here. Copies of the completed COE Data Forms documenting the vegetation, soils and hydrologic characteristics of the observed wetlands are included in Appendix D, Jurisdictional Determination.

Fens are wetlands with organic soils dependent on direct contact with mineral enriched groundwater for nutrients and consistent moisture. Fens in the Rocky Mountains have extremely slow rates of peat accumulation (approximately 8 inches per 1,000 years) due to a cold, dry climate. Fens are common in northern latitudes of North America, Siberia, and Eastern Europe. In southern latitudes, like the Southern Rockies, fens are infrequent and are found at high elevations where the climate is cold, wet and precipitation exceeds evapotranspiration. Fens generally form in depressions in the landscape where organic matter accumulates faster than it decomposes forming thick organic soil horizons (up to 15 feet in depth at some sites on the Grand Mesa). Such accumulations take place over thousands of years. Region 2 of the FS, as a

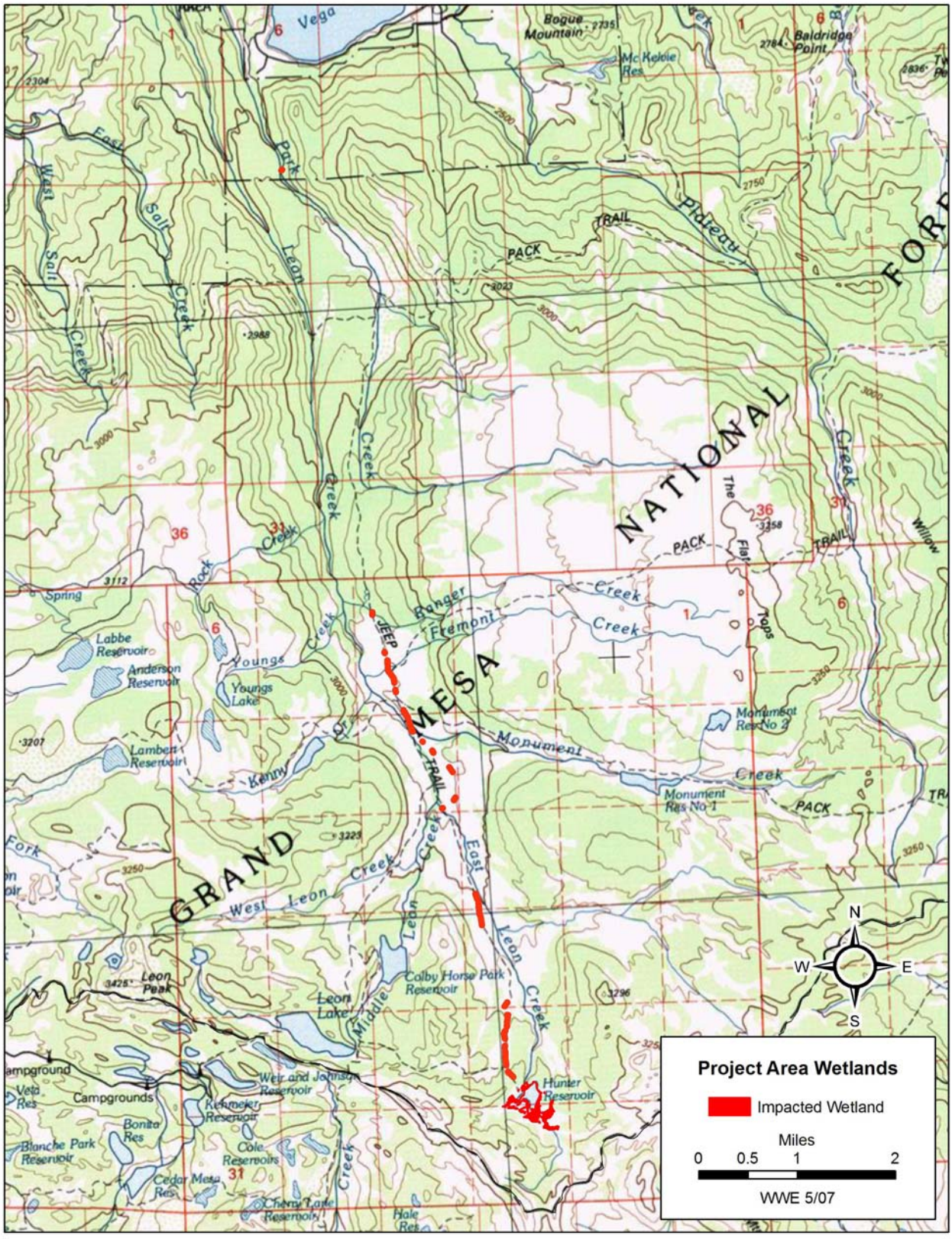

Figure 3.5.1-1. Project Area Wetlands

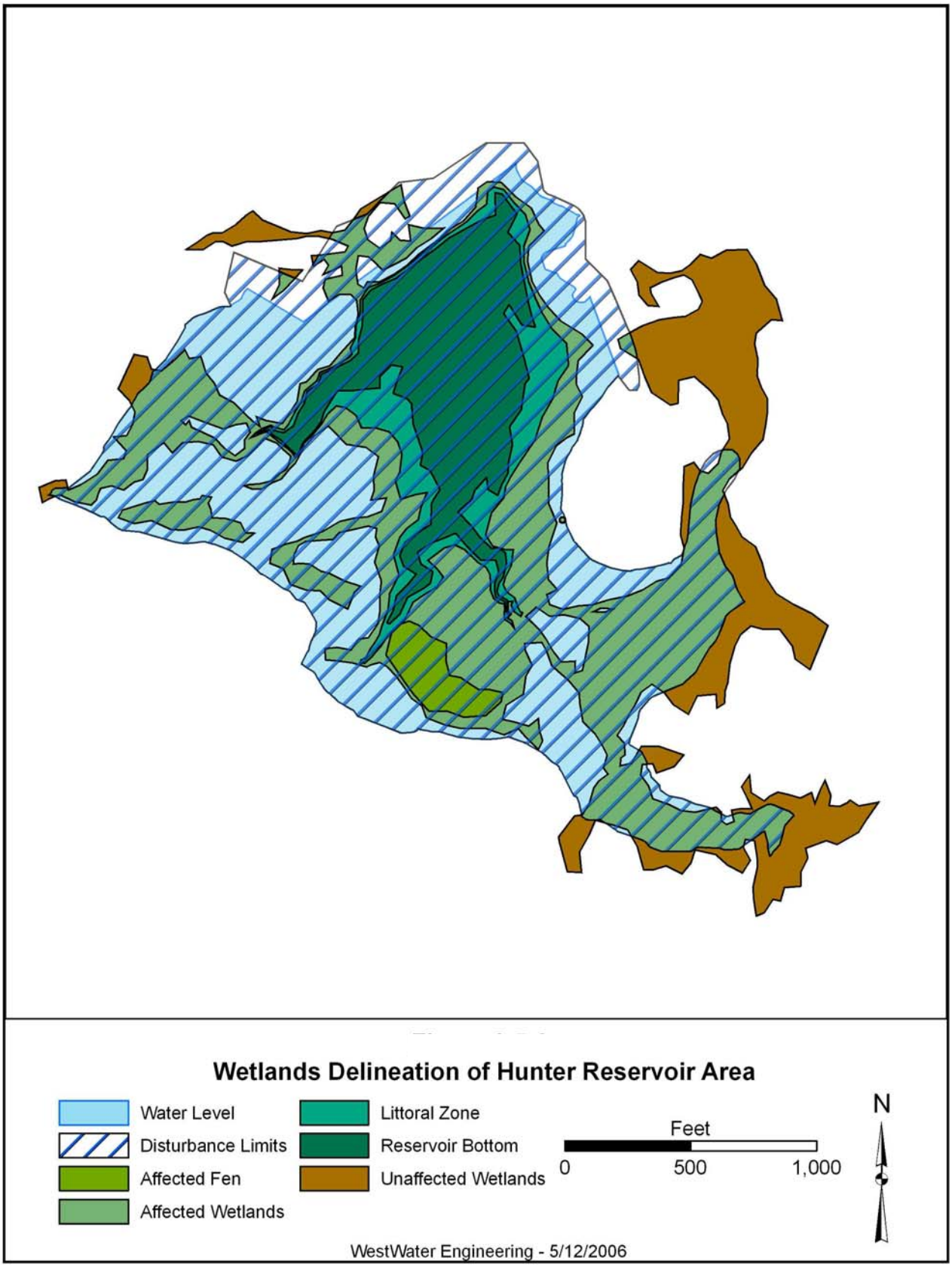

Figure 3.5.1-2. Wetlands Delineation of Hunter Reservoir Area

matter of policy, recognizes fens as special areas with unique wetland characteristics and urged all regional Forest Supervisors to provide a leadership role in protecting, preserving and enhancing these valuable resources (FS 2002*a*).

Many of the existing reservoirs on the Grand Mesa have been constructed in areas with fens and could be subject to requests for enlargement of storage volume in the future.

There are no existing estimates of the abundance of fens on the Grand Mesa. A Technical Memorandum to the FS from WWE (WWE 2007) outlines the project team's approach to estimating the abundance of fen on the Grand Mesa. This approach is based on a FS report (FS 2002*b*). The total area of fen-like characteristics, in the technical memorandum, is estimated to be 2,635 acres.

In addition to wetlands in the vicinity of Hunter Reservoir, the NFSRs to the reservoir (NFSR 280 and 262) cross 26 wetlands and Waters of the United States (approximately 0.8 acre) that could be impacted by improvements necessary to allow construction equipment and vehicles access to Hunter Reservoir. Details of the delineation are included in Appendix D.

The mitigation plan was developed over a two-year time frame by the project team made up of representatives of the COE, the FS, a third party consultant, and the Proponent. The essence of the plan is a systematic assessment of the wetland function that would be affected and then a strategy for replacement of that function. The functional assessment was conducted in accordance with the direction of COE RGL 02-2. In order to comply with the COE direction, the project team developed a method for assessing wetland functions and wetland values on the Grand Mesa, Colorado, between 9,000 and 11,000 feet elevation (Appendix A – The Grand Mesa Method). This method provides experienced natural resource specialists with a systematic, qualitative approach to scoring wetlands and comparing relative functional values.

The GMM is comprised of basic site-specific information followed by seven scoring indices including the Hydrogeomorphic Index, Vegetation Index, Water Quality Index, Wildlife Habitat Index, Threatened Endangered and Sensitive Species (TESS) Index, Recreation Index and Buffer Quality Index. Each of these indices is assigned a percentage (or weight factor) of the total (Appendix A). The Index Values (IV) multiplied by their respective weight factor (WF) equals the Weighted Index Value (WIV). That is IV * WF = WIV. The sum of the WIVs is the Total Weighted Index (TWI). That is $\sum$WIV = TWI. The TWI is then multiplied by the number of acres in the wetland (A) to determine the Functional Value (FV). That is, TWI * A = FV. The $\sum$WIV provides a relative assessment of wetland quality between sites, while the FV provides an assessment of the relative value between sites. It helps to determine whether wetland functions are diminished and identify potential restoration or enhancement opportunities.

A total of 20 existing Grand Mesa wetlands were compared using the GMM to provide a perspective of the $\sum$WIVs and FVs present on the Grand Mesa. This analysis included rating 2 reference areas (1) Coyote Fen, for wetlands and (2) Monument Creek, for riverine factors. Reference sites are considered areas of high value relative to other areas of the Grand Mesa, as selected by the EIS team. The $\sum$WIV ranged from a low of 0.40 to a high of 0.87, and the FV ranged from a low of 0.56 to a high of 39.85 (see Appendix A).

The existing wetland of Hunter Reservoir, including the fen, was assessed using the GMM. The existing Hunter Reservoir wetland ∑WIV is 0.50. Comparing this value to the range of ∑WIV observed, the Hunter Reservoir wetland has a quality about 22 % of the highest value observed at the Coyote Reference Site. The Hunter Reservoir FV is 23.25. This is the second highest FV observed due to the large area of the Hunter wetland (46.5 acres).

3.5.2 Environmental Consequences

3.5.2.1 Proposed Action

Direct effects of the Proposed Action are that approximately 32 acres of wetlands within the high water line of the expanded Hunter Reservoir could be permanently lost due to inundation. Potential indirect effects, such as siltation related to construction activities and soil compaction of wetland adjacent to construction, are expected to be fully mitigated by construction Best Management Practices. Littoral zone wetlands are expected to be entirely replaced by establishment of a new littoral zone along the perimeter of the enlarged reservoir, so no loss of functional value is anticipated for this wetland type at Hunter Reservoir. A new wetland fringe (2.8 acres) would develop along the new reservoir shore line, offsetting a portion of the lost wetland, so the total lost wetland acreage would be 29.2 acres. Wetland road crossings would be restored by successful implementation of reclamation planned for those areas as part of the project proposal. Evaluation of the lost wetland using the GMM indicates a functional debit of 13.9 (Appendix B) that must be replaced through compensatory mitigation. This functional debit includes lost functional value of the 2 acre fen. The loss of 2 acres of fen constitutes approximately 0.076 % of the 2,635 acres (WWE 2007) of estimated fen-like area on the Grand Mesa.

3.5.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and wetlands would not be affected.

3.5.3 Mitigation

The COE requires that the wetland function affected by the Proposed Action be mitigated (replaced). This is described in guidance provided under the COE Regulatory Guidance Letter No. 02-2 (COE 2002). Without replacement of the wetland function lost, it is unlikely that the project could proceed.

Therefore, this EIS includes a plan for compensation of unavoidable wetland impacts called the Conceptual Wetland Mitigation Plan located in Appendix B. Again, the mitigation plan was developed over the last two years by a team of interagency specialists. The evaluation method of potential sites, the GMM was described in Section 3.5.1. The GMM provides a relative assessment of wetland quality which when multiplied by the acreage of the wetland provides the functional value of the wetland. Twenty existing wetlands were evaluated and detailed in Appendix A. When compared with high quality reference sites, Hunter Reservoir wetland had a relatively low quality rating. This would result in the loss of wetland functional value that could be replaced with compensatory mitigation in the vicinity of Hunter Reservoir and at other locations on the Grand Mesa National Forest.

The FS has recommended two sites to serve as compensatory mitigation for the inundation of wetland from the Hunter Reservoir enlargement. These sites are detailed in Appendix B and summarized below:

1. Hunter Road Realignment

This area is approximately one mile of existing access road to Hunter Reservoir (NFSR 280). Stream crossings have heavily impacted the riparian wetland in the area. The road would be realigned out of the wetland area and the stream crossings reduced to only one. The former road would be re-vegetated and effects from cattle would decrease because they would follow the new more accurate route. Barrier fences would be installed as well.

2. Coon Creek Drainage

The Coon Creek Drainage site includes a privately owned 1891 reservoir easement. The 1891 easement could result in a decrease in wetland functional value if the easement holder elected to maintain or expand the existing reservoir. However, if the 1891 easement were relinquished to the FS, the area would be protected from future development. Also, conditions at the site would be improved by lowering existing reservoir water levels to create additional wetland areas.

The mitigation actions for both of these sites would increase their functional value to equal or exceed the functional value of the wetland lost by the enlargement of Hunter Reservoir. The description of the functional values are detailed in Appendix A, and based upon evaluation using the GMM.

3.6 Aquatic Wildlife

3.6.1 Existing Environment

Hunter Reservoir, its tributary streams, and associated wetlands provide habitat for a wide variety of aquatic organisms. These include aquatic macroinvertebrates and vertebrate species including fishes and larval amphibians.

Aquatic macroinvertebrates are those invertebrates that spend at least part of their life cycle in water. These include worms, mollusks, mites and insects. Insects are by far the most common. Most insect species spend just the immature phase (larval or nymph phase) in water. Although sensitive species occur in most insect families, three families are comprised primarily of species that are more sensitive to disturbance. These are Ephemeroptera (mayflies), Plecoptera (stoneflies) and Tricoptera (caddisflies).

Macroinvertebrate communities occur in all water bodies on the GMUG, including ponds, lakes, reservoirs, wetlands, rivers, perennial streams and intermittent streams. Even degraded systems usually contain aquatic macroinvertebrates; however, these communities are composed of very different assemblages of species from those in pristine systems. Because of their wide distribution and their sensitivity to disturbance and pollutants, macroinvertebrates are widely used to monitor the health of streams and rivers.

No formal sampling for aquatic macroinvertebrates was done during fieldwork, but the relatively good condition of many of the streams near Hunter Reservoir should produce near-optimum

population levels. Mayflies, for example, appear to be abundant based upon observation frequency of adults.

The most important aquatic vertebrate species in Hunter Reservoir is the *Oncorhynchus clarkii pleuriticus,* the Colorado River cutthroat trout (CRCT). The CRCT, one of three native inland cutthroat trout in Colorado (Table 3.6.1), occupies the upper Colorado River Basin. Both Leon Creek and Hunter Reservoir are listed as occupied habitat (CRCT Task Force 2001) although this has not been scientifically verified by DNA testing (Kowalski 2005). Historically, this species was found in far greater numbers distributed widely throughout the basin. Current occupied range is greatly reduced from historic range. Due to many factors, including widespread reduction in distribution, this species of cutthroat is classified a "Species of Special Concern" by CDOW. The CRCT is also a FS Region 2 sensitive species. The CRCT was petitioned in 1999 as threatened or endangered by the Center for Biological Diversity. Currently, the CRCT is undergoing status review by the FWS.

Table 3.6.1. Summary of Hunter Reservoir Vicinity Trout Species Distribution (Del Piccolo 2006)

Stream or Segment	Fish Species Present			
	Cutthroat	Cutbow	Rainbow	Brook
East Leon	X			
Middle Leon	X			
West Leon	X			
Upper Leon	X			
Middle Leon		X		
Lower Leon			X	
Monument	X			
Kenney	X			
Park				X
Plateau above Vega Res.	X		X	X
Plateau below Vega Res.			X	
Hunter Reservoir	X			
Monument Reservoir #1	X			

Bozek and Rahel (1991) in their study of CRCT micro- and macro-habitat variables concluded spawning gravel is the most limiting habitat variable of all requirements necessary to sustain a population. Fluvial (stream-dwelling) CRCT populations in Colorado and Wyoming, such as those found in East Leon Creek below Hunter Reservoir, generally are found above 7,500 feet elevation in streams with less than 30 cfs average daily discharge, slope greater than 4%, a gravel-cobble-boulder dominated substrate with pool-to-riffle ratio of 1:1 (Trotter 1987, Young 1995). Research on competition between cutthroat and other salmonids indicates slope can have a dominant effect favoring inland cutthroat trout (Fausch 1989), wherein the steeper the slope the greater the cutthroat dominance over brook trout. This does not necessarily describe preferred habitat, but could more likely indicate CRCT are able to sustain populations in habitat too harsh for other salmonids (Young 1995).

Three sub-basins occur in the watershed above the reservoir and produce modeled base flows that vary between 1.2-7.9 cfs monthly at Hunter Reservoir Dam. At least one sub-basin has a perennial water discharge of 1-2 cfs and is potential spawning habitat for CRCT. However, spawning has not been confirmed. (Section 3.3, Water Resources/Hydrology)

Historically at Hunter Reservoir, other non-indigenous trout have been stocked by CDOW (Table 3.6.1), including greenback cutthroat, *O. c. stomias* or *O. clarkii pleuriticus* introgressed to a high degree with non-indigenous genetic matter, e. g. Trapper's Lake CRCT (Rogers 2006). Cutthroat also readily hybridize with and produce fertile offspring with rainbow trout, *Oncorhynchus mykiss*, another closely related spring spawning sub-family Salmoninae member (Young 1995). Rainbow trout are found in the lower reaches of Leon Creek while hybrid cutthroat crossed with rainbow ("cutbow") are found in the middle reaches of Leon Creek.

Greenback cutthroat were stocked in the reservoir from 1979-1985 due to an abundance of available fish at the time (CDOW 2005). Trapper's Lake CRCT's were also stocked prior to development of a conservation strategy that now precludes the stocking of non-indigenous salmonids in CRCT habitat (CRCT Task Force 2001).

Upper Leon Creek provides habitat for at least one other fish species, the mottled sculpin (*Cottus bairdi*), but stream sampling by CDOW in 1979 turned up only the salmonid species described above (CDOW 2005).

Habitat (Hammerson 1999) is present for tiger salamander (*Ambystoma tigrinum*), striped chorus frog (*Pseudacris triseriata*), northern leopard frog (*Rana pipiens*) and boreal toad (*Bufo boreas boreas*), but only the chorus frog was found during field work in 2005 and 2006. The numerous potholes surrounding Hunter Reservoir seem to be the preferred breeding habitat; in Hunter Reservoir and its associated streams, larvae would be subject to predation by CRCT.

3.6.2 Environmental Consequences

Macroinvertebrate communities are influenced by the timing of flow and water quality in the streams in which they live. Geology, elevation, temperature, gradient and substrate distribution are other factors that commonly influence macroinvertebrate communities. As habitats are degraded, by chemical pollutants, increased sediment, or unfavorable changes in flow (especially severe reductions), the response of the macroinvertebrate community is typically a reduction in the number of species which occur there and especially the number of sensitive species.

Siltation, chemical spills, removal of shade trees, and alterations in stream flows during construction and operation of the new dam could reduce numbers of individuals and/or change species make-up of macroinvertebrate communities. A reduction in macroinvertebrate communities will produce a corresponding decrease in populations of those vertebrate species which depend upon macroinvertebrates for food. These factors may also directly impact fish species.

Two concerns identified for the Proposed Action during scoping relate to discharge, reservoir releases, and the effects on CRCT. One concern is that a rapid increase in release would mimic a flood and displace or wash fish downstream, particularly if the release is instantaneous. The other is whether or not reservoir releases will be sufficient to be considered flushing discharges by fisheries biologists. Flushing-flows move bedload, transport sediment, and recruit new spawning gravels. Flushing-flows are also called bankfull flow in hydrological terminology (Rosgen 1996).

The predicted annual average monthly base release to East Leon Creek below Hunter Reservoir will be a bit higher and shifted to later in the summer during releases. Spawning by CRCT begins after releases have peaked but before runoff subsides (Young 1995). Emergence is controlled by water temperature and tends to be in late summer although alevins (new hatchlings) have been observed in substrate as late as early September (Young 1995). Because the shape of the hydrograph remains similar (see Section 3.3, Water Resources/Hydrology) it appears spawning and emergence could be shifted approximately one month. Total number of redds (spawning areas) should not be affected. The effect on recruitment (see Glossary) and survival of alevins is not as easily predicted. Recruitment could be enhanced in release years from the effects of a greater wetted perimeter in the stream channel and longer duration of flow over and through what would otherwise be marginal redds during relatively dry years. Removal of wetlands surrounding Hunter Reservoir will decrease the amount of breeding habitat available to amphibians.

As stated in Section 3.3, when the reservoir is filling there would be decreased instream flow in downstream reaches of Leon Creek. Those effects will be most noticeable in the 0.6 mile reach of the stream directly below the dam before the first major tributary discharges into Leon Creek. Aquatic wildlife in this reach would be subjected to decreased over-winter capacity in pools, potential decrease in food supply, and available spawning habitat. However, the existing environment, as described in Appendix C may undergo these effects anyway. In conclusion, hydrologic alteration of East Leon Creek resulting from the increased capacity of Hunter Reservoir would not likely cause any significant changes to the current aquatic wildlife.

3.6.3 Mitigation

No mitigation measures are required for aquatic wildlife.

3.7 Wildlife

3.7.1 Existing Environment

Birds

The FWS has compiled a list of migratory bird species, which appear to be declining in numbers or distribution or for which more information is needed (FWS 2002). Table 3.7-1 lists the bird species of conservation concern (BOCC) in the Southern Rockies/Colorado Plateau.

Potential nesting habitat for the BOCC is limited by the elevation, which is approximately 10,000 feet or above for Hunter Reservoir. According to the literature (Andrews and Righter 1992, Kingery 1998), there is breeding habitat for the golden eagle, flammulated owl and Williamson's sapsucker, Swainsons hawk and northern harrier in the project area. Many others could be encountered as migrants or accidentals.

Other bird species observed during field work from 2004 to 2006 include green-winged teal, greater sandhill crane, spotted sandpiper, broad-tailed hummingbird, great horned owl, tree-toed woodpecker, hairy woodpecker, tree swallow, violet-green swallow, Steller's jay, Clark's nutcracker, gray jay, common raven, mountain chickadee, house wren, American dipper, ruby-crowned kinglet, mountain bluebird, Townsend's solitaire, hermit thrush, American robin, warbling vireo, yellow-rumped warbler, Wilson's warbler, green-tailed towhee, song sparrow,

white-crowned sparrow, savannah sparrow, vesper sparrow, dark-eyed junco, brown-headed cowbird, pine grosbeak, Cassin's finch, and pine siskin.

Table 3.7-1 Bird Species of Conservation Concern (BOCC)

Common name	Scientific name	Common name	Scientific name
Northern harrier	*Circus cyaneus*	Short-eared owl	*Asio flammeus*
Swainson's hawk	*Buteo swainsonii*	Black swift	*Cypseloides niger*
Ferruginous hawk	*Buteo regalis*	Lewis' woodpecker	*Melanerpes lewis*
Golden eagle	*Aquila chrysaetos*	Williamson's sapsucker	*Sphyrapicus thyroideus*
Prairie falcon	*Falco mexicanus*	Gray vireo	*Vireo vicinior*
Peregrine falcon	*Falco peregrinus*	Pinyon jay	*Gymnorhinus cyanocephalus*
Gunnison sage-grouse	*Centrocercus minimus*	Bendire's thrasher	*Toxostoma bendirei*
Snowy plover	*Charadrius alexandrinus*	Crissal thrasher	*Toxostoma rufum*
Mountain plover	*Charadrius montanus*	Sprague's pipit	*Anthus spragueii*
Solitary sandpiper	*Tringa solitaria*	Virginia's Warbler	*Vermivora verginiae*
Marbled godwit	*Limosa fedoa*	Black-throated gray warbler	*Dendroica nigrescens*
Wilson's phalarope	*Phalaropus tricolor*	Grace's warbler	*Dendroica graciae*
Yellow-billed cuckoo	*Coccyzus americanus*	Sage sparrow	*Amphispiza belli*
Flammulated owl	*Otus flammeolus*	Chestnut-collared longspur	*Calcarius ornatus*
Burrowing owl	*Athene cunicularia*		

Raptors

Raptors (hawks, eagles, owls) are birds of prey, which generally occupy the top of the avian food chain. During WWE 2005 and 2006 field work, suitable raptor nest sites, such as trees and cliffs, were searched within one quarter mile of Hunter Reservoir. On July 2, 2006, recorded calls of northern goshawk, Cooper's hawk and sharp-shinned hawk were played around Hunter Reservoir and along the access road. There was no response. On the night of July 2, 2006, recorded calls of great horned owl, flammulated owl, northern pygmy owl, long-eared owl, boreal owl, and northern saw-whet owl were played at Hunter Reservoir. Calling was done in accordance with a protocol developed by the BLM, but there was no response at any site. The great horned owl was observed at dusk about two miles north of Hunter Reservoir, but there was no evidence of nesting. Those raptor species for which suitable nesting habitat is present include sharp-shinned hawk, northern goshawk, red-tailed hawk, golden eagle, American kestrel, flammulated owl, great horned owl, northern pygmy owl, long-eared owl, boreal owl, and northern saw-whet owl (Andrews and Righter 1992, Kingery 1998). However, the project area is at the upper known elevation limit for most of these species (10,000 feet). The only raptor

species observed during WWE 2005 and 2006 fieldwork were red-tailed hawk, Cooper's hawk, and great horned owl. No active or inactive nests were found.

Mammals

Mammals observed include American pika, mountain cottontail, least chipmunk, golden-mantled ground squirrel, pine squirrel, yellow-bellied marmot, American beaver, long-tailed vole, montane vole, northern pocket gopher, coyote, ermine, Rocky Mountain elk, and mule deer. Moose, recently introduced to Grand Mesa by the CDOW, have been reported in the lower Leon Creek drainage, but no sign was noted near the Hunter Reservoir area.

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action

Terrestrial wildlife species would be impacted by increased noise, traffic, and human presence during construction. Such activities could cause some species to move away from the disturbance. Others could be directly impacted by collisions with vehicles and destruction of dens, burrows, and nests by earth-moving activities. A pika population was observed during the 2005 fieldwork in the area where basalt boulders would be mined for rip-rap (Figure 2-1). The pika habitat in that area would be impacted as a result of removing this material.

Removal of vegetation (Table 3.7-1) would cause a reduction in carrying capacity for species dependent upon the vegetative types shown in Figure 3.4.1. Consequently, the project will result in the removal of wildlife habitat. Vegetation type and area affected are presented in Table 3.7-2. A total of 88.8 acres of vegetation would be affected by the Proposed Action. Some vegetation would be restored following successful re-vegetation of the area surrounding the dams, temporary roads, and temporary use areas (4.5 acres). However, approximately 84.3 acres (Table 3.7-2) would be permanently inundated by the Proposed Action.

Table 3.7-2. Vegetation (acres) Affected by Proposed Action

Vegetation Type	Hunter Reservoir	Existing Access Road	New Access Road
Spruce/fir	17.5	0.3	2.7
Willow/riparian	11.8	1.2	<0.1
Grass/forb/shrub	55.0	0.1	<0.1

If the project results in an improved fishery in Hunter Reservoir, it would increase the number of people traveling there to fish. This increased human traffic post-construction could make the area less attractive to some species such as elk, but more attractive to scavengers.

3.7.2.2 No Action

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and terrestrial wildlife would not be affected.

3.7.3 Mitigation

No mitigation measures are required for wildlife.

3.8 Special Status Species (Federally Listed, FS MIS, FS Sensitive)

3.8.1 Existing Environment

Federally-Listed Species

The FWS lists 19 animal and 13 plant species in Colorado as either threatened or endangered. Those species that are known to occur on or near the Grand Mesa are shown in Table 3.8.1-1. A complete description of the habitat requirements of each species and the findings of the field inventory for threatened, endangered and candidate species can be found in the Biological Assessment (BA) prepared for this project.

Table 3.8.1-1. Species Listed by FWS potentially present on the Grand Mesa

Common Name	Scientific Name	Status *	Habitat Affected
Plants			
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T	No
DeBeque phacelia	*Phacelia submutica*	C	No
Insects			
Uncompahgre fritillary	*Boloria improba acrocnema*	E	No
Amphibians and Reptiles			
None currently listed			
Fishes			
Razorback sucker	*Xyraunchen texanus*	E	Yes
Colorado pikeminnow	*Ptychocheilus lucius*	E	Yes
Humpback chub	*Gila cypha*	E	Yes
Bonytail	*Gila elegans*	E	Yes
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	T	Yes
Mexican Spotted Owl	*Strix occidentalis lucida*	T	No
Yellow-billed Cuckoo	*Coccyzus americanus*	C	No
Mammals			
Black-footed ferret	*Mustela nigripes*	E	No
Canada lynx	*Lynx canadensis*	T	Yes

* T = Threatened, E = Endangered, C = Candidate

Note: the DeBeque milkvetch and boreal toad have recently been removed from the list of Candidate species. FWS has been granted an extension (to June 2007) for de-listing the Bald Eagle.

No portion of the project area has been designated as critical habitat by the Secretary of the Interior (PL-93-205, Section 4, 1978).

Information on species status, distribution, and ecology was derived from FWS recovery plans, Colorado Natural Heritage Program data base maps and reports, CDOW habitat mapping, Forest-wide geographic information system (GIS) lynx mapping coverage (CDOW 2005), personal knowledge of the FS and BLM wildlife biologists, various scientific studies and reports, correspondence with FWS biologists, and an extensive compilation of information contained in the Biological Evaluation (BE) for the Revision of the White River National Forest (FS 2002*c*).

Most of the potential species were dropped from further consideration because their range distributions are outside the project area, habitats necessary for their life requirements are not found within the project area, or there would be no effect on the quantity or quality of their habitat that is not located on the GMUG. These species are briefly described below.

DeBeque phacelia (*Phacelia submutica*), Federal Candidate. Maximum known elevation is 6,200 feet (Spackman et al. 1997). Minimum elevation of project is considerably higher.

Uintah Basin hookless cactus (*Sclerocactus glaucus*), Federally-Threatened. Maximum known elevation is 6,000 feet (Spackman et al. 1997). Minimum elevation of project is considerably higher.

Uncompahgre fritillary (*Boloria improba acrocnema*), Federal Candidate. Not known to occur on Grand Mesa. No habitat near project.

Yellow-billed cuckoo (*Coccyzus americanus*), Federal Candidate. Found in deciduous trees and shrubs at lower elevations than project area (Andrews and Righter 1992).

Bald eagle (*Haliaeetus leucocephalus*), Federally-Threatened. Information on species status and ecology for the bald eagle is contained within the Northern States Bald Eagle Recovery Plan **(**FWS 1983).

No bald eagle nests or roost trees have been documented on the Grand Valley Ranger District of the GMUG. Bald eagles primarily use low elevation habitat along the Colorado, Eagle, and White River drainages and may forage along some stream systems that project up onto the Grand Mesa National Forest (Andrews and Righter 1992). Individuals may occasionally be seen in fall and winter on Grand Mesa. Winter use by bald eagles on the Forest is limited at higher elevations by lack of prey and habitat trends are likely stable. Hunter Reservoir may provide foraging habitat for this species during migration, so bald eagle is considered further in the BA.

Mexican spotted owl (*Strix occidentalis lucida),* Federally-Threatened. This subspecies of the spotted owl is generally found associated with Douglas fir/ponderosa pine side canyons in southern Colorado, through New Mexico and Arizona. It is also found in canyons in pinyon-juniper. A Mexican spotted owl was collected in Snowmass in the early 1900s, and a pair of Mexican spotted owls were documented in Dinosaur National Monument in 1996. They have not been documented on the GMUG, but there is potential habitat in certain areas. Breeding ranges occur up to 8,200 feet in elevation. The project area does not contain suitable habitat.

Colorado pikeminnow (*Ptychocheilus lucius***), humpback chub (***Gila cypha***), bonytail (***Gila elegans***), and razorback sucker (***Xyrauchen texanus*), all Federally Endangered. These species are not found within the boundaries of the project area, but do have the potential of being affected by activities that deplete or degrade the flow of downstream waters into the Colorado River. Any authorized FS action that would result in the depletion of water or degradation of water quality to tributaries of the Colorado River would require formal consultation with the FWS. Ute Water conducted such consultations in 1998, and the present project is covered by that consultation (BLM 1998, FWS 1998). The discussion of the effects of the new depletion is discussed further in the BA (Appendix G).

Black-footed ferret (*Mustela nigripes*), Federally Endangered. Limited to prairie dog colonies at lower elevations (Armstrong 1972). All known existing populations were introduced from captive-reared stock.

Canada lynx (*Lynx canadensis),* is evaluated in greater detail in the BA.

Information on Canada lynx status, distribution, and ecology was derived from Forest-wide vegetation models developed in collaboration with FWS (FS 2002*c*, as updated January 29, 2002), and information compiled in the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) and the lynx science report (Ruggiero et al. 2000). There are no reliable data available on the population status of lynx in the area, although there are numerous location records on Grand Mesa of radio-collared lynx released in the San Juan Mountains by the CDOW (1995).

Habitat for Canada lynx is found above 8,000 feet according to Fitzgerald et al (1994). The GMUG has mapped potential lynx habitat (Figure 3.8.1), dividing the Forest into denning/winter forage habitat, which is coniferous forest with snags, hollow logs, downed trees, and root wads for den sites; winter forage habitat (no denning), which is coniferous forest with few or no such features; other foraging habitat (willow, sagebrush, low quality habitat); and non-habitat. Lynx habitat is found in each proposed reservoir site. There are also approximately 4 to 5 miles of designated snow compaction routes in the project area in the form of snowmobile trails. Compacted snow may allow lynx competitors such as coyotes and red foxes access to lynx habitat during the winter. Lynx are considered in detail in Appendix G, the BA.

Management Indicator Species (MIS) - MIS are those species that have been selected by the various Forests to represent the habitat needs of a larger group of species requiring similar habitats. Descriptions of the habitat relationships, distribution, population trends and other information are described in the Management Indicator Species Assessment for the GMUG (June 2001) as well as the updated GMUG 2005 MIS Assessment. The MIS listed in the 2005 MIS Forest Plan Amendment are listed in Table 3.8.1-2. The list was taken from the GMUG website (www.fs.fed.us/r2/gmug).

MIS will be considered further in Appendix E, Management Indicator Species Assessment of this report.

Only those species for which habitat is present are analyzed in greater detail. They are elk, marten, red-naped sapsucker, northern goshawk, and the four trout species. During fieldwork conducted by WWE in the summer of 2005, elk and their sign were observed regularly. Marten were not observed, but habitat appears favorable (Fitzgerald et al. 1994). The same is true for northern goshawk (Andrews and Righter 1992). Furthermore, there are probable breeding records for this species in the general area of the project (Kingery 1998). The red-naped sapsucker was observed during fieldwork, but its preferred habitat, conifers with aspens for nesting, is more extensive below Hunter Reservoir. Dominant vegetation around Hunter is Engelmann spruce and subalpine fir, with virtually no aspen (Section 3.4.1). However, sapsucker foraging habitat (willow) will be affected by the project, so this species is analyzed. There appears to be habitat for the four trout species in the analysis area.

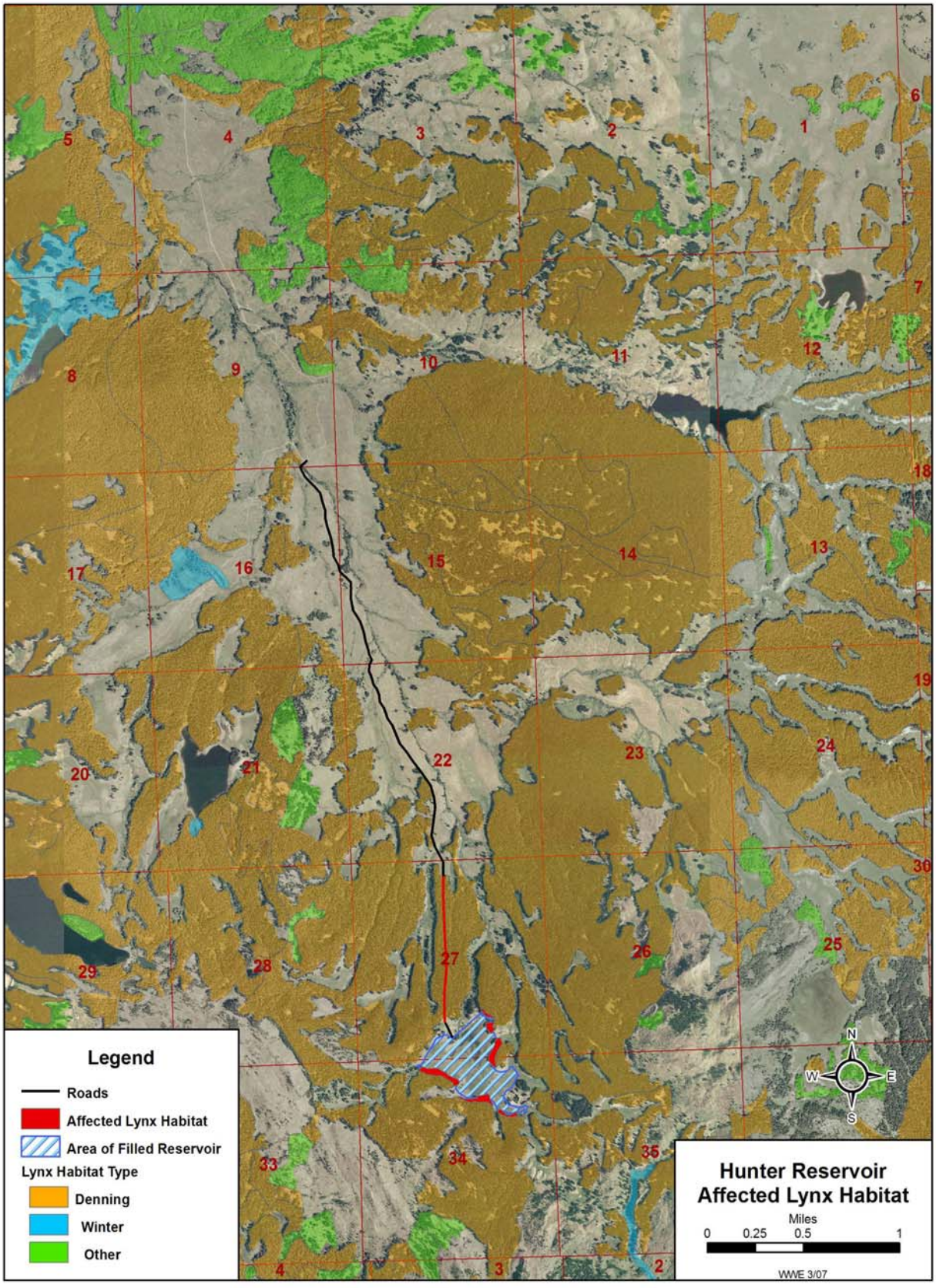

Figure 3.8.1. Affected Lynx Habitat in Project Area

Table 3.8.1-2. Management Indicator Species (MIS)

Name (*Scientific Name*)	Habitat Affected	Habitat Association
American elk *Cervus elaphus*	**Yes**	New-growth spruce/fir, Douglas-fir, lodgepole pine, aspen, mountain shrub.
Abert's squirrel *Sciurus abertii*	No	Mature ponderosa pine
American Marten *Martes Americana*	**Yes**	Mature spruce/fir, lodgepole pine
Red-naped sapsucker *Sphyrapicus nuchalis*	**Yes**	Aspen, aspen/conifer mix; cavity nester
Brewer's Sparrow *Spizella breweri*	No	Mature sagebrush
Merriam's wild turkey *Meleagris gallopavo*	No	Oak and pinyon/juniper, aspen, mixed conifer
Northern goshawk *Accipiter gentilis*	**Yes**	Mature aspen, aspen/conifer mix
Colorado River cutthroat trout *Oncohynchus clarki pleuriticus*	**Yes**	Aquatic/riparian
Rainbow trout *Oncorhynchus mykiss*	**Yes**	Aquatic/riparian
Brown trout *Oncorhynchus trutta*	**Yes**	Aquatic/riparian
Brook trout *Salvelinus fontinalis*	**Yes**	Aquatic/riparian

Note: The four fish species are collectively designated Common Trout for the purposes of the MIS assessment.

Sensitive Species

The species listed in Table 3.8.1-3 have been designated as Sensitive by the GMUG. 13 species have potential habitat affected and are analyzed further in Appendix F, Biological Evaluation. Two of the species listed in Table 3.8.1-3 were observed during field work in 2006. Two three-toed woodpecker nests were confirmed, one located along the existing access road about one half mile below Hunter, and the other on the east side of Hunter Reservoir just above the new high-water line. Both nest holes were in dead spruces.

Colorado River Cutthroat Trout are present in most streams and reservoirs in the Leon Creek drainage; brook trout are rare, but neither rainbow nor brown trout are known to be present in the Leon Creek drainage above the Forest Boundary**.**

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action

ESA Listed Species and Candidates.

Colorado River Fishes: The Proposed Action will result in a very slight depletion in Colorado River flows. However, this depletion has previously been consulted upon (BLM 1998 and BO), and a reasonable and prudent alternative has been implemented.

Table 3.8.1-3. Potential Grand Valley Ranger District Sensitive Species

Species (*Scientific Name*)	Habitat Affected	Species Found	Habitat Description
MAMMALS			
Townsend's big-eared bat *Corynorhinus townsendii*	No	No	Forages in semi-desert shrublands, pinyon-juniper woodlands and open montane forests. Roosts in caves, mines, buildings and crevices.
Spotted bat *Euderma maculatum*	No	No	Restricted to cliff or rock faces in arid canyons associated with waterways in ponderosa pine or Douglas fir at 6,000-8,000 feet.
Wolverine *Gulo gulo*	**Yes**	No	Inhabits undisturbed high boreal forests and tundra near timberline.
River otter *Lontra canadensis*	No	No	Riparian habitats that traverse a variety of other habitats, mainly large river systems.
Marten *Martes americana*	**Yes**	**Yes**	Inhabits mature spruce/fir and mixed conifer forests.
Fringed myotis *Myotis thysanodes*	No	No	Inhabits caves, mines, and buildings in low elevation conifer and oakbrush shrublands up to 7,500 feet. Forages over associated riparian habitat.
Pygmy shrew *Sorex hoyi*	**Yes**	No	Moist boreal environments, forest generalist, all captures above 9,600 feet.
BIRDS			
Northern goshawk *Accipiter gentilis*	**Yes**	No	Mixed hardwoods and conifers in stands of mature timber above 7,500 feet.
Boreal owl *Aegolius funereus*	**Yes**	No	Mature spruce/fir or spruce/fir-lodgepole forests.
Sage sparrow *Amphispiza belli*	No	No	Desert sagebrush habitat
Northern harrier *Circus cyaneus*	Yes	No	Nests and forages in dense portions of open montane grasslands and wet meadows.
Olive-sided flycatcher *Contopus cooperi*	**Yes**	No	This species breeds primarily in mature spruce/fir or Douglas fir forests.
Black swift *Cypseloides niger*	No	No	Species nests on high cliffs near or behind large waterfalls and forages high above the landscape over conifer forests.
American peregrine falcon *Falco peregrinus anatum*	**Yes**	No	Species nests on high cliffs overlooking rivers/lakes and forages over forests and shrublands.
Loggerhead shrike *Lanius ludovicianus*	No	No	Species inhabits open country with available lookout perches, especially semi-desert shrublands.
Lewis' woodpecker *Melanerpes lewis*	No	No	Inhabits lowland and foothill riparian areas and nests in decadent cottonwoods 2,000-8,000 feet.

Table 3.8.1-3. Potential Grand Valley Ranger District Sensitive Species

Species (*Scientific Name*)	Habitat Affected	Species Found	Habitat Description
Flammulated owl *Otus flammeolus*	No	No	Nests in cavities in aspen and aspen mixed with conifer habitat to 10,000 feet, foraging close to nest sites, may forage over shrublands.
Three-toed woodpecker *Picoides dorsalis*	**Yes**	**Yes**	Species is resident in mature and old growth stands of spruce/fir.
Purple martin *Progne subis*	No	No	Species forages in open grassy parks, shores of lakes, meadows and around ponds; prefers habitat near open water. Nests in mature aspen stands.
Brewer's sparrow *Spizella breweri*	No	No	Inhabits sagebrush-dominated shrublands; may also be found in alpine willow stands.
Columbian sharp-tailed grouse *Tympanuchus phasianellus columbianus*	No	No	Inhabits sagebrush-dominated shrublands, intermixed with grasslands and mountain shrublands.
AMPHIBIANS			
Boreal toad *Bufo boreas boreas*	**Yes**	No	Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, and lakes.
Northern leopard frog *Rana pipiens*	**Yes**	No	Wet meadows, marshes, beaver ponds, and streams.
FISHES			
Bluehead sucker *Catostomus discobolus*	No	No	Foothill areas - streams
Flannelmouth sucker *Catostomus latipinnis*	No	No	Foothill areas- streams
Roundtail chub *Gila robusta*	No	No	Foothill areas - streams
Colorado River cutthroat trout *Oncorhynchus clarkii pleuriticus*	**Yes**	**Yes**	Headwater streams and lakes.
INSECTS			
Great Basin silverspot *Speyeria nokomis Nokomis*	No	No	Inhabits wetlands fed by springs or seeps; host plant violets at 5,200-9,000 feet.
Hudsonian emerald *Somatochlora hudsonica*	No	No	Boggy ponds 7,600-10,600 feet.
PLANTS			
Wetherill milkvetch *Astragalus wetherillii*	No	No	Big sagebrush and pinyon-juniper habitat. Steep slopes, canyon benches, and talus below cliffs. On sandy clay soils derived from shale and sandstone 5,250-7,400 feet.

Table 3.8.1-3. Potential Grand Valley Ranger District Sensitive Species

Species (*Scientific Name*)	Habitat Affected	Species Found	Habitat Description
Lesser panicled sedge *Carex diandra*	No	No	Fens, calcareous meadows 6,100-8,600 feet. (per Weber 2001 this is alpine/subalpine).
Slender cottongrass *Eriophorum gracile*	Yes	No	Fens, 8,000-12,000 feet
Rocky Mountain thistle *Cirsium perplexans*	No	No	Found on barren gray shale slopes 4,500-7,000 feet. Rock, cliff, and canyon habitat.
Harrington's beardtongue *Penstemon harringtonii*	No	No	Found 6,800-9,200 feet in open sagebrush or, less commonly, pinyon-juniper habitat. Not documented in Mesa or Delta County.
DeBeque phacelia *Phacelia scopulina var submutica*	No	No	Found at low elevation 4,700-6,200 feet, on steep clay slopes in the Wasatch Formation.
Sun-loving meadowrue *Thalictrum heliophilum*	No	No	Sagebrush and pinyon-juniper habitat in undeveloped soils, light colored clays with shale fragments; 6,300-8,800 feet.
Lesser bladder wort *Utricularia Minor*	No	No	Aquatic plant found in floating fena to 10,000 feet.

(Harrington1964)

Bald Eagle: Based upon the potential for long-term improvement in foraging habitat at Hunter Reservoir, the Proposed Action **may affect, not likely to adversely affect** this species. This determination is also based upon the lack of records documenting use of Hunter Reservoir by migrating individuals.

Canada Lynx: This analysis indicates there will be no additional snow compaction, no permanent increase in human activity, and no increase in road density as a result of the project. However, approximately 20 acres of potential denning habitat and 12 acres of potential foraging will be removed, and carrying capacity will be reduced proportionally. There are recent records of lynx use of the area. Therefore, the Proposed Action **may affect, likely to adversely affect** the Canada lynx.

Management Indicator Species (MIS). MIS are analyzed in the MIS report. The MIS report indicates that the project will result in (1) a minor reduction in summer range and minor increase in disturbance for elk due to construction of the reservoir and roads along with related vehicle traffic and other human activity. The Proposed Action is not expected to reduce the elk habitat effectiveness index below the current 0.54 for the DAU; (2) a slight decrease in the amount of available habitat for American marten; (3) a slight decrease in the amount of available habitat for red-naped sapsucker; and (4) the possibility of damage to common trout populations due to siltation or pollution of Leon Creek. Decreases in or alteration of habitats are not likely to have measurable effects on any MIS species.

Sensitive Species. Sensitive species are analyzed in the BE. The project will result in minor decreases in the amount of habitat available for these species, but the loss will be relatively minor compared to the amount of habitat available in the Leon Creek drainage and on the Forest. For the wolverine, marten, pygmy shrew, northern harrier, northern goshawk, boreal owl, olive-sided flycatcher, three-toed woodpecker, boreal toad, leopard frog, CRCT and slender cottongrass, a finding of **may adversely impact individuals, but is not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide** is made in the BE.

All wildlife species would be impacted by increased noise, traffic and human presence during construction. Such activities would cause some species to move away from the disturbance. Others would be directly impacted by collisions with vehicles and destruction of dens, burrows and nests by earth-moving activities. Removal of approximately 88.8 acres of various vegetative types would cause a reduction in carrying capacity for those species dependent upon those vegetative types. Approximately 4.5 acres of existing and new access road would be reclaimed upon completion of the Proposed Action, resulting in a permanent loss of 84.3 acres of habitat. If the project results in an improved fishery in Hunter Reservoir, it would increase the number of people traveling there to fish, even if the road is returned to its pre-construction primitive state. This increased human traffic post-construction would make the area less attractive to some species such as elk.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and Special Status Species would not be affected.

3.8.3 Mitigation

No mitigation measures are required for Special Status Species (Federally Listed, FS MIS, FS Sensitive).

3.9 Recreation, Roads and Travel Management

3.9.1 Existing Environment

All of the area potentially affected by the Proposed Action is on NFS lands managed by the GMUG. Hunter Reservoir is accessed on NFSR 262 and NFSR 280. NFSR 262 runs from the Forest boundary south of Vega Reservoir about eight miles to the confluence of Middle and East Leon Creeks. NFSR 280 continues from that confluence south to Hunter Reservoir, about three miles. Current GMUG Road Management Objectives state that both roads are unimproved Forest roads and, in general, a high-clearance four-wheel drive vehicle or an all-terrain vehicle (ATV) is required to complete a trip to Hunter Reservoir. NFSR 262 is a less difficult road than NFSR 280 and would appear to receive more traffic, either because NFSR 280 is too challenging or because traffic flows off to the east on the Leon Lake Road (NFSR 127).

The season of access is relatively short due to the high elevation of the area, with the reservoir just under 10,400 feet, and the residual snow and subsequent mud along the road well into June. Access is further complicated by the number of stream crossings along the route where the water may be quite deep and flowing rapidly in the spring and early summer months.

All of the area along the route and at the potential reservoir site has a Recreation Opportunity Spectrum classification of Semi-Primitive Motorized (SPM). The setting is generally natural appearing, with limited evidence of human development. Hunter Reservoir itself is the major evidence of human development. There is limited signage and no recreation facilities are provided. The area offers moderate to good opportunities for solitude and closeness to nature. The expectation for interacting with other people is relatively low and decreases as the route progresses south.

Fishing, some hiking, dispersed camping, 4-wheel driving and hunting are the recreation uses found in the area. Dispersed camping and hunting activities increase during the fall big game seasons, especially along NFSR 262 between Vega Reservoir and the Leon Creek Crossing. Hunter Reservoir's location at the end of a long, difficult access route keeps use levels at the reservoir low.

A snowmobile route follows the access roads up from Vega Reservoir to Hunter Reservoir and south over the divide. The Vega Snowmobile trail goes from Vega Reservoir south to its intersection with the S-P Snowmobile Trail near Monument Creek. From there, the Leroux Snowmobile Trail continues up Leon Creek south, past Hunter Reservoir, over the divide to Leroux Creek. The trail is marked along its route. Although that marking goes around Hunter Reservoir, travel is usually across the reservoir.

Few comments about recreation were made during scoping but one individual opposed higher levels of use. The commenter felt that any improvement of the road up to Hunter Reservoir

would make it easier to get there and increase use. This comment seems to echo comments made on the Sheep Flats Timber Sale, a portion of which is accessed from NFSR 262. Road improvements were opposed because the public felt recreation use was currently too high.

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action

The Proposed Action calls for enlargement of Hunter Reservoir and it can be expected that CDOW would recognize the opportunity to create an improved recreational fishery and stock it accordingly. The improved fishery would undoubtedly attract more anglers. The Proposed Action calls for improvement of the access route, particularly along NFSR 280, but would remove some of those improvements and allow the others to degrade over time. Eventually, the condition of the road should return to its current condition, but retaining the resource protection measures that had been implemented. There will likely be some increase in public traffic to the reservoir while access is improved and that will increase the familiarity of recreationists with the area. Although there will be no reservoir to fish in at the time, the increased familiarity and the knowledge that the reservoir has become a larger recreational fishery would draw more anglers. The increase in fishing would be limited by the difficulty of access to the site. Allowing the road to return to its current condition, while keeping resource protection features, would appear to meet with the favor of many recreationists familiar with the area. The rerouting of the last mile of road out of the wetlands and onto a slope may cause this portion of the road to open later in the season due to snow drifts in the timber.

Removal of timber around the existing reservoir would also remove signage for the Leroux Snowmobile Trail, potentially creating confusion among snowmobilers. That would be prevented if the project proponent relocates the trail above the high-water mark and installs new signs around the reservoir.

3.9.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and recreation, roads and travel management would not be affected.

3.9.3 Mitigation

No mitigation measures are required for recreation, roads and travel management.

3.10 Grazing

3.10.1 Existing Environment

The Proposed Action site is part of the Leon Creek Cattle and Horse Allotment. Vegetative species include Letterman's stipa, mountain brome, Carex sp., planeleaf willow, strawberry, and various other high country grasses and forbs. The allotment provides a total of 7,152 AUMS for permittees.

3.10.2 Environmental Consequences

3.10.2.1 Proposed Action

FS specialists have estimated the loss of approximately 4.3 AUMS annually with the enlargement of Hunter Reservoir. The 4.3 AUMS lost by the enlargement of Hunter Reservoir represent 6% of the total AUMS allocated to the Leon Creek Cattle and Horse Allotment.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and grazing would not be affected.

3.10.3 Mitigation

No mitigation measures are required for grazing.

3.11 Cultural Resources

3.11.1 Existing Environment

File searches were conducted for the Proposed Action through the Office of Archaeology and Historic Preservation (OAHP) and the GVRD of the FS. They indicated that no cultural resources had been previously recorded with Area of Potential Effect (APE).

A thorough cultural resource inventory by Forest archaeologists was conducted for the proposed Hunter Reservoir Expansion. Total survey area included 96 acres. Vegetation consists of meadow grasses with spruce, fir and aspen surrounding. The meadow lies amidst moderate slopes rising to the east and west and gently sloping terrain to the north and south. No sites eligible to the National Register of Historic Places were recorded.

The cultural resource analysis of the Proposed Action was conducted in compliance with the National Historic Preservation Act, the Colorado State Protocol Agreement, and other Federal law, regulation, policy, and guidelines regarding cultural resources. In general, cultural resources inventories are conducted to meet requirements of the NEPA of 1969 (42 U.S.C 4321), the Federal Land Policy and Management Act of 1979 (43 U.S.C. 1701), and the NHPA. These laws are concerned with the identification, evaluation, and protection of fragile, non-renewable evidence of human activity, occupation and endeavor reflected in districts, sites, structures, artifacts, objects, ruins, works of art, architecture, and natural features that were of importance in human events. Such resources tend to be localized and highly sensitive to disturbance.

Part of the inventory process is to ascertain the significance of any recorded cultural properties because the NHPA directs Federal agencies to ensure that Federally-initiated or authorized actions do not inadvertently disturb or destroy significant cultural resource values. Significance is a quality of cultural resource properties that qualifies them for inclusion in the National Register of Historic Places according to prescribed criteria given in the Code of Federal Regulations. Field assessments regarding significance are made as recommendations by the cultural resources consultant to the federal agencies and State Historic Preservation Officer (SHPO). The final determination of the site significance is made by the controlling agencies in consultation with the SHPO and the Keeper of the Register.

The Code of Federal Regulations (CFR) is used as a guide for the in-field site evaluations. Titles 36 CFR 50, 36 CFR 800, and 36 CFR 64 are concerned with the concepts of significance and (possible) historic value of cultural resources. Titles 36 CFR 65 and 36 CFR 66 provides standards for the conduct of scientific data recovery activities. Finally, Title 36 CFR 60.4 establishes the measure of significance that is critical to the determination of a site's NRHP eligibility, which is used to assess a site's research potential.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action

Reservoir expansion activities would not impact any known significant cultural resources.

3.11.2.2 No Action Alternative

Under the No Action Alternative, the FS would not approve the enlargement of Hunter Reservoir and cultural resources would not be affected.

3.11.3 Mitigation

No mitigation measures are required for cultural resources.

3.12 Inventoried Roadless Areas (IRAs)

3.12.1 Existing Environment

In response to the Wilderness Act of 1964, the Forest Service began an inventory and evaluation of all roadless or undeveloped lands for possible inclusion in the wilderness system. This "Roadless Area Review and Evaluation" came to be known as RARE II ("II" indicates it was the second attempt at the process). The Final Environmental Impact Statement (FEIS) on RARE II was completed in 1979 but the EIS and its record of decision (ROD) were overturned by federal court rulings. Subsequently, the Forest Service developed regulations that required the evaluation of individual roadless areas during the forest planning process.

As part of RARE II, the GMUG identified 43 roadless units totaling approximately 1.5 million acres, of which, around 400,000 acres were designated as wilderness as part of the Colorado Wilderness Act. The remaining lands were reviewed during the development of the 1983 GMUG Land and Resource Management Plan (Forest Plan). Lands not recommended for wilderness were made available for multiple uses, such as grazing, timber harvest, oil and gas exploration, and motorized recreation.

Two Inventoried Roadless Areas (IRAs) are located in the vicinity of the project area: the Salt Creek IRA (RARE Unit 192; 10,880 acres) and the Priest Mountain IRA (RARE Unit 191; 102,580 acres). The Park Creek Road (NFSR 262) separates the two IRAs but is not included in either one. Neither IRA was recommended for wilderness designation in the RARE II FEIS because of alterations to the landscape by road and trail construction, vegetation harvest and vegetation treatments, reservoirs, ditches, and private lands lying within the boundaries of the IRAs. The 1983 Forest Plan confirmed the RARE II determination.

Between 1983 and 1991, under the guidance of the Forest Plan, roads were constructed, timber was harvested, and motorized recreation trail systems were established within the remaining RARE II areas on the GMUG. Since 1991, as a result of a court decision, such activities in RARE II areas are required to be evaluated in an EIS.

An additional constraint on activities was implemented in January 2001 when the Roadless Area Conservation Rule, known as the "Roadless Rule," was published. The Roadless Rule established nationwide prohibitions generally limiting, with some exceptions, timber harvest, road construction and road reconstruction within the 1979 RARE II inventory areas until a new roadless inventory had been done. As a part of its Forest Plan Revision, the GMUG has updated its inventory of roadless/undeveloped lands, now referred to as the "Draft 2005 Roadless Inventory." This inventory was based on the existing conditions of the land.

After several intervening court rulings – a July 14 2004 injunction setting aside the Roadless Rule and a 2006 rule reinstating it – the Roadless Rule is currently in place for activities occurring in the 1979 RARE II IRAs.

Under the Roadless Rule, road construction and reconstruction is generally not allowed in inventoried roadless areas; but there are exceptions. The Forest Service regulations promulgated as a result of the 2001 Roadless Rule outline those exceptions and are found at 36 CFR 294.12(b), which reads, in part: ". . . a road may be constructed or reconstructed in an inventoried roadless area if the Responsible Official determines that one of the following circumstances exists:

> (4) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a classified road and that cannot be mitigated by road maintenance. Road realignment may occur under this paragraph only if the road is deemed essential for public or private access, natural resource management, or public health and safety."

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action

Hunter Reservoir and the road (NFSR 280) accessing it from the Park Creek Road both lie within the boundaries of the Priest Mountain IRA. Under the Grand Mesa Travel Plan, NFSR 280 is maintained as a high-clearance, full-sized access route. Hunters, fishermen, Ute Water personnel, FS personnel, State Engineer's Office personnel, as well as others, have used the road via either full-sized four-wheel-drive or ATV to access the reservoir for inspections, hunting camps, fishing, or to make repairs on the dam, release water from the reservoir, or to conduct soil testing.

None of the current uses of NFSR 280 is barred by the Roadless Rule nor did the Rule revoke, suspend or modify the existing 1891 Act easement that was issued for the occupancy of NFS lands by Hunter Reservoir (36 CFR 294.14(a)). However, in order for the Hunter Reservoir enlargement to be approved, the wetland mitigation described in Section 3.5, Wetlands, must be implemented and that mitigation would involve road construction that would have to be exempted under The Roadless Rule.

An important part of the wetlands mitigation is the relocation of approximately one mile of existing Hunter Reservoir access road (NFSR 280). The road currently lies in wetland and riparian areas adjacent to Leon Creek. The road and its many stream crossings have heavily impacted the riparian wetland in the area. The intent of the mitigation is to reclaim and restore the wetland along Leon Creek Moreover, grazing in the stream bottom would likely decrease as the animals would follow the new, easily accessible road.

One of the criteria described above for exempting road construction in an IRA is to "prevent irreparable resource damage that arises from the design, location, use, or deterioration of a classified road and that cannot be mitigated by road maintenance." The explicit reason for the road relocation is the prevention of ongoing damage to a wetland in a creek bottom and, as a side effect, the restoration as well of the creek's riparian area, and enhancement of its water quality and aquatic habitat. Although the road relocation would result in construction of about a mile of new road in the Priest Mountain IRA (a 1979 RARE II area), the reason for the road construction and its impacts are in accord with Roadless Rule exception number 4 described above, and the road construction does not contradict the 2001 Roadless Rule.

3.12.3 Mitigation

No mitigation measures are required for IRAs.

3.13 Short-term Uses and Long-term Productivity

NEPA requires an assessment of "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (Sec. 102 (C)(iv) [42 USC § 4332]). In the context of the Hunter Reservoir Enlargement Project, the short-term includes the period during which construction of the road improvements and the dam enlargement would occur (approximately two years), and the period during which the road would be returned to its original state and the disturbed area in the vicinity of the enlarged reservoir would be reclaimed (approximately three years). Additionally, the short-term includes any time required to complete mitigation efforts, such as actions needed to replace the wetland function lost by the enlargement of the reservoir. In all likelihood, such actions would take place during the five years that project construction and reclamation occurred.

Generally, the short-term uses of the environment required by the Proposed Action would not greatly affect the long-term productivity of the project area. The construction activities during the enlargement of Hunter Reservoir might create marginal disruption of some longstanding uses of the area by wildlife, domestic livestock and winter recreationists, but the disruption would cease when the construction stopped. After all disturbed areas have been reclaimed, much of the same vegetation resources that were present prior to the project would be available, as restored vegetation and habitat would mitigate short-term environmental effects. Although the inundation of the enlarged reservoir would cause the long-term loss of 61 acres of wildlife and domestic forage and the same amount of wildlife habitat, that amount would not be enough to affect local wildlife populations or permitted grazing. The long-term productivity of the reservoir as a fishery for CRCT would be enhanced by the inundation.

The principal exception to this generality is the loss of wetlands, especially 2 acres of fen, at the Hunter Reservoir site. Their loss would represent a long-term loss of productivity at that site. On the other hand, the terms of the mitigation described in Section 3.5, Wetlands, would result in enhanced ecological productivity at other sites in the vicinity of the project. According to the analysis of wetland function included in the GMM, overall wetland functionality, i.e., long-term productivity, would be increased by implementation of the mitigation.

3.14 Irreversible and Irretrievable Commitments of Resources

NEPA additionally requires an assessment of "any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented" (Sec. 102 (C) (v) [42 USC § 4332]). Irreversible and irretrievable resource commitments are those resource uses and alterations that are not just long-term but permanent, representing a loss of future management options with respect to that resource in that place. Most of the resource uses required by the Proposed Action are short-term in the commitment of resources required, e.g., disturbed areas would be reclaimed and would eventually return to the productivity they held before project implementation. However, several resource commitments can be considered irreversible:

- The fen and wetland inundated by the enlargement of Hunter Reservoir cannot be replaced. However, the loss of ecological function may be offset or replaced at a different location. Section 3.5 and Appendices F and G describe this in detail.
- An additional 30 acres or more of spruce, fir, grass, forbs, and shrubs would be lost due to the inundation of the reservoir.
- The landscape modification produced by removal of basalt from the nearby talus should be considered permanent. The basalt would be used as riprap and not returned to its original site, which is an irreversible modification of the landscape.

There were no irreversible and irretrievable commitments of resources identified for aquatic wildlife, terrestrial wildlife, recreation, or grazing.

3.15 Cumulative Impacts Analysis

This section provides an analysis of the incremental effect of the Hunter Reservoir enlargement when added to other past, present, and reasonably foreseeable future actions that have occurred or may occur in the project area. Although the individual impact of each separate project might not be significant, the additive impacts of multiple projects could be.

Existing environmental conditions in the project area reflect changes brought about by past projects and activities. The project area is isolated, at a relatively high elevation, and generally undeveloped. Past human activity in the area has focused on the development of the area's water resources for agricultural purposes, on timber harvest, livestock grazing, and on recreational activities. Currently, grazing and recreational activity represent the level of use that has occurred in the recent past, though timber harvesting is in decline. Future use is likely to remain much as it is today although recreation use may grow as the regional population grows. The possibility of oil and gas exploration impacts exists though no activities are currently proposed in the general

project area. Assuming successful implementation of the design criteria and wetland mitigation measures, the Hunter Reservoir project would not make any substantial contribution to the overall impacts anticipated for most resources in the area. The single possible exception would be the wetland function represented by the loss of 32 acres of wetland if the reservoir were to be enlarged.

The most extensive alteration of natural systems in the general area of the project since human settlement began has been brought about by domestic and agricultural water developments across most of the Grand Mesa National Forest. Construction of reservoirs, ditches, and domestic water sources has resulted in regulation of most free-flowing waters and naturally impounded waters on the Grand Mesa. Such projects have resulted in the loss of groundwater dependant ecosystems, such as fens. The Hunter Reservoir Enlargement Project would add to these impacts if it were not mitigated by the replacement of similar or greater wetland function. However, with the mitigation described in Section 3.5, Wetlands, and in Appendix B, the wetland function in the area would not be affected and may be enhanced.

Since many of the existing Grand Mesa reservoirs were originally constructed on sites with extensive wetland and fen, it is likely that future projects would also affect these resources. Surface water diversions for agriculture and municipal use are expected to continue and increase. Within the project area, the Proposed Action is the only new water project under consideration at this time. As future water projects are proposed, it is likely to become more difficult to provide for functional replacement of wetland impacts. This is true because the options for such replacement would become more limited as potential mitigation projects are completed. Water projects are likely to continue to provide for agricultural and domestic benefits while gradually resulting in increased cumulative effects on the natural resource values of the area.

4.0 CONSULTATION AND COORDINATION (DOW and COE CONTACTS)

Under Section 404 of the Clean Water Act, Ute Water must receive a Department of the Army Permit (404 Permit) for the construction of the dam from the COE, a cooperating agency in this EIS. Construction of the dam will mean discharge of "dredge or fill material into the waters of the United States," necessitating the 404 permit. More importantly, the enlarged reservoir will inundate 32 acres of wetlands, including two acres of fen. Executive Order 11990 requires Federal agencies to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. When such a loss is anticipated, applicants must establish that the impact cannot be avoided, that reasonable efforts have been made to minimize impacts through project design and construction, and finally, that a plan for compensation of unavoidable wetland impacts is in place. The decision by the COE on Ute Water's 404 Permit will rely on analysis in this EIS of the wetland function lost because of the dam construction and the compensation proposed to offset that loss.

By a series of Federal statutes and memoranda of agreement or understanding for the management of state resident wildlife, the FS and the Colorado Division of Wildlife engage in various activities to manage wildlife resources on NFS land. These statutes include the Organic Act, the Federal Land Management Policy Act, the Wilderness Act, the NEPA and so forth. The various documents guide development of goals and objectives between the agencies. From this perspective, it is likely that conservation of the Colorado River Cutthroat Trout (CRCT) will guide decisions by both agencies on management direction for the alternative selected by FS.

5.0 LIST OF PREPARERS AND SPECIALISTS

The following FS individuals, Private Contractors, Federal, State, and local agencies, tribes and other non-FS persons developed this EIS.

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Linda Bledsoe	Lands Supervisor	Water rights, Historical documentation
Clay Speas	Fish Biologist	Aquatic Biology
Gary Shellhorn	Hydrologist	Hydrology
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WestWater Engineering (Third Party Contractor)		
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Steve Moore	Environmental Scientist	Areas of Critical Environmental Concern; Alternatives Analysis; Paleontological Resources; Wastes, Hazardous or Solid; Access and Transportation; Recreation; and Cumulative Effects
Mary Wilson-Nichols	Environmental Scientist	Report coordination, administrative record, geology, paleontology, soils
Lonnie Renner	Wildlife Biologist	Threatened and Endangered Plant Species; Invasive, Non-Native Species; Wetlands and Riparian Zones; Vegetation; Fire Management; and Rangeland Management
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Project Team		
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7.0 GLOSSARY

Accidentals – Birds where only one to three sighting are recorded in a given area over history.

Acre-foot. A unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet.

Adfluvial – Migrating between lakes and rivers or streams.

Affected environment – In the NEPA process, the area that will be affected or created by the alternatives under consideration.

Alevins – newly hatched, incompletely developed fishes (usually salmonids) still in nest or inactive on bottom, living off stored yolk. Larval Salmonidae that have hatched but have not yet completely absorbed their yolk sacs and usually have not yet emerged from the gravel.

All-terrain vehicle (ATV) – A motorized recreational vehicle less than 50 inches in width and with more than two wheels, such as a 3-wheeler or 4-wheeler.

Alluvial – Pertaining to material or processes associated with the transportation and deposition by concentrated running water.

Alluvium – Sediment deposited by water, including gravel, sand, silt, and clay, in various mixtures.

Alternative – In NEPA terms, one of several substitute or alternate proposals that a Federal agency is considering in an environmental analysis.

Aquatic – Living or growing in or on the water.

Aquifer – A layer of permeable rock, sand, or gravel that stores and transmits water in sufficient quantities for a specific use.

Stage at Average Low Flow – Base Flow

Best Management Practices – One or more practices designed to prevent or reduce pollution or another negative effect on a resource.

Big Game – Large Mammals, such as deer, that are hunted for sport.

Biological Assessment – Information prepared by, or under the direction of, a Federal agency to determine whether a Proposed Action is likely to affect listed species or designated critical habitat.

Biological Evaluation – A documented USDA Forest Service review to determine how an action may affect any sensitive species.

Blanket Cutoff – A drainage layer of impervious material placed built into the foundation to reduce the seep rate under the dam.

Breach – An opening through a dam that allows the uncontrolled draining of a reservoir. A controlled breach is a constructed opening. An uncontrolled breach is an unintentional opening caused by discharge from the reservoir. A breach is generally associated with the partial or total failure of the dam.

Broodstock – A group of mature fish that is kept separate in captivity and used for producing fry, also: mature fish retained at a hatchery to produce eggs and young. The term can include younger fish eventually to be used as spawners but not yet mature. May be used for eggs or juveniles from which subsequent generations will be produced.

Colluvium – Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g. direct gravitational action) and by local, unconcentrated runoff.

Cooperating Agency – An agency which has jurisdiction by law in an action being analyzed in an environmental document and who is requested to participate in the NEPA process by the agency that is responsible for preparing the environmental document.

Compaction – Mechanical action that increases the density by reducing the voids in a material.

Cumulative impact or cumulative effect – Effect on the environmental that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Denning/Winter – Coniferous forest with lots of downed trees, hollow logs, and root wads providing den sites for Lynx.

Direct Impact – An impact caused by an action that occurs at the same time and place as the action (see 40 CFR 1508.8).

Discharge – Any of the ways that groundwater comes out of the surface, including through springs, creeks, or being pumped from a well.

Endangered Species – A plant or animal species that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior/Secretary of Commerce in accordance with the Endangered Species Act of 1973.

Erosion – The wearing away of the land surface by running water, wind, ice or other geologic agents.

Evapotranspiration (**ET**) – the sum of evaporation and plant transpiration. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and waterbodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapour through stomata in its leaves. Evapotranspiration is an important part of the water cycle.

Fen – Wetlands with organic soils dependent on direct contact with mineral enriched groundwater for nutrients and consistent moisture. Fens in the Rocky Mountains have extremely slow rates of peat accumulation (approximately 8" per 100 years) due to a cold dry climate.

Fluvial – inhabiting a river or stream

Forage – Vegetation used for food by wildlife, particularly big game wildlife, and domestic livestock.

Gill Net Set – A gill net set is a gill net placed where it can capture fish for a set or prescribed amount of time. To prevent injury and to release live fish from the gill net, shorter periods of time are used in a set to lower the chance of mortality from prolonged capture.

Groundwater – Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

Habitat – A place where a plant or animal naturally or normally lives and grows.

Heritage Resources – The remains of sites, structures, or objects used by people in the past; this can be historical or pre-historic (see Cultural Resources)

Hydrology – The science dealing with the study of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Intermittent stream – A stream that does not flow year-round but has some association with groundwater for surface for subsurface flow.

Invasive species – A species that can move into an area and become dominant either numerically or in terms of covers, resource use, or other ecological impacts. An invasive species may be native or nonnative.

Irretrievable impact – A category of impact in the NEPA to be analyzed in environmental impact statements. Refers to commitments that are lost for a period of time. For example, while an area is used a developed recreation site, some or all of the timber production there is irretrievable lost. If the recreation area closes, timber production could resume; the loss of timber production during the time that the area was devoted to developed recreation is irretrievable. However, the loss of timber production during that time is not irreversible, because it is possible for timber production to resume if the area is no longer used as a recreation area. Contrast with irreversible impact.

Irreversible impact – A category of impact in the National Environmental Policy Act to be analyzed in environmental impact statements. Refers to commitments that cannot be reversed, except perhaps in the extreme long term. For example, once trees have been removed and inundated with water for a reservoir, they will not be replaced within any measurable time period. Contrast with irretrievable impact.

Introgression – Infiltration of the genes of one species or subspecies into the gene pool of another through repeated back crossing of an interspecific hybrid with one of its parents.

Lacustrine – Living or growing in or along the edges of lakes.

Landslide – 1. A general term for a mass movement landform. Types of landslides include creep, rock slides and falls, earthflows, debris flows, an avalanches. 2. A process characterized by downslope movement or transport, by means of gravitational stresses, of a mass of soil, rock and other debris that may or may not be water saturated.

Lease (mineral) – A legal document executed between a mineral owner or lessor and another party of lessee which grants the lessee the right to extract minerals fro the tract of land for which the lease has been obtained {(see 43 CFR 3400.0-5(r)}

Listed Species – Refers to one or more species listed by the U.S. Fish and Wildlife Service as endangered (E), threatened (T) or proposed for Federal listing as threatened or endangered (P). Also referred to as PET species or a subset of the species defined as PETS species.

Lithology – The description of rocks on the basis of such characteristics as color, structure, mineral composition and gain size. Generally, the description of the physical character of a rock.

Livestock – Foraging animals of any kind that are kept or raised for use or pleasure.

Loam – Soil composed of a mixture of sand, clay, silt, and organic matter. Loam contains about 60% sand, 30% silt (particles between 0.002 and 0.02mm diameter) and 20% clay. Loam soils feel smooth and spongy when rolled into a ball.

Management Indicator Species (MIS) – 1. A species whose condition can be used to assess the impacts of management actions on a particular area. 2. A species whose population changes are believed t indicate the effects of management activities, and is monitored to track population numbers and habitat conditions, as a way of monitoring biodiversity.

Mass wasting – The down-slope movement of large masses of earth material by the force of gravity. Also referred to as Mass movement or a landslide.

Midseral range conditions – The period in the life of a forest stand from crown closure to first merchantability. Brush, grass, or herbs rapidly decrease in the stand because of stand density.

Migrant – Birds that pass through a given area during the spring or fall migration seasons, but do not nest there.

NFSR-National Forest System Road – A road wholly or partly within, or adjacent to, and serving National Forest System land and necessary for the protection, administration and use of the National Forest System and the use and development of its resources.

Native species – Any species native to a given land or water area by natural occurrence.

Normal pool – The reservoir surface area at water level, also referred to as normal storage.. The total storage space, measured in acre-feet, in a reservoir at the normal storage elevation, excluding storage of flood waters above the normal full storage elevation.

Outcrop – A rock formation that appears at or near the surface; the intersection of a rock formation with the surface.

Perennial stream – A stream or part of a stream that flows continuously during the calendar year as a result of ground-water discharge or surface runoff.

Peak Flow – Refers to a specific period of time when the discharge of a stream or river is at its highest point.

Permeability – The ability of a rock or soil to transmit a fluid.

Porosity – The ratio of the volume of voids in the soil to the total volume of the mass or solids, expressed as a percentage.

Proposed species – Species proposed for Federal listing as threatened or endangered under provisions of the Endangered Species Act of 1973.

Raptor – Predatory bird, such as an eagle, falcon, hawk, owl, or vulture.

Reach – stream segment

Recharge – The processes by which groundwater is absorbed into a zone of saturation.

Reclamation – Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, emplacement of topsoil, re-vegetation and other work necessary to restore the disturbed area for post-action use.

Record of Decision (ROD) – A document separate from, but associated with, an environment impact statement that publicly and officially discloses the responsible official's decision on the Proposed Action (see 40 CFR 1505.2).

Recruitment – The number of new juvenile fish reaching a size/age where they represent a viable target for the commercial, subsistence or sport fishery for a given species.

Redd – Depression, usually a pit or a trough in the stream gravel, dug in preparation for, or during, spawning. Eggs are laid, fertilized and covered with gravel, alevins are hidden in the redd after hatching.

Responsible official – The USDA Forest Service employee who has been delegated the authority to carry out a specific planning action.

Restoration – the process of modifying an ecosystem to achieve a desired, healthy, and function condition. Contrast with rehabilitation.

Revegetation – the re-establishment and development of a plan cover by either national or artificial means, such as re-seeding.

Riffle – A reach of stream that is characterized by shallow, fast moving water broken by the presence of rocks and boulders.

Riparian – the area adjacent to rivers and streams that lies between the stream channel and upland terrain and that supports specific vegetation included by perennial and/or intermittent water.

Runoff – The portion of precipitation that flows over the land surface or open channels.

Saddle Dams – A subsidiary dam of any type constructed across a saddle or low point on the perimeter of a reservoir.

Scoping – A public information process required by NEPA to determine private and public concerns, scope of issues, and/or questions regarding a Proposed Action to be evaluated in an environmental impact analysis.

Sediment – Material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice or mass-wasting and has come to rest on the earth's surface.

Seep – A wet area where a seasonal high water table intersects with the ground surface.

Sensitive Species – Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by (1) significant current or predicted downward trends in population numbers or density; or (2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Significant Impact – A qualitative term used to describe the anticipated importance of impacts to the human environment as a result of an action.

Sinuosity – Ratio of Channel Length to Valley Length, Ratio of Valley Slope to Channel Slope.

Slump – A mass movement process characterized by a landslide involving a shearing and rotary movement of a generally independent mass of rock and earth along a curved slip surface.

Spillway – A structure over or through which flood flows are discharged. If the flow is controlled by gates, it is a controlled spillway; if the elevation of the spillway crest is the only control, it is an uncontrolled spillway.

Tackifier – A glue-like material that is added to water and sprayed on the surface of disturbed or stockpiled topsoil to prevent soil loss by wind erosion.

Talus – A sloping mass of rock debris at the base of a cliff

Thalweg – The deepest part of a stream's channel.

Threatened Species – A plant or animal species likely to become endangered throughout all or a specified portion of their range within the foreseeable future, or designed by the Secretary of the Interior or the Secretary of Commerce under the Endangered Species act of 1973.

Toe Drain – A system of pipe and/or pervious material along the downstream toe of a dam used to collect seepage from the foundation and embankment and convey it to a free outlet.

Topography – Physical shape of the ground surface; the configuration of land surface including its relief, elevation, and the position of its natural and manmade features.

Till – An unconsolidated glacial sediment that is directly deposited by ice without being reworked by other processes. Usually contains a lack of bedding and sorting.

Turbidity – A cloudiness or haziness of water (or other fluid) caused by individual particles (suspended solids) that are generally invisible to the naked eye, thus being much like smoke in air. The greater the amount of total suspended solids (TSS) in the water, the murkier it appears and the higher the measured turbidity. The major source of turbidity in the open water zone of most lakes is typically phytoplankton.

Year Class – All the individuals of a population of fishes hatched in the same year. After this brood is recruited to the fishery it appears year after year until all its members die. Also called cohort or generation, the number of year classes present in a population can be an indicator of population stability in naturally reproducing populations. Number of year classes present in a catch can be determined by conducting a length-frequency distribution analysis.

Watershed – The registration or area drained by a river, stream, etc.; drainage area.

Wetlands – Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs [see 33 CFR 328.3(a)(7)(b)].

Wilderness – A Congressionally designated area that is essentially unaltered and undisturbed by humans. Management of this area preserves and protects its physical and biological characteristics.