L.E.D.E. DAM/RESERVOIR ENLARGEMENT

EAGLE COUNTY, COLORADO

ENVIRONMENTAL ASSESSMENT

USDA Forest Service

White River National Forest

Eagle/Holy Cross Ranger District

L.E.D.E, Reservoir Enlargement

Draft Environmental Assessment

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TABLE OF CONTENTS

Section No. Page

1 SUMMARY 1

2 PURPOSE AND NEED FOR THE PROPOSED ACTION 3

2.1 HISTORY AND BACKGROUND 3
2.2 NEPA REQUIREMENTS 4
2.3 THE PROPOSED ACTION 5
2.4 PURPOSE AND NEED 5
2.4.1 History 5
2.4.2 Dam Safety 5
2.4.3 Long Term Storage 6
2.4.4 Protect Water Rights 6
2.4.4.1 Water Supply Planning 7
2.4.4.2 Population Growth 8
2.4.4.3 Need for Additional Supply 9
2.4.4.4 Availability of Unappropriated Water 10
2.4.4.5 Summary of Expected Public Benefits 10
2.5 FOREST PLAN DIRECTION 11
2.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT 13
2.7 LIST OF PERMITS AND APPROVALS 13

3 ALTERNATIVES INCLUDING THE PROPOSED ACTION 14

3.1 INTRODUCTION AND BACKGROUND 14
3.2 ALTERNATIVE 1 – NO ACTION 14
3.3 ALTERNATIVE 2 – REPAIR DAM AND INCREASE STORAGE TO 685 AF 15
3.4 ALTERNATIVE 3 – REPAIR DAM AND INCREASE STORAGE TO 947 AF 16
3.5 ALTERNATIVE 4 – REPAIR DAM AND INCREASE STORAGE TO 1040 AF +/- 16
3.6 OTHER ALTERNATIVES CONSIDERED BUT ELIMINATED 17
3.6.1 Groundwater Development 17
3.6.2 Purchase from or Expansion of Existing Reservoirs 17
3.6.3 Purchase Water from other Municipalities, Building Tanks 18
3.6.4 Water Conservation 18

4 AFFECTED ENVIRONMENT 18

4.1 WATER RESOURCES 18
4.1.1 Scope of the Analysis 18
4.1.2 LEDE Reservoir 19
4.1.3 Gypsum Creek 21
4.1.3.1 Above LEDE Reservoir 21
4.1.3.2 Below LEDE Reservoir 22
4.1.4 Antones Cabin Creek 23
4.2 WETLANDS AND RIPARIAN AREAS 23
4.3 UPLAND VEGETATION 25
4.4 MANAGEMENT INDICATOR SPECIES (MIS) 26
4.5 FOREST SERVICE SENSITIVE SPECIES 28
4.6 THREATENED, ENDANGERED, AND PROPOSED SPECIES 29
4.7 RECREATION 30

5 ENVIRONMENTAL CONSEQUENCES 31

5.0 DIRECT, INDIRECT AND CUMULATIVE EFFECTS 31
5.1 WATER RESOURCES 31
5.1.1 Alternative 1 – No Action 31
5.1.2 Alternative 3 – Rebuild and Increase Storage to 947 AF 32
5.1.2.1 LEDE Reservoir 32
5.1.2.2 Gypsum Creek 34
5.1.2.3 Antones Cabin Creek 35
5.1.2.4 Cumulative Effects 35
5.2 WETLANDS AND RIPARIAN AREAS 36
5.2.1 Alternative 1 – No Action 36
5.2.2 Alternative 3 – Rebuild and Increase Storage to 947 AF 36

5.3 UPLAND VEGETATION 37
5.3.1 Alternative 1 – No Action 38
5.3.2 Alternative 3 – Rebuild and Increase Storage to 947 AF 38
5.4 MANAGEMENT INDICATOR SPECIES 39
5.4.1 Alternative 1 – No Action 39
5.6.2 Alternative 3 – Rebuild and Increase Storage to 947 AF 39
5.5 FOREST SERVICE SENSITIVE SPECIES 40
5.5.1 Alternative 1 – No Action 41
5.7.2 - Alternative 3 – Rebuild and Increase Storage to 947 AF 41
5.6 THREATENED, ENDANGERED, AND PROPOSED SPECIES 43
5.6.1 Alternative 1 – No Action 43
5.8.2 Alternative 3 – Rebuild and Increase Storage to 947 AF 43
5.7 RECREATION 45
5.7.1 Alternative 1 – No Action 45
5.9.2 Alternative 3– Rebuild and Increase Storage to 947 AF 45
5.8 SUMMARY OF ENVIRONMENTAL CONSEQUENCES 46
6 MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES 49
7 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES 50
8 COORDINATION AND CONSULTATION 50
9 LIST OF PREPARERS 50
10 REFERENCES 51

TABLES

Table 2-7: LEDE Authorizations and Pending Applications 14

Table 3-4: Proposed Changes in LEDE Dam and Reservoir Characteristics 16

Table 4.6: White River National Forest Management Indicator Species 27

Table 5.1.2.1: LEDE Reservoir Operation: Average Year 33

Table 5.3: Expected Wetland Effect from LEDE Reservoir Enlargement 38

Table 5.4: Upland Vegetation Effect Summary for LEDE Reservoir Enlargement 40

Table 5.7.2: Summary of Determination of Effects on R2 Sensitive Species 44

Table 5.8: Summary of determination of Effects for T&E Species 46

Table 5.10: Summary Comparison of Environmental Consequences 49

APPENDICES

Appendix A: Existing USFS Special Use Permit

Appendix B: Maps

Appendix C: Colorado SEO, Dam Safety Branch, Latest Inspection

PREFACE

An environmental assessment is not a decision document. It is a document disclosing the environmental consequences of implementing the proposed action and alternatives to that action. The decision would be documented in a decision notice signed by the responsible official.

The environmental consequences on lands and activities administered by other Federal, state and local jurisdictions resulting from the proposed action have been disclosed in this Environmental Assessment (EA). Through consultation, other Federal, state and local jurisdictions have assisted in the disclosure of environmental consequences and development of alternatives to the proposed action.

The Forest Service decision relates only to lands administered by the Forest Service and would be documented in a decision notice. Decisions by other jurisdictions to issue or not issue approvals related to this proposal may be aided by the disclosure of effects available in this document.

1 SUMMARY

Currently, LEDE Reservoir is operated under a Forest Service Special Use Permit EAG152, issued to the Town of Gypsum. The Town of Gypsum has applied for a revised Special Use Permit for the expansion of the LEDE Reservoir. White River National Forest (WRNF) proposes to issue a revised Special Use Permit to the Town of Gypsum authorizing necessary reconstructive work on the LEDE Reservoir dam and spillway to meet current safety standards mandated by the State of Colorado. Further, the Forest proposes to authorize the enlargement of LEDE Reservoir from its current size of 24.8 surface acres and 431 acre-feet (AF) of storage capacity to 32.2 surface acres and 947 AF of storage capacity. This meets the Town of Gypsum's identified need for an additional 512 AF of water supply for projected municipal growth.

The Project Area is located approximately 18.5 road miles southeast of Gypsum, Colorado at the head of the Gypsum Creek drainage and is within the Eagle-Holy Cross Ranger District of the WRNF. This proposed action is needed because the dam is an aging structure that is out of compliance with current minimum safety standards. Specifically, repairs would include widening the emergency spillway, widening the crest of the dam and installing a new 18" diameter outlet works. Further, the existing reservoir does not have sufficient storage capacity to accommodate the Town's full water right or meet the projected water demands. The enlargement proposal is also designed to provide reliable dry-year carryover storage and help meet minimum in-stream flows on Gypsum Creek. Ancillary benefits include enhancement of the fishery and recreational opportunity provided by the reservoir.

The overall project purpose is to provide Gypsum with a water supply of an additional 516 AF of firm yield water for use in its service area, by expansion at the existing reservoir site. The proposed action has been designed to address the critical

components listed above, which were defined in a detailed Needs Analysis conducted by Town as part of the EA process. The Needs Analysis and preliminary Alternatives analysis clearly point to expansion of in-basin storage as the only cost-effective and practicable alternative to addressing Gypsum's water supply issues. Based on the existence of LEDE Reservoir in the basin, water rights held by the Town and potential to expand this facility to capture physically-available water, multiple alternatives were considered, and four alternatives were developed for detailed analyses, including the No Action alternative and three potential enlargement scenarios, as follows:

Alternative 1: No Action

Alternative 2: Repair dam and enlarge to 685 AF storage

Alternative 3: Repair dam and enlarge to 947 AF storage

Alternative 4: Repair dam and enlarge to 1040 AF storage

Only Alternatives 1 and 3 carry forward in this analysis, with Alternative 3 being the Preferred Alternative. Alternative 2 was dismissed because it did not meet the Town's demonstrated need for storage capacity and dry-year carryover storage and the cost/benefit ratio was not optimal. Alternative 4 was dismissed because of geotechnical issues, reasonable expectation of annual hydrologic yield in the basin, and diminished cost/benefit ratio. Alternative 3 was selected as the Preferred Alternative because it most effectively meets the Town's storage needs, water rights protection, dry-year carryover, has reasonable expectation of annual fill from hydrologic yield in the basin and demonstrated the best cost/benefit ratio.

Several supporting documents were prepared to assess the effects of the various alternatives on the affected environment. These include a Biological Evaluation (BE) of USFS sensitive species, a Biological Assessment (BA) of Threatened, Endangered and Candidate species (which has been submitted for consultation with the U.S. Fish and Wildlife Service) and a Management Indicator Species (MIS) report. The results of these analyses are summarized in the EA.

The Alternatives analyses in all documents identified Alternative 3, reservoir enlargement to 947 AF, as the Preferred Alternative for its combination of: 1) meeting the Town's demonstrated need and associated goals; 2) avoiding and minimizing environmental effects; 3) providing environmental and recreational benefits; and 4) cost-effective implementation. This alternative meets the overall project purpose: to provide Gypsum with an additional 516 AF of firm yield water for the Town service area, and to accomplish dam safety and other stated goals.

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2 Purpose and Need for the Proposed Action

2.1 History and Background

The Eagle Ranger District of the WRNF has received a proposal from the Town of Gypsum, Colorado to enlarge LEDE Reservoir located in Eagle County, Colorado near the headwaters of Gypsum Creek, approximately 18.5 road miles southeast of the Town of Gypsum. The reservoir is located in the WRNF and is operated by the Town as part of the water supply system that serves the Town of Gypsum as well as other agricultural obligations within the Gypsum valley. The reservoir and ditch operate under Forest Service Special Use Permit No. EAG152, which is in effect through December 31, 2036 (Appendix A). The Town is proposing to enlarge the reservoir from its current capacity of 431 AF to 947 AF of storage capacity to provide a stable, long-term water supply for Gypsum. This would expand the reservoir surface area from approximately 24.8 surface acres to approximately 32.2 surface acres.

The LEDE water rights were originally decreed in Civil Action No. 963, Eagle County. Additional water rights have been secured by Gypsum over time, and are shown as an attachment in Appendix A. The water rights were decreed for irrigation uses, and provide storage for up to 947 AF in an existing reservoir. The Town of Gypsum purchased the LEDE Reservoir and LEDE Ditch water rights in 2005. Currently, the reservoir is limited to 431 AF of physical capacity. The reservoir has aging infrastructure which requires replacement to comply with state dam safety regulations. Since replacement/reconstruction is required, Gypsum wishes to enlarge the reservoir to full capacity in order to meet calculated future demands, provide adequate dry-year carryover storage, protect valuable senior water rights and improve ability to protect in-stream flows on Gypsum Creek.

The existing LEDE Dam is a homogenous earth embankment with a rock toe-drain. According to records of the Colorado Office of the State Engineer (SEO) and construction drawings, the dam was originally constructed to a height of about 15 feet in the 1930s, and raised to the present crest height of 44 feet in the early 1940s. The crest length is about 340 feet, and the crest width varies from 8 to 12 feet. The present jurisdictional or hydraulic height of LEDE Reservoir Dam is 39 feet. The reservoir maximum pool elevation is 9524, as estimated from the USGS topographic quadrangle map.

The existing spillway is an unlined 16-foot-wide, open-cut channel on the right abutment, with concrete grade-control structures. The outlet works consists of an 18-inch riveted steel pipe and corrugated metal pipe (CMP) below the dam, regulated by a sloped gate. The dam is presently classified as a “small”, “high hazard” dam. The reservoir has aging infrastructure which has been in the ground in excess of 75 years and requires replacement to comply with state dam safety regulations. Replacement of this existing infrastructure would require the removal of nearly all of the existing earth structure. Therefore, since near total reconstruction is required, Gypsum wishes to enlarge the reservoir to full capacity in order to cost-effectively meet future demand, provide

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adequate dry-year storage and carry-over supply and to protect valuable senior water rights in the reservoir.

Part of the water stored in the reservoir is supplied by the LEDE Ditch which diverts water from Antones Cabin Creek, aka Lost Creek, to the reservoir. The ditch is approximately 2800 feet in length with the majority of the ditch being piped. The existing diversion ditch, dam, and reservoir are located on U.S. Forest Service Land and are operated under the terms of an existing Special Use Permit (see Appendix A).

The Town seeks to ensure long-term reservoir capacity and avoid reservoir restrictions, firm-up existing capacity, and increase capacity for LEDE Reservoir to accomplish the following goals:

1. Dam Safety – Provide a reliable and safe reservoir that meets the USFS and Colorado Division of Water Resources current dam safety regulations.

2. Long Term Storage – Provide a long term releasable water storage reservoir for both municipal and agricultural uses on Gypsum Creek that would provide in-basin water without an Eagle River exchange.

3. Protect Water Rights – Protect the Town of Gypsum's water rights investment and by developing 947 AF of reliable dry year in-basin storage.

2.2 NEPA Requirements

This proposal involves issuing a revised special use permit and potential wetlands permitting – both of which are Federal actions that could affect the quality of the environment on public lands administered by the USDA Forest Service. Thus, Gypsum's proposed action requires compliance with the National Environmental Policy Act (NEPA) [PL90-190; 42 U.S.C. § 4331 et. seq.]. The NEPA process requires that complete environmental information be made available to Federal, state and local agencies, organizations, and individuals that may be interested in or affected by the Proposed Action. Opportunities to review this information and submit comments must be provided before decisions are made or actions are taken on public lands.

Under the regulations of the Council on Environmental Quality (CEQ) for implementation of NEPA, an Environmental Assessment (EA) should be prepared to determine whether a proposed action may cause significant environmental effects (40 CFR 1500). The EA provides the Forest Service with documentation of an environmental analysis for determining if a proposed action should be approved based upon a "finding of no significant impact" (FONSI) or if additional studies are required.

The purpose of this EA is to examine and disclose the environmental consequences of implementing the Proposed Action and alternatives to that action. This EA has been prepared to meet the requirements of NEPA, the CEQ guidelines, and the applicable Forest Service regulations. The Forest Service special use permitting decision would be documented in a decision notice.

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2.3 The Proposed Action

The proposed enlargement of the LEDE reservoir would raise the existing dam by approximately 19 feet, widening the crest to 22 feet and reconstruction of the dam spillway on the west side of the dam for safety, logistical and hydrological concerns. The proposed project would increase the active storage capacity of LEDE Reservoir from 431 AF to 947 AF. A detailed description of the project is provided below under Section 3, Alternative 3. Because the proposed action would affect Forest Service property outside the current special use permit, an amendment to the special use permit is required.

2.4 Purpose and Need

2.4.1 History

Gypsum is a small town located in Eagle County, Colorado. There are approximately 6,000 residents in this historic ranching town. More recently, Gypsum has experienced rapid growth as a bedroom community for neighboring ski areas. The Town boundaries encompass both the Eagle River and Gypsum Creek, with the confluence just north of Gypsum's center. A study area map is attached in Appendix B that outlines the Town's service boundaries, and the LEDE Reservoir location.

Over the last ten years Gypsum has almost doubled in population within an estimated 7.5 square miles. Additionally, projected growth expected from already approved development projects either underway or expected to start soon would add another 6,000 people to Gypsum's population over the next 10 to 15 years. Recent community survey results indicated that approximately 92% of these residents own their own home and are mainly over the age of 40 with almost half of the respondents holding a Bachelor's degree or higher with household incomes between $75,000 and $150,000.

As a result of this growth, Gypsum has experienced a sizeable increase in the number of light industrial type businesses locating there which support the growing residential and commercial construction industry within Eagle County which is largely fueled by tourism and recreation of the area ski resorts. These resorts also employ a large number of service-oriented employees and numerous real estate agents for these properties. As the population numbers increase, the town has become more attractive to commercial businesses, including Costco which opened up four years ago. The Eagle County Airport, Colorado's third busiest airport, brings in a large number of visitors, and is also located within the town employing a large amount of area residents. In addition to the growing resort economy, Gypsum continues to have large ranch lands with irrigated agriculture within the town's service area. Given its history and projected growth, along with dam safety and regulatory concerns, this project is based upon the following needs outlined below.

2.4.2 Dam Safety

The existing LEDE Reservoir does not comply with Colorado dam safety requirements as follows:

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1. The existing spillway needs modification to comply with current regulatory criteria.

2. The existing dam would need to be raised an additional 5 feet to meet current dam safety free-board requirements, and the dam crest would need to be widened (approximately doubled) to the required minimum of 18 feet.

3. The outlet pipe requires reconstruction due to age and deterioration, and to meet the design requirement of reducing the water levels in the dam by 5 feet over 5 days.

4. The dam outlet gate and trash rack need to be replaced due to their age (78 years), wear and deterioration.

Please see the attached dam safety report from the Colorado Department of Water Resources, Appendix C.

2.4.3 Long Term Storage

Gypsum's municipal water supply has been based upon a variety of sources, including multiple agricultural water rights transferred to the Town with various developments over time. The Town of Gypsum produces and stores its own drinking water. Gypsum delivers to 2,038 water service taps, and has approved 126 additional water service taps. Drinking water is obtained from Mosher Creek and Gypsum Creek. Both streams supply the entire Town with drinking water. Gypsum's system provides water for 250 acres of irrigation. Gypsum also leases several water rights for irrigation use to properties in its service area, and has contractual obligations to provide 100 AF of irrigation water that supplements the irrigation of 200 additional acres under the H.O.R. ditch. Future growth is estimated at a fairly high rate, and the LEDE Reservoir is necessary to provide adequate storage releases for changes in irrigation rights, stream flow maintenance, and direct diversion. However, such agricultural water rights are limited to use during irrigation season, and long term storage is legally and physically required to assist in managing Gypsum Creek water rights calls and dry-year operations while providing a year-round water supply.

2.4.4 Protect Water Rights

Gypsum owns several senior and junior water rights to make up its supply for year-round municipal water service. Development in Gypsum often occurs on agricultural lands with senior irrigation rights. However, frequently such senior irrigation water rights are only available during irrigation season, and to the extent they do not upset other decreed water rights and instream flows. In order to fully utilize its existing water rights, and to secure adequate legal supplies for future municipal demands, Gypsum has gone through substantial water supply planning to fully understand its water supply needs on a monthly basis, and under expected growth circumstances. Based on the below study of expected population growth over a 50 year period and on the availability of existing

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supply; the below information explains how expanding the LEDE Reservoir would assist in protecting Gypsum's portfolio of rights and serve Gypsum's expected needs.

2.4.4.1 Water Supply Planning

The Town of Gypsum is committed to protecting senior water rights so that it may adequately plan for a reliable municipal water supply for decades to come. Planning for future growth is essential to creating and maintaining mandated enhancements to public welfare. Planning horizons or study periods may vary by study type. For example, planning for a water storage tank may be undertaken with a period related to the expected service life of the tank materials in mind, while planning for a water storage reservoir may be undertaken with a period related to the sediment transport capacity of the source stream in mind. In the case of municipal water supplies, which depend on hydrology and adjudication of water rights to supply changing populations, prudence requires planning based on a more distant time horizon than might be necessary for infrastructure considerations like the tank example. For this reason, we believe a planning period on the order of 50 years or more is appropriate for the development of a reservoir.

The Town of Gypsum acquired the LEDE storage right in 2005 after nearly 20 years of sporadic negotiations. The acquisition was largely driven by the 2002 dry year, which set new lows for the Gypsum basin yield. In 2002, even Gypsum's most senior direct diversion was called out and Gypsum was required to negotiate and lease other water rights and implement an emergency substitute water supply plan to continue its municipal service. This prompted thorough investigation which resulted in the Town's determination that it requires additional and long-term, in-basin reservoir storage. A 50-year planning horizon requires estimating a water demand in the year 2060. Since by its very nature planning for the future cannot be achieved to great precision, a round figure is more suitable. Population forms a basis for estimating municipal water demand, and population is determined by the U.S. Census Bureau in years divisible by 10, so this analysis would consider the year 2060. This represents a planning period of approximately 50 years.

Based on water usage, it is estimated that in 2010, approximately 130 acres were irrigated by water rights owned by the Town, which were diverted through its municipal water treatment plants. The bulk of this irrigation water service was provided to the Town's residents for use on lawns and gardens and to the various entities responsible for keeping parks, playgrounds and other common areas green. About 1.4 cfs was used for these purposes. Based on water leases and other agreements and information, it is estimated that in 2010 approximately 120 additional acres were irrigated or planned for irrigation by water rights owned by the Town. Some of this irrigation was used for landscaping, streetscaping, and parks, while some was also used for agriculture consisting primarily of hay production.

In addition to irrigation under water rights owned by the Town, the Town is contractually obligated to make water available from storage in LEDE Reservoir for agricultural irrigation of lands served by water rights not owned by the Town (i.e. the

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H.O.R. ditch). This reservoir water serves as a supplement to the direct flow rights which serve the subject area consisting of approximately 200 acres not already accounted for.

The primary agricultural crop irrigated as described above is hay consisting mostly of meadow grasses and some alfalfa. Due to annual climatic and operational changes, harvesting and yield rates vary. Generally, two cuttings of hay are put up for a total annual yield from 2 to 4 tons per acre depending on fertilization and other factors.

2.4.4.2 Population Growth

Based on information obtained from the U.S. Census Bureau website, the population of the Town of Gypsum was about 1,750 according to the 1990 census. The 2000 census showed the Town's population had more than doubled to about 3,654. Based on an annual exponential growth model, this increase corresponds to a growth rate of about 7.6% each year. The Census Bureau estimates that in 2010 the Town's population was about 6,477. On the same basis, this corresponds to a rate of about 5.9% over that period. Comparison of this figure to the corresponding rates of 2.3% and 1.6% for Eagle County and the State of Colorado, respectively, underscores the onslaught of growth in Gypsum. Although still very high, 5.9% is somewhat lower than the 7.6% from the previous period, demonstrating that the Town's population growth has not maintained a constant exponential rate, and suggesting that a logistic model is more appropriate. A standard approach to modeling logistic growth involves extrapolation of a sigmoidal curve expressed mathematically by the following equation.

$$N = \frac{K}{1 + e^{-r(t - t_h)}}$$

In this equation, N stands for the population size at any given time; K, represents the carrying capacity of the subject environment; r, the average exponential growth rate applicable when N is far less than K; t, time from model beginning; and t_h, the time from model beginning at which N is half of K .

The value of K is based on environmental constraints such as economic resources or available space. As the Town of Gypsum and those private properties adjacent to it are completely surrounded by federal lands, excepting only the short border with the Town of Eagle to the east, it can be assumed that the limited space available for development would be the governing environmental constraint. In recognition of the tendency toward greater density as capacity is approached, the population density of a substantially similar Colorado municipality further along in its development can be multiplied by the available area as one means of estimating a value for K. There are several comparable communities with a range of densities. For example, the 2000 census reported the following densities in persons per square mile: Paonia - 1,972; Durango - 2,052; Carbondale - 2,584. Taking Durango's density as representative, and applying it to the area of contiguous private property in and adjacent to the Town of Gypsum (about 16.71 square miles), yields an estimate of about 34,000 for K.

Values of the remaining parameters r and t_h can then be estimated by fitting the sigmoidal curve to the census population data from 1990 and 2000 along with the Bureau

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population estimate for 2010. Good correlation is achieved with 7.05% and 45 years, respectively. Thus calibrated and using 1990 as t_o, the equation can be used to project the Town's population size, resulting in an estimated population of about 30,000 in the year 2060. While this population size estimate could be high, local and national growth patterns for the last two decades, and the continued projected regional growth expectations in western states dictate a conservative approach for water supply planning.

2.4.4.3 Need for Additional Supply

We estimate that the Town's population is currently about 6,600. Drinking water treatment facility diversion records show that wintertime (no irrigation) diversions are currently running about 1.04 cubic feet of water per second of time (cfs), which corresponds to 102 gallons per person per day (this reflects general assumed average use.) Although domestic water use constitutes the vast majority of the winter flow demand, this figure also includes commercial usage, system losses, and any other incidentals. It is worth mention that the current figures show achievement of a 36% reduction in diversions per person since 2003, owing almost exclusively to recent system improvements. Gypsum defines standard service equivalence as one Equivalent Residential Unit (EQR) (equal to 350 gallons per day plus lawn and garden irrigation water). Using this system, the Town of Gypsum is currently serving an estimated 1,920 EQRs.

Some future demand reduction may be achieved through water conservation measures, and the Town Code and water rates encourage conservation by escalating fee structures. However, reductions would likely be most apparent in the summer months when conservation measures and improved irrigation practices may be in effect. For this reason and based on the need for conservative water supply planning to ensure adequate availability, the current ratio of population to demand is deemed the most appropriate for use in demand projections. At 3.44 persons per EQR (6,600 / 1,920) the projected 2060 population of 30,000 would demand an estimated 8,721 EQRs of potable water service. This is expected to require wintertime diversion of about 4.73 cfs, with summertime diversion requirements far exceeding that figure.

In addition, pursuant to the Town's purchase agreement for the LEDE Reservoir water rights, it must be in a position to supply 100 acre-feet to the seller for irrigation. This contractual agreement is for irrigation in addition to the irrigation currently supplied by the town for various outdoor irrigation needs.

The Town's water storage capacity should insulate against peak hour demands, however there would be longer periods when total daily usage exceeds the overall winter average. This can be accounted for by application of a peaking factor. Using the nominal factor of 1.5, yields a peak daily demand around 7.1 cfs – the diversion rate most appropriate for planning purposes.

Due to operational considerations related to diversion and treatment of the water to be supplied to municipal customers under health department regulations, it is anticipated that there would be times when all municipal diversions would need to be taken at the Little G intake. Under this scenario, the Town's entire municipal supply would have to

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come from water rights it holds at the subject location at a wintertime rate as high as 7.1 cfs by the end of the planning period described above.

In Division 5 Water Court case number 96CW366, the Town obtained a year-round municipal right in the amount of 2.5 cfs at the Little G Intake. The Town decreed additional water rights in the amount of 7.5 cfs to reliably supply its growing population in the conditional Little G Intake, First Enlargement water right in case number 03CW325 to meet this demand. To use these relatively junior diversions without curtailment by senior users, storage and storage releases on Gypsum Creek are required.

2.4.4.4 Availability of Unappropriated Water

As described above, in-basin storage within the headwaters of Gypsum Creek are critical to the operation of the Town of Gypsum's potable water system. The 2002 dry year demonstrated the need for storage and carry over storage from wet years to dry years in order to make more water available for diversion in dry years. The ability to redirect direct diversion water rights to storage to meet the Town's diversion needs is a critical component of municipal operations. Therefore, Gypsum analyzed the capability of the watershed to provide unappropriated water for storage purposes.

One major consideration to be made as part of any evaluation of alternatives is the hydrologic yield available to the reservoir. Various hydrologic yield analyses were conducted from 1998 to 2009, and are incorporated into the discussion in Section 4.1 below. These analyses estimated yield by prorating discharge measurements from nearby watersheds on the basis of drainage area ratios, elevation, land cover, and annual precipitation. An underlying assumption of this method was reliance on elevation and proximity to approximate precipitation and runoff characteristics, including aspect. Based on these analyses, there would be about 1,160 ac-ft of water in the hydrologic area available for storage in LEDE Reservoir on average. In wet years more water may be available and in dry years less water may be available -- but on average, if Gypsum builds the improved facilities, physical and legal water is available for diversion and storage in the reservoir, while meeting minimum in-stream flow rights and other senior calling water rights.

Other downstream reservoir contracts have been acquired by Gypsum (Wolford Reservoir and Green Mountain contracts). This contract water can be used to mitigate downstream calls such as Shoshone or Cameo. However, such contract water cannot be used to satisfy Gypsum Creek calls at the primary intake.

2.4.4.5 Summary of Expected Public Benefits

Water supply planning for the Town of Gypsum requires a planning horizon on the order of 50 years. Therefore it was appropriate for water storage rights planned in 2010 to accommodate demands projected out to the year 2060. Extrapolation of a calibrated logistic growth equation yields an estimated population size of about 30,000 by that time. Application of the winter demand rate of 1.04 cfs results in a projected average demand of 4.73 cfs. Accounting for periods of increased usage with a nominal peaking factor of 1.5, results in a wintertime peak daily demand of about 7.1 cfs. As the Town continues to grow and expand its infrastructure, it can and would put the proposed water to beneficial

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use within the appropriate planning period described above. There is sufficient unappropriated water available in Gypsum Creek and Antones Cabin Creek to fully supply the storage of 947 AF of water in LEDE Reservoir at the current diversion rate of 2.0 cfs or 4 AF per day. The reservoir at 947 AF represents a 236 day supply. At a 2060 diversion rate of up to 7.1 cfs or 14.2 AF per day, the reservoir would provide 66 days of municipal water storage. There is substantial benefit to the Town of Gypsum to build adequate additional in basin storage to provide an adequate future public water supply. Additionally, such storage would also benefit minimum in-stream flows during times of transport of the water in the creek system. Dam safety goals can also be met with this project. The future needs of the Town may approach 5000 AF in 2060 from direct flow and storage rights. LEDE represents a moderate and reasonable level of storage to combine with direct flow rights for the best utilization of both sources of water supply. Live, in-basin storage is of paramount importance to the Town of Gypsum, and would be used judiciously.

2.5 Forest Plan Direction

The project site falls within Forest Management Area Prescription 4.3 – Dispersed Recreation, and also falls within the active Gypsum Creek cattle and horse grazing allotment. The predominant land uses in the LEDE reservoir area include moderate to high recreational use during the summer and fall for camping, fishing and big game hunting, as well as extensive livestock grazing use, particularly along the north and east sides of the reservoir. During winter, the area is popular for snowmobile use and cross-country skiing. Forest Management Prescription 4.3 in the current Forest Plan reads as follows:

Management Area 4.3 Dispersed Recreation

Theme – Dispersed recreation areas are managed to provide undeveloped recreation opportunities in natural or natural-appearing landscapes.

Management area description – The areas may be designated as either motorized or non-motorized. The non-motorized areas would usually have good vehicular access to a central parking area from which the non-motorized use originates.

Facilities may be present to provide for health and sanitation, to protect resources, or to enhance the recreation experience. These structures may range from small resorts and campgrounds to fire grills, signs, or vehicle barriers. Roads are generally open to motorized activities. The travel system may include motorized and non-motorized trails.

Desired condition – A wide variety of backcountry recreation opportunities exist as long as they do not interfere with maintaining a natural-appearing landscape. Resource management activities are compatible with, and reduce effects to, recreation resources and opportunities

Biological communities are maintained or improved to provide an attractive setting for visitors, complement the recreational values, and provide varied plant communities,

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structural stages, and associated wildlife. Habitat for sensitive species would be protected and maintained, and may also be enhanced where such opportunities exist.

The recreation opportunity spectrum (ROS) for this management area is semi-primitive non-motorized, semi-primitive motorized or roaded natural year-round. Scenery is managed to provide a range of scenic integrity objectives from moderate to very high.

Management Area classifications for lands surrounding the LEDE reservoir area include 8.32—Designated Utility Corridor to the north and Management Area 1.2—Proposed Wilderness, which designation occurs to the west, south and east sides of the Project Area. Details of those management prescriptions as listed in the Forest Plan follow.

Management Area 8.32 Designated Utility Corridors – Existing and Potential

Theme – This prescription emphasizes management of existing and potential linear and non-linear rights-of-way corridors. These corridors are used for major oil and gas pipelines; major water transmission systems (excluding reservoirs); slurry pipelines; aerial and underground utility facilities for transmission of electricity; major communications systems including telephone, microwave, and fixed sites; railroad rights-of-way; and major routes for highways and roads.

Management area description – These areas are managed for the construction, operation, and maintenance of facilities associated with public utilities and transportation systems. Rights-of-way for corridors are typically linear management areas that may traverse other management areas. Vegetation composition and structure have been altered to meet the needs of the site. Protection of facilities and personnel within the area is the primary emphasis for vegetation treatment. Physical disturbances to existing conditions frequently are high within the right-of-way corridor and low outside the corridor. The road system within utility and railroad corridors, as well as utility sites, may be restricted to utility maintenance access. Most roads have a native surface suitable for passage with high clearance vehicles. Other management options include livestock grazing, wildlife habitat, and dispersed recreation.

Desired condition – For existing corridors and sites, visitors can expect to see obvious modifications to general forest areas. Larger trees are removed to provide for safety and protection of facilities and of personnel working within the area. Smaller trees are still present. The boundaries of the cut areas bordering the corridors and cleared sites are blended into the surrounding vegetation. Opportunities for viewing wildlife are good. Wildlife species that prefer edge habitats, such as deer, are most common. Raptors are often seen within the corridors, although they may not nest there. Habitat for sensitive species may be enhanced where opportunities exist, but the focus is on maintenance and protection of these habitats. Dispersed recreation activities may be available for both motorized and non-motorized activities, including hunting, ATV riding, snowmobiling, hiking, cross-country skiing, horseback riding, and bicycling

The recreation opportunity spectrum (ROS) for this management area is compatible with the surrounding areas. Scenery is managed to provide a range of scenic integrity objectives from low to very high.

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Management Area 1.2 Proposed Wilderness

Theme – Areas that the Forest Service has recommended or would recommend to Congress for inclusion in the National Wilderness Preservation System are managed to protect their wilderness characteristics until Congressional action is taken. Non-conforming activities may be limited or restricted.

Management area description – These are areas that the Forest Service has independently found suitable for inclusion in the National Wilderness Preservation System. Areas are managed to protect wilderness characteristics until Congressional action is taken. These areas are in the roadless area inventory. They are capable and available for wilderness designation. Uses, levels of use, and management actions would vary from area to area. However, no activities that jeopardize the eligibility of these areas for Congressional designation as wilderness are allowed.

Desired condition – Generally, opportunities for primitive recreation are provided, with moderate-to-high degrees of solitude available. The effects of past human use may be evident in some areas.

The recreation opportunity spectrum (ROS) for this management area is primitive or semi-primitive non-motorized year-round. Scenery is managed to provide a range of scenic integrity objectives from moderate to high.

2.6 Scope of this Environmental Assessment

This EA focuses on effects of the proposed enlargement of LEDE Reservoir. Public notice regarding the Forest Service's determination to prepare this EA was published on January 31, 2011 in the Glenwood Post Independent (PN No. #6109183). The scoping period closed on March 2, 2011 and no substantive comments were received.

The main issues identified in the scoping process for the proposed project include:

- Potential effects on stream flows in Gypsum Creek;
- Potential effects on wetlands and riparian areas along the existing shoreline of LEDE Reservoir;
- Potential effect on fishery resources;
- Potential effect on recreational uses in and around LEDE reservoir;
- Potential effects on endangered, threatened, candidate and Forest Service sensitive species;

2.7 List of Permits and Approvals

Table 2 lists all of the existing permits and approvals for the LEDE Dam project to date. All of these permits and approvals would have to be obtained or revised prior to construction of the proposed project. LEDE Reservoir currently operates under an

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existing Special Use Permit with the U.S. Forest Service. An application for amendment of the existing permit to reflect the enlargement was submitted in early February 2012.

Table 2.7 LEDE Authorizations and Pending Applications

Agency	Approval Type	ID Number	Application Date	Approval Date
U.S. Forest Service	Special Use Permit	FS-2700-4	February 2012	Pending
Corps of Engineers	404 Permit	ID #201100950	February 2012	Pending
Colorado Water Quality Control Division	401 Water Quality Certification		March 2012	Pending
State Engineer's Office	Dam safety Design, Drawings & Specifications (Engineering Review)	Dam ID: 370105	March 2012	Pending
Eagle County	1041 Permit		November 2010	Pending
Colorado Parks & Wildlife; Colorado Water Conservation Board	Wildlife Mitigation Plan	n/a	January 2013	Pending

3 Alternatives Including the Proposed Action

3.1 Introduction and Background

Four alternatives were considered for this project:

1. No Action
2. Repair dam and enlarge to 685 AF storage
3. Repair dam and enlarge to 947 AF storage
4. Repair dam and enlarge to 1040 AF storage

Only Alternatives 1 and 3 carry forward in this analysis, with Alternative 3 being the Preferred Alternative. Alternative 2 was dismissed because it did not meet the Town's demonstrated need for storage capacity and dry year carryover storage and the cost/benefit ratio was not optimal. Alternative 4 was dismissed because of geotechnical issues, reasonable expectation of annual hydrologic yield in the basin, and diminished cost/benefit ratio. Alternative 3 was selected as the Preferred Alternative because it most effectively meets the Town's storage needs, water rights protection, dry-year carryover, has reasonable expectation of annual fill from hydrologic yield in the basin and demonstrated the best cost/benefit ratio.

The following analysis addresses Alternative 1, No Action, as required by NEPA, and compares it to Alternative 3, the only practical alternative for the analysis.

3.2 Alternative 1 – No Action

Under the No Action alternative, the capacity of LEDE Reservoir would not be increased and there would be no changes in reservoir operations according to the

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conditions of the current Special Use Permit – EAG152. Water releases from the reservoir would continue to occur as they have historically, on an as-needed basis.

The State Engineer's Office has reclassified the dam as a "small," "High Hazard" dam. Thus, the State requires that (at a minimum) the outlet works and the spillway be reconstructed. The outlet pipe and control valve are showing signs of rust and deterioration, especially in the original section of the pipe, which is at least 78 years old. Reconstruction of the outlet works would entail removal of the majority of the existing dam embankment. The existing spillway is under-sized, lacks the required capacity to accommodate storm flows as required by current regulations, and shows signs of severe erosion. Failure to address these issues would put the reservoir in violation of State Dam Safety regulations, and its storage subject to temporary or permanent spill. This would leave Gypsum without an important water supply source.

Under the existing SUP, the Town has an obligation to maintain the permitted structures in good working order and in accordance with all other regulatory requirements. The existing SUP fully covers the required repairs noted above in order to satisfy current dam safety requirements imposed by the State. Therefore, the No Action alternative assumes the stated repairs are to be made as noted with no enlargement of capacity and no change to current reservoir operations.

This alternative would not increase the existing storage capacity or yield of the reservoir but would preserve the existing capacity. Because the required reconstruction of the outlet works necessitates physically removing most of the existing dam, and then reconstructing it, the cost of this alternative is exorbitant for relatively small benefit achieved. The lack of increased storage capacity also puts some of the Town's water rights at risk. The operation and maintenance costs of the rehabilitated dam of existing size would be basically equal to the larger alternatives. Therefore, the No Action Alternative does not assist with Gypsum's long term goals for meeting existing and growing public water supply needs, and it risks losing some of Gypsum's water rights. Further, this alternative does not provide the opportunity for future releases to benefit in-stream flow, or for increased depth and dry-year carryover storage.

3.3 Alternative 2 – Repair dam and Increase Storage to 685 AF

The second alternative evaluated proposed maximizing LEDE Reservoir storage yield within the existing jurisdictional hazard rating. By maintaining the existing rating of a Small, High Hazard Dam, the dam's jurisdictional height could be raised an additional 9.5 feet, to 49 feet, and theoretically maintain the same rating ("small, high hazard"). This would raise the crest height of the dam 14.5 feet. The crest would be widened to 20 feet. The existing outlet pipe would be replaced and the spillway would be reconstructed on the left abutment. Approximately 254 AF of additional storage would be added to the dam, for a total of approximately 685 AF of storage. However, this amount of storage would not allow the full use of the original water storage rights of 947 AF, nor would it be likely to allow a substantial amount of carryover storage from one year to the next. These outcomes reduce water supply flexibility over time and for the expected population increase. These shortcomings also hinder the cost/benefit ratio. Therefore, this alternative was dropped from further analysis.

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3.4 Alternative 3 – Repair dam and Increase Storage to 947 AF

This alternative would meet current dam safety regulations, and enlarge the capacity from 431 AF to 947 AF of storage. Total water surface area would increase from 24.8 acres to 32.2 acres. Enlargement would involve increasing the dam height by 19.5 feet and widening the crest to 24.5 feet to meet current safety regulations. The jurisdictional dam height would then be approximately 59 feet high and the total height of the structure 65 feet. The slopes of the dam would also be flattened to meet current safety standards. This would result in additional fill added to the upstream side of the dam (within the inundated area). Lengthening of the upstream face of the dam would extend the upstream toe of fill approximately 170 feet into the reservoir basin. The increase to 947 AF of storage would also be likely to allow a reasonable amount of carryover storage from wet years to dry years. This carryover storage is becoming increasingly valuable due to the apparent increasing frequency and amplitude of wet and dry year cycles.

The increasing frequency and amplitude of wet and dry year cycles is predicted to worsen as climate change progresses. In addition, this alternative provides the lowest cost per acre foot, and therefore, the best cost/benefit ratio. Storage under this scenario also provides adequate water for long term municipal supplies, protects the Town's senior water rights and allows for releases to assist in preserving in-stream flows. Therefore, this was chosen as the preferred alternative.

The addition to the spillway and dam crest would result in the physical changes to the dam and reservoir shown in Table 3-4.

Table 3.4 Proposed Changes in LEDE Dam and Reservoir Characteristics (516 acre-feet enlargement)

Parameter	Existing reservoir	Change	Proposed Reservoir
Maximum reservoir water surface area	24.8 acres	+7.4 acres	32.2 acres
Maximum dam spillway elevation	9,524.3 feet	+17.7 feet	9,542 feet
Embankment crest elevation	9,529.3 feet	+18.7 feet	9,548 feet
Maximum storage capacity	431 AF	+516 AF	947 AF
Minimum storage capacity	0 AF	0 AF	0 AF
Active capacity	431 AF	+516 AF	947 AF

3.5 Alternative 4 – Repair dam and Increase Storage to 1040 AF +/-

The fourth alternative evaluated was based on the largest physically reasonable structure that also had a reasonable chance of filling in most years. The volume of this alternative was calculated to be approximately 1040 Acre-feet. The jurisdictional dam height would be approximately 64 feet and the total height of the structure approximately 70 feet.

This maximum was based on a number of criteria, the most important of which may be:

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1. Not exceeding a reasonable height on the easterly lateral moraine, such that the dam fill volume did not go to extremes

2. An expectation of being able to fill the reservoir reasonably often (see Feasibility Study, Hydrologic Yield section)

3. Staying within an additional 5 to 10 acres of additional permanent disturbance.

4. A reasonable expectation of being able to administrate available water rights to maximize utilization of water.

This alternative was dismissed due to geotechnical issues, reasonable expectation of annual hydrologic yield in the basin, overall environmental effects and diminished cost/benefit ratio.

3.6 Other Alternatives Considered but Eliminated

An exhaustive practicability screening analysis was conducted early in the process, which eliminated all off-site alternatives from further analysis. Reasons for dismissal from detailed evaluation in this EA ranged from environmental effects, technical feasibility and their ability to effectively meet the purpose and need for the proposed project. These alternatives included groundwater development, purchase of water from existing reservoirs or municipalities, and water conservation measures. The alternatives considered and the basis for their elimination from detailed evaluation are described below.

3.6.1 Groundwater Development

Geologically, the ground water available in reasonable proximity to the Town's water treatment plants and water distribution systems supply points would be expected to be limited in quantity near the upstream water treatment plant and of poor quality near both the upper and lower water treatment plants. The quality of groundwater available to the lower water treatment plant is generally poor due to the high concentration of gypsum in the area. This gives the water a high total dissolved solids and an excessive hardness in the form of CaSO4. In addition, even if water quality was acceptable, under Colorado law, groundwater is generally considered to be tributary to surface water. Thus, any groundwater development is still only development of junior water rights – and as such, subject to curtailment without adequate storage release available.

3.6.2 Purchase from or Expansion of Existing Reservoirs

There are no existing upstream reservoirs that have available water, physically or legally, on the Eagle River system. Gypsum does hold water contracts for storage in Green Mountain Reservoir and Wolford Reservoir, but physical water from those sources can only be legally "exchanged" up the Eagle River to Gypsum; it can't be physically transported there to satisfy calling senior water rights on the Eagle River or Gypsum Creek. Contract water available from the Colorado River Water Conservation District

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storage on the Eagle River upstream of Gypsum is only available in small amounts, and Gypsum has already contracted for the maximum amount available to a municipality, which is 20 AF. Therefore, this alternative is simply unavailable.

3.6.3 Purchase Water from other Municipalities, Building Tanks

Gypsum is not aware of any neighboring municipalities on the Eagle River with long-term water storage available for other municipal users – rather the trend is for other upstream users to develop their long-term supplies. Additionally, building additional water tanks is not physically or financially prudent. Typically 1-2 million gallon tanks are used for water storage and delivery for municipal use. To secure the needed storage for an additional 400-500 AF would equal over 80 additional water tanks. Costs to construct such tanks and the land area required to house such a development are prohibitive.

3.6.4 Water Conservation

Gypsum has implemented water conservation measures in its existing code and tiered-use water rates. The detailed analysis provided in Section 2.4 shows Gypsum's projected needs for water quantity based on the wintertime usage of the town, which is the lowest water-use season for a municipality. Most water conservation measures that have a substantial effect are related to irrigation, and are thus summer-related. Conservation measures related to wintertime usage are very unlikely to have a major effect upon water usage. Therefore, the maximum effect of any possible summertime water conservation is considered in this analysis. Gypsum currently has an aggressive conservation plan that is instituted in times of drought conditions.

4 Affected Environment

4.1 Water Resources

4.1.1 Scope of the Analysis

The scope of the water resources analysis focuses on riparian and wetland resources within upper Gypsum Creek and upper Antones Cabin Creek watersheds on National Forest System land.

Pursuant to the 2002 Forest Plan, as amended, stream health management measures are provided in the Region 2 Watershed Conservation Practices Handbook (WCPH) to ensure applicable Federal and State laws are met on NFS lands. The WCPH contains several Management Measures of relevance regarding stream health and effects to water resources:

- MM-3. In the water influence zone (WIZ) next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.

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- MM-5. Conduct actions so that stream pattern, geometry, and habitats maintain or improve long-term stream health.

- MM-6. Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function.

- MM-8. Manage water use facilities to prevent gully erosion of slopes and to prevent sediment and bank damage to streams.

Specific to the actions proposed for the LEDE Reservoir expansion, the primary stream health metrics that could be affected are fine sediment deposition into local streams and changes in stream flow regime.

4.1.2 LEDE Reservoir

LEDE Reservoir stores water from two small catchments: the catchment directly up-gradient of the embankment in the headwater area of the Gypsum Creek watershed, and the catchment up-gradient of the headgate of the LEDE Ditch in the headwater area of the Antones Cabin Creek watershed.

The Town of Gypsum owns several water rights for the LEDE Ditch and LEDE Reservoir (see below). The most senior of these water rights was decreed in Civil Action No. 963, with a 1931 priority date, for 947 acre feet. Historically, LEDE Reservoir has been able to store all of the water in Gypsum Creek tributary to the LEDE Reservoir under its senior reservoir storage priority. The in-basin Gypsum Creek water is estimated to be 280 acre feet on average. Another approximately 880 acre feet is added by the LEDE Ditch which diverts water from Antones Cabin Creek for both storage and pass through for use in the Gypsum Creek Basin. The most senior water right for the LEDE Ditch is also a 1931 priority date, for 15.23 cfs.

Table 4.1 Summary of Water Rights

Water Right	Case No. (Division 5 Water Court or Eagle County)	Amount Decreed	Decreed Use	Appropriation Date	Adjudication Date
LEDE Ditch	Civil Action No. 963	15.23 cfs, absolute	Irrigation	June 11, 1931	October 3, 1936
LEDE Reservoir	Civil Action No. 963	473.5 AF Absolute, 473.5 AF Conditional, Made Absolute	Irrigation	June 10, 1931	October 3, 1936

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		; Total 947 AF			
Eye Lake Supply Ditch	Case No. 91CW254; 02CW235	20 cfs, conditional	Delivery of water into storage	April 27, 1966	August 23, 1991
Wolcott Reservoir	Civil Action 1529; Case No. 02CW235	600 AF, conditional	Municipal, industrial, domestic, irrigation, stock watering, augmentation and exchange, electric power generation, recreational, and all other associated municipal uses	April 27, 1966 (change of water right and exchange appropriation date May 4, 1992)	July 9, 1979 (change of water right and exchange adjudication date of 1993)
LEDE Ditch, Town Enlargement	Case No. 05CW292	30 cfs, conditional	Domestic irrigation, commercial, industrial, street washing, fire protection and all other municipal purposes including augmentation and exchange	October 7, 1998	December 30, 2005
LEDE Reservoir, Town Enlargement	Case No. 05CW292	400 AF, conditional	Storage for recreational, aesthetic, piscatorial purposes, domestic, commercial, industrial, street cleaning/washing, fire protection, all other municipal uses, augmentation and exchange	October 7, 1998	December 30, 2005

Neither catchment is monitored by a flow measurement station, so no site specific historical discharge data are available for hydrologic analysis. The only historical flow data available are diversion records, which may not accurately reflect the hydrologic yield, as they are based on infrequent historic observations of diversion and storage operations and are dependent on condition and maintenance of the various facilities.

Although there are no flow measurement stations on the subject catchments, there are similar watersheds nearby for which high quality discharge data are available for a meaningful period of record. Given the lack of site-specific data, the best available means of estimating the yield of the catchments which supply LEDE Reservoir is correlation based on hydrologic parameters with similar nearby gauged watersheds: Beaver Creek near Avon, Colorado, and Cross Creek near Minturn, Colorado. These watersheds are not only nearby but also have slope and aspect characteristics similar to the LEDE catchments. Surface water discharge from Beaver Creek has been measured consistently since the early 1970s by the USGS (site number 09067000). Surface water discharge from Cross Creek has been measured consistently since the late 1950s by the USGS (site number 09065100). Detailed hydrologic analyses based on these two gauges (LEDE Hydrology-Basin Yield Project Memorandum 02.15.2013 in the Project Record) suggest that on average years approximately 1,160 acre-feet of water are available to fill

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the reservoir: 276 acre-feet from the drainage area above the reservoir and 884 acre-feet from upper Antones Cabin Creek via the LEDE ditch.

Typically, the reservoir is filled from late May to late June or mid-July using water from Antones Cabin Creek and Gypsum Creek when both creeks are already at high flow. The LEDE Ditch has historically diverted all of the available flow from Antones Cabin Creek which means that some water has passed directly through the reservoir and into Gypsum Creek. The remaining reservoir water has been stored and then released (or has seeped out) from the reservoir for irrigation in the lower valleys during the late irrigation season from July to October. It has been common for the reservoir to be completely empty by late fall. Thus, no winter time flow has been available for release from the reservoir.

4.1.3 Gypsum Creek

4.1.3.1 Above LEDE Reservoir

The headwaters of Gypsum Creek above LEDE Reservoir consist of a 1st order intermittent stream. Rosgen classification is an A-channel which flows over a coarse, stable bed, with surrounding uplands composed of relatively shallow soils underlain by coarse rock and boulders. The headwaters of Gypsum Creek, including the segment on which LEDE Reservoir is constructed, are intermittent in nature and run dry during a major part of the year.

There are no roads, developments or water diversions on the Gypsum Creek channel above the reservoir, so hydrologic integrity of the basin is intact. There is water added to the basin above the reservoir via diversions from Antones Cabin Creek in the LEDE Ditch. This water supplements natural flows in the Gypsum Creek channel in the reach immediately above the reservoir, which increases flows by an average of 7 cfs during the spring runoff period.

There has been no historic timber harvest, mining or other resource extraction activities in the headwater basin above the reservoir, although livestock grazing is a permitted activity within the watershed. Field review of the Gypsum Creek channel within the Project Area revealed evidence of livestock grazing, as well as the presence of native ungulates, but no evidence of excessive herbivory, bank trampling or resource damage.

Riparian areas along the Gypsum Creek channel above the reservoir were in an overall functioning condition. The wetland delineation report approved by the USACE contains details about the vegetation and functional condition of these areas (Dahmer 2011). Riparian vegetation is important to aquatic biota as it provides cover, shade, terrestrial insect input and mediates non-native material input directly to the stream channel. Riparian vegetation also moderates temperature fluctuations to aquatic habitats.

Given the lack of anthropogenic manipulations in the upper basin, stream health in the Gypsum Creek headwaters above the confluence with the LEDE Ditch diversion, can be considered a reference condition stream channel. The segment of Gypsum Creek

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below LEDE Ditch confluence down to the existing reservoir, had an altered flow regime for decades. These increased flows resulted in some bank erosion and channel adjustments over time, but any eroded sediment was captured by the reservoir.

4.1.3.2 Below LEDE Reservoir

The Gypsum Creek channel below LEDE Reservoir is a 1st order intermittent stream and does not gain perennial flows until a point approximately 600 feet below the dam. Consequently, the riparian corridor in that uppermost reach is extremely narrow and often limited to small depositional areas on bends. Further downstream of the dam, the channel winds its way through alternating forested and meadow areas, including large wetlands associated with beaver dams. The channel is generally steep with a stable, coarse-grained bed. Aside from intermittent impacts from cattle grazing, the channel banks are stable and generally well vegetated.

Riparian areas along the Gypsum Creek channel below the reservoir are in an overall functioning condition. The wetland delineation report approved by the USACE contains details about the vegetation and functional condition of the intermittent stretch immediately below the reservoir (Dahmer 2011). The augmented stream flows from reservoir releases during the growing season likely contribute to the health of the riparian vegetation. Though dam releases through the summer and early fall add water to this channel during periods when the natural flow regime would render it dry, reservoir storage operations have also historically dried this segment of intermittent channel during spring runoff when it would naturally contain runoff flows.

Historically, releases from the reservoir have occurred during the summer months when stream flow of Gypsum Creek is insufficient to meet certain senior direct flow water rights and supplemental irrigation supplies are required. The demand for municipal water in the Gypsum Creek watershed primarily occurs during the same summer months when stream flow is low and the Town's available water supply is also low. Accordingly, municipal releases occur during the same time of year that historical irrigation releases have occurred. Releases from the reservoir substantially augment the native stream flow of upper Gypsum Creek during the late summer months

In spring runoff events, the amount of water diverted by the LEDE Supply Ditch exceeds the amount of water required to fill LEDE Reservoir. In these instances, the excess inflow has been routed through the reservoir and into Gypsum Creek.

There are minimum in-stream flow rights, decreed in 1980 by the Colorado Water Conservation Board (CWCB), on Gypsum Creek. There are two decreed rights: a right of 5 cfs from LEDE Reservoir to Red Creek (Case No. 80CW117) and a right of 6 cfs from the confluence of Red Creek and Gypsum Creek, to Gypsum Creek's confluence with the Eagle River. These instream water rights are junior to the senior water rights typically used to fill LEDE Reservoir. Historically, the Gypsum Creek instream flow calls have occurred far down on Gypsum Creek, closer to the Eagle River confluence because of the senior diversions by agricultural rights near the Town.

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4.1.4 Antones Cabin Creek

Antones Cabin Creek is a 2nd order headwater stream that feeds West Brush Creek, and is spatially and seasonally intermittent in the upper reaches.

The watershed basin of Antones Cabin Creek is characterized by very rugged and rocky terrain. The area of the watershed below the ditch diversion lacks a well defined channel and areas that would appear to be streambed are often dry, even when water is available above. Water is traveling below the surface, but it does not necessarily re-appear lower in the basin. The travel path of sub-surface water in this basin is not readily apparent. In fact, trial water releases in the upper part of the basin did not increase the flow in the lower part of the basin, and may have ended up in Gypsum Creek via groundwater flow.

The LEDE Supply Ditch historically and currently captures the entire surface flow of Antones Cabin Creek very high in the basin, and has existing capacity adequate to deliver this water to the reservoir. Virtually all of the water that is diverted by the ditch is diverted during the snowmelt runoff period, primarily mid-May through mid-July. Diversions during the late summer months (August through October) are minimal due to lack of runoff in the watershed area above the ditch headgate.

CWCB has also decreed 2.5 cfs minimum stream flows on Antones Cabin Creek from April 15 to September 30 and 0.5 cfs from October 1 to April 14. This right has a 1997 priority date and has never placed a call. Again, like in Gypsum Creek, several of Gypsum's LEDE water rights are senior in priority to this instream flow right. As discussed previously, there is no perennial stream channel that connects the diversions at LEDE Ditch to the lower portion of Antones Cabin Creek and the water at the LEDE Ditch headgate dries up during the late season.

4.2 Wetlands and Riparian Areas

Surveys to gather site data and delineate wetlands and waters of the U. S. were first conducted in early October 2009, with follow-up visits in June 2010. Additional data points were collected in October 2011 to improve documentation of the findings. All data collections were done using Level 3 procedures for areas greater than 5 acres in size, of the routine onsite determination method as described in the 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands in conjunction with the Western Mountains, Valleys and Coast Region Supplement. See the Wetland Delineation Report in the Project Record for a complete description of methods and results.

Wetlands are legally defined by the Clean Water Act as found in the 1987 Wetland Delineation Manual and require three elements to be classified as jurisdictional wetlands regulated under the CWA:

1) Dominant hydrophytic vegetation in the plant community ("hydrophytic" species are categorized as to their relative saturation tolerance as Obligate (OBL), Facultative Wetland (FACW) and Facultative (FAC) species. If a site is dominated (i.e. ≥50% of the plant community) by

species with these designations, then it meets the vegetation criteria for wetlands)

2) Hydric soils (soil characteristics that form only under significant periods of saturation and anaerobic conditions)
3) Hydrology to support the wetland (this must be present during a sufficient portion of the growing season to support hydrophytic plants)

A total of 3.53 acres of wetlands meeting all three standard jurisdictional criteria were delineated within the Project Area, which includes three types of wetland areas: 1) riparian-associated wetlands along inlet/outlet channels dominated by shrub/tree overstories; 2) shrub-dominated slope wetlands on the northeast corner; 3) lucustrine-supported grass/grass-like fringe wetlands around portions of the reservoir shoreline. The reservoir itself contains 24.8 surface acres of open water when full, which area is regulated under the Clean Water Act as a "water of the United States" (Figure 1 in Appendix B).

Hydrology for most of the reservoir perimeter is clearly dependent on the reservoir, which is filled primarily by waters diverted from Antones Cabin Creek via the LEDE Ditch, which empties into the existing Gypsum Creek channel above the reservoir. There is one small un-named tributary on the northeast side of the reservoir that contributes a small amount of water along a poorly defined channel, and two small seeps which are tributary to Gypsum Creek at the far southern end of the reservoir.

Wetland vegetation supported around the eastern perimeter of the reservoir itself is dominated by beaked sedge (*Carex utriculata*), small-wing sedge (*Carex microptera*), Tufted hairgrass (*Deschampsia caespitosa*) and mountain brome (*Bromus carinatus (syn. marginatus*)). The northeast slope wetland contains a mixture of shrubs, grass/grasslike and forb vegetation. This site is dominated by planeleaf willow (*Salix planifolia*), mountain willow (*Salix monticola*), bog birch (*Betula glandulosa*), shrubby cinquefoil (*Pentaphylloides floribunda*), beaked sedge (*Carex utriculata*), small-wing sedge *(Carex microptera),* and in some locations supports moss.

The western side of the reservoir is steep and very rocky, and much of the shoreline has no wetland fringe at all. The areas that do support a very narrow fringe wetland are dominated by an Engelmann spruce *(Picea engelmannii),* with sparse clusters of tufted hairgrass and beaked sedge along with occasional moss clumps at water's edge.

The southern inlet along Gypsum Creek proper is mainly composed of an Engelmann spruce and subalpine fir (*Abies lasiocarpa*) overstory with scattered planeleaf willow and bog birch shrubs along the channel. Much of the inlet channel is steep and somewhat incised, so herbaceous wetland fringes are largely limited to depositional areas on stream bends and contain beaked sedge, tufted hairgrass, the non-native Kentucky bluegrass (*Poa pratensis*), redtop bentgrass (*Agrostis stolonifera*) and Columbia needlegrass (*Stipa columbiana*).

The exception to this is a small, relatively flat bench where Gypsum Creek enters the reservoir, and where two small, un-named tributaries also converge. At this location a robust stand of beaked-sedge persists on an elevated bench above the Gypsum Creek

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channel, which then gives way to a dense overstory of mixed-age spruce and fir forest upslope.

4.3 Upland Vegetation

LEDE Reservoir is situated near the very head of the Gypsum Creek drainage in a north-facing bowl between 9480 and 9650 feet elevation. Dominant vegetation includes a varied mixture of spruce/fir forest, mature lodgepole pine forest, mixed lodgepole-aspen forest and subalpine meadow. Lodgepole pine, Engelmann spruce, and subalpine fir are generally dominant trees occupying the 8,000 to 11,000 foot elevation zone, and are common throughout the WRNF (USFS 2002).

The east side of the reservoir is primarily composed of subalpine meadow which eventually transitions into to mixed aspen/conifer forest, with a scattered shrub species. The exception is the northeast inlet area, which is a slope wetland primarily composed of willows and some bog birch mixed with sedges. The south end of the reservoir meets spruce/fir forest except for the mixed grass/forb vegetation with sparse willows of the riparian along the Gypsum Creek inlet channel. The west side of the reservoir is generally spruce/fir forest mixed with grassy parks, which occur on steep, very rocky slopes. At the top of the western ridgeline, the spruce/fir forest gives way to extensive stands of mature lodgepole pine forest. The north end of the reservoir includes the dam; grass/forb and mixed-shrub vegetation is below the dam along the outlet channel. The outlet channel alternates between grass/forb, willow, spruce-riparian and aspen stands for approximately one mile below the reservoir, after which it becomes a largely beaver dam complex with willows and wetlands.

Upland areas in the open meadows surrounding the reservoir are characterized by timothy *(Phleum pratense)*, smooth brome *(Bromus inermis)*, Kentucky bluegrass, Columbia needlegrass, orchardgrass *(Dactylis glomerata)*, sulphur flower (*Eriogonum umbellatum*), western yarrow (*Achillea millefolium*), Virginia strawberry (*Fragaria ovalis*) and minor occurrences of gooseberry *(Ribes inerme)* and Wood's rose *(Rosa woodsii)*.

Extensive stands of mixed-age Engelmann spruce and subalpine fir covers much of the west side of the reservoir, with dense canopy cover and much blow-down. There is little understory vegetation in the evergreen forested areas, but what exists is dominated by myrtle blueberry (*Vaccinium myrtillus*), bearberry (*Arctostaphylos uva-ursi*), common lupine (*Lupinus caudatus*) and elk sedge (*Carex geyeri*). Forested uplands on the east side of the reservoir contain spruce/fir stands mixed with large stands of aspen (*Populus tremuloides*) and a number of small, open parks dominated by grass/forb communities. These areas are productive and have much higher species richness than the strictly evergreen forest areas. These sites contain all of the species thus far noted, plus Arapahoe Peak larkspur (*Delphinium barbeyi*), monkshood (*Aconitum columbianum*), alpine timothy (*Phleum alpinum*), American vetch (*Vicia americana*), lovage (*Ligusticum porteri*), cow parsnip (*Heracleum lanatum*), Columbine (*Aquilegia caerulea*), twinflower (*Linnaea borealis*) and shrubs such as snowberry (*Symphoricarpos oreophilus*) and ninebark (*Physocarpus monogynus*).

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There is a heavily-used campground area on the north end of the reservoir, which is strongly favored by local residents for weekend camping and parties. Also, livestock grazing around the reservoir can be intense as it is a key water source amid open meadows. Given these varied and concentrated land uses, a number of weedy species and some listed noxious weeds are present in the Project Area. These include common tansy *(Tanacetum vulgare)*, Canada thistle *(Cirsium arvense)*, plumeless thistle *(Carduus acanthoides)*, houndstongue (*Cynoglossum officinale*), erect knotweed *(Polygonum erectum)*, English plantain *(Plantago lanceolata)* and common dandelion *(Taraxicum officinale).*

4.4 Management Indicator Species (MIS)

The WRNF Forest Plan completed in 2002 identifies MIS, as required under 36 CFR 219.19(a)(6). Management Indicator Species, their habitats, and population trends are analyzed and monitored in order to indicate the likely response of other species with similar habitat requirements to forest management activities. Forest Plan goals include demonstration of positive trends in habitat availability, habitat quality, or other factors affecting MIS. MIS trends are to be evaluated at the Forest scale. Table 4.6 contains the updated MIS list for the WRNF and those species carried forward with detailed analysis. The detailed analysis of the alternatives and their effects are documented in the LEDE Reservoir Enlargement Project MIS Report (available in the Project Record).

Table 4.6: WRNF Management Indicator Species Carried Through Analysis.

MIS	Associated Environmental Features	Detailed Analysis Necessary
American elk	all major vegetation types	Yes
Brewer's sparrow	sagebrush	No
cave bats	caves/mines	No
American pipit	alpine grasslands/tundra	No
Virginia's warbler	mixed mountain shrubland/Pinyon-Juniper	No
aquatic macroinvertebrates	streams and rivers	Yes
all trout	streams and rivers	Yes

Effects of the proposed project to each species and its habitat were considered, with detailed analysis continuing for American elk, aquatic macroinvertebrates and trout. The remaining species were dismissed from detailed evaluation in this report either because no suitable habitat is available for those species in the vicinity of the proposed project, or the species is analyzed in a separate project document.

American elk inhabit essentially all vegetation types throughout the WRNF. LEDE Reservoir is located within DAU E-16. Only summer and overall range for American elk occur within 1000 feet of the reservoir. There are no other habitats for American elk

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present in the Project Area. Based on numerous site visits in spring, summer and fall, elk overall and summer range in the Project Area (within 1000 feet of the reservoir) appear to be in fair condition, providing some forage and browse in streamside and upland environments. Some of the upland meadow areas on the east side of the reservoir receive moderate to heavy cattle grazing use due to the gentle slopes and easy access to water. The current elk population within DAU E-16 is estimated at 7,100 elk post-hunting season. This herd has been actively managed to reduce the population to 5100 elk. Based upon the most recent data available, the DAU E-16 herd remains above the population objective.

Trout as a group are distributed throughout most perennial streams and lakes in the WRNF. Forest-wide aquatic monitoring to evaluate MIS trends for the Forest Plan began in 2003. One MIS sampling station near the project area is located in Gypsum Creek 2.8 miles below the reservoir, with four samples collected from 2007-2012. According to CPW and USFS records, Gypsum Creek contains a naturally-reproducing trout population, though it has also received numerous supplemental stocking of trout from CPW from 1973 to the present. According to the most recent USFS fisheries electro-shocking survey on Gypsum Creek (2011), the stream was dominated by brook trout. Surveys indicate all age classes of trout are well distributed across sampling years, and data across all metrics indicate that Gypsum Creek is in a robust state for trout populations when compared to reference site trout population data. The MIS report contains a detailed discussion of the survey results and population trends (see Project Record).

The outlet channel for approximately 600 feet below LEDE reservoir is an intermittent channel which offers no suitable habitat for fish or macroinvertebrates. Approximately 600 feet below the reservoir, a minor surface water seepage begins to appear in the Gypsum Creek channel and gradually increases to approximately 1 cfs by the time it reaches the LEDE Reservoir road junction with USFS Road 412 (Gypsum Creek Road), which is approximately 1.5 miles below the reservoir (Zancanella & Associates field observations).

LEDE Reservoir has historically been annually stocked by Colorado Parks and Wildlife (formerly the Colorado Division of Wildlife) with non-native trout species (Craig Wescoatt, pers. comm.). However, because the reservoir lacks storage capacity and is usually drained by early fall each year, over-winter survival of stocked fish seldom occurs. Therefore the reservoir is essentially a put-and-take seasonal fishery.

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. Benthic macroinvertebrates the MIS site on Gypsum Creek described above in 2007 and 2011. Analyses contained in the MIS report indicate at this site, Gypsum Creek was robust for all macroinvertebrate metrics compared to reference conditions however; there is not yet enough data to determine trends in macroinvertebrate populations or composition. As noted in the Management Indicator Species (MIS) report (see Project Record) the intermittent nature of Gypsum Creek within the Project Area would not be expected to support a year-round macroinvertebrate population.

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4.5 Forest Service Sensitive Species

US Forest Service Region 2 designated sensitive species that may be declining in numbers or occurrence or whose habitat is limited or declining (May 25, 2011).

Based on biological review of the Project Area and its surrounding environment, species occurrence records and natural histories, a pre-field review was conducted of available information to determine which sensitive species should be carried forward in analysis. Sensitive species (animals and plants) having habitat in the LEDE Reservoir Project Area include: Townsend's big-eared bat (*Corynorhinus townsendii)*, fringed myotis (*Myotis thysanodes)*, hoary bat (*Lasiurus cinereus)*, American marten (*Martes americana)*, pygmy shrew (*Sorex hoyi)*, North American wolverine (*Gulo gulo luscus)*, northern goshawk (*Accipiter gentilis)*, boreal owl (*Aegolius funereus)*, northern harrier (*Circus cyaneus)*, olive-sided flycatcher (*Contopus cooperi)*, flammulated owl (*Otus flammeolus*), boreal toad (*Anaxyrus boreas boreas)*, northern leopoard frog (*Lithobates pipiens)*, Colorado river cutthroat trout (*Oncorhynchus clarkii pleuriticus)*, trianglelobe moonwort (*Botrychium ascendens*), forkleaf moonwort, (*Bortrychium* tax NOV. "*fu rcatum*"), narrowleaf moonwort (*B. lineare*), Paradox moonwort (*B. paradoxum*), yellow lady's slipper (*Cypripedium parviflorum*), altai cotton-grass (*Eriophorum altaicum var. neogaeum*), Hall fescue (*Festuca hallii*), Colorado tansyaster (*Machaeranthera coloradoensis*), Porter's feathergrass (*Ptilagrostis porteri*), dwarf raspberry (*Rubus arcticus* ssp. *acaulis*) and hoary wouldow (*Salix candida*). No further analysis is needed for species that are not known or suspected to occur in the project area, <u>and</u> for which no suitable habitat is present. The Biological Evaluation contains detailed analyses for these species (available in the Project Record).

There are no known populations of Colorado River Cutthroat Trout (CRCT) in the LEDE Reservoir or the Gypsum Creek watershed. However, CPW has stocked CRCT in tributary streams in the past with limited success and two CRCT have been documented in Red Creek which is located downstream of the Project Area. Therefore, CRCT may be present in the watershed, though their presence would be limited to individuals that would likely be outcompeted for habitat over time by non-native species (Matt Grove, pers. comm.). The Gypsum Creek channel is an intermittent stream to a point approximately 600 feet below the reservoir, and as such offers no suitable habitat for CRCT. The reservoir itself currently offers suitable habitat for CRCT, but it is only seasonal as the reservoir is generally drained annually. These factors coupled with the annual stocking of non-native trout species, therefore renders the reservoir currently un-suitable for CRCT. The BE report (see Project Record) contains a detailed review of project effects to CRCT.

The LEDE Project Area is located in the elevation range of boreal toad and northern frog, and one adult boreal toad was documented in the nearby Antone's Cabin Creek watershed in 2011. No other amphibian species have been documented within or immediately surrounding the project area. LEDE reservoir offers limited potential breeding habitat for boreal toad and northern leopard frogs. Potential breeding habitat at LEDE Reservoir is mainly located along the emergent vegetation area near the inlet on the south end of the reservoir. No other rooted aquatic vegetation areas in still-waters appropriate for this species were noted on the site visits. The wide disparity between

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spring and summer water levels in the reservoir may have a negative effect on eggs hatching and tadpole survival. Summer habitat and winter hibernacula requirements could be met throughout the uplands surrounding LEDE reservoir.

The area around the LEDE reservoir project site was surveyed for U.S. Forest Service Sensitive Plant Species during the summer of 2010 in conjunction with the wetland delineation effort. None of these sensitive plant species were found in the Project Area, though potential habitat was present. The quantity of habitat for most of these plant species was limited in spatial extent; the quality for most was marginal. A detailed description of these sensitive plant species and the field findings are included in the Biological Evaluation report which is incorporated herein by reference (see Project Record).

The north, south and west sides of the Project Area are bounded by mature, mixed spruce-fir forest with coarse woody debris, wetlands, and creeks that could provide hunting/foraging, resting/roosting/perching, and breeding habitat for Townsend's big-eared bat, fringed myotis, hoary bat, American marten, pygmy shrew, northern goshawk, boreal owl, olive-sided flycatcher, and flammulated owl. The forested areas with coarse woody debris, reservoir, creeks and wetlands provide access to moist soil and abundant prey for these species. The creeks and wetlands provide them with access to water, and in the case of the bat and some bird species, additional foraging area. While species specific differences in habitat quality at LEDE Reservoir varies, overall the quality of habitat for these species is good.

The proximity of open meadow areas and some wetlands around the reservoir offers potential foraging and nesting habitat for northern harrier. However, northern harrier has a clear preference for lightly-grazed or undisturbed meadow areas with relatively tall, thick vegetation. The dry meadow with very short stature vegetation, bare ground, small spatial extent of the wetlands, and extensive grazing activity makes these meadows and wetlands unsuitable for northern harrier foraging and nesting. While potential habitat for this species exists, it is extremely marginal and highly unlikely to attract anything but cursory use by northern harrier in summer.

4.6 Threatened, Endangered, and Proposed Species

A list of threatened, endangered and proposed species pertinent to the Eagle-Holy Cross Ranger District was obtained from the Forest Service (concurrence by USFWS February 3, 2011) and a Biological Assessment (BA) was conducted. Based on biological surveys of the Project Area and surrounding habitats, habitat suitability, records of species from the area of influence and habitat affinities, the USFS list was narrowed to those species that required specific analysis for the LEDE reservoir project. The BA report contains details of the analysis (see Project Record).

Two mammals, Canada lynx (*Lynx canadensis*) and North American wolverine (*Gulo gulo luscus*), and four fish species are 1) known to occur near the LEDE Reservoir analysis area based on confirmed sightings, 2) may occur near the Project Area based on unconfirmed sightings, 3) potential habitat exists for the species near the Project Area, or 4) water depletions may affect downstream off-site habitats. The Project Area does not

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include any designated critical habitat for any of the threatened, endangered, or proposed species.

Approximately 119 acres of habitat for Canada lynx can be found within 1000 feet of LEDE Reservoir. This includes denning, winter foraging, other and currently unsuitable habitat. Some of the denning and winter foraging habitat for lynx, found in mixed conifer forested stands, has evidence of insect and disease to varying levels of magnitude. These same forested areas serve as secondary movement/travelling and hunting/foraging habitat for North American wolverine. Despite the natural occurrence of insects and disease, these forested environments are still biologically functioning habitats for these two mammal species.

Potential effect of water depletions on the endangered Colorado Pikeminnow (*Ptychocheilus lucius*), bonytail chub (*Gila elegans*), humpback chub (*Gila cypha*), and the candidate razorback sucker (*Xyrauchen texanus*) is a primary concern for the USFWS. These species are grouped in the Biological Assessment (BA) analysis because all are endangered big-river species endemic to the lower Colorado River drainage, none of which have suitable habitat in the Project Area. However, the USFWS believes that the major causes for the decline of these four species are impoundments and water depletions from the Colorado River and its tributaries.

4.7 Recreation

The WRNF is broadly recognized as providing exceptional outdoor recreation opportunities. Recreation has grown to become the predominant use of the forest and the primary economic base for many communities near the Project Area. LEDE reservoir and the surrounding areas are well-suited for a broad variety of recreational activities. The Forest Service Recreation Opportunity Spectrum (ROS) defines classes of outdoor recreation activities based upon the physical, social and managerial characteristics of the area. The 2002 Forest Plan designates the areas around LEDE reservoir as Management Area 4.3—Dispersed Recreation. The area also falls into motorized prescription B, non-motorized use, except snowmobile winter use. Most of the lands surrounding LEDE reservoir on the east, south and west are designated Management Area 1.2—Proposed Wilderness, and are managed as de facto wilderness until such time as Congress takes action on the proposal.

The area immediately surrounding LEDE reservoir is mapped as a snow compaction area due to the basin's popularity as a snowmobiling playground. Cross-country skiers and snowshoers also make use of the area during winter months.

The presence of the reservoir and associated put-and-take fishery is also an important attraction for summer camping recreation that takes place on the north end of the reservoir. No estimates are available of actual user-days of camping at the reservoir. Other recreational activities available around LEDE reservoir includes dispersed hiking, hunting, sight-seeing, and mountain biking opportunities.

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5 Environmental Consequences

5.0 Direct, Indirect and Cumulative Effects

Under NEPA and the regulation for implementation of NEPA, actions that could affect the environment must be analyzed in terms of their overall context and intensity. The duration of an effect is an important factor in determining its context and intensity. Short-term effects are typically associated with construction and development activities of limited and predictable duration. Long-term effects may also be predictable but extend beyond the period of construction and may become permanent (40 CFR 1508).

Short-term and long-term effects can be direct or indirect. A direct effect is caused by action and occurs at the same time and typically in the same vicinity of the action. An indirect effect is reasonably foreseeable effect that is also caused by the action but is removed by time or distance. Cumulative effects are an aggregate of the incremental direct and indirect effects of an action when added to past, present and reasonably foreseeable future actions, including activities by other parties (40 CFR 1508.7).

In the following discussion of environmental consequences, the potential effects of each alternative are described for each resource category and where applicable identified as direct, indirect and/or cumulative.

5.1 Water Resources

5.1.1 Alternative 1 – No Action

Under the No Action alternative, the reservoir would be restored to its original storage capacity and functional condition by repairing the dam, spillway and outlet works to meet State dam safety regulations. Water diversion into storage would continue to occur, primarily during early spring runoff and releases of water from storage would continue to occur under the historic release schedule. This Alternative would provide for the continued use of the water resource currently allocated to LEDE, retain a wetland fringe and mudflats surrounding the reservoir, and would continue current reservoir operations. Maintaining the reservoir and the standard operations, which have been on-going since the 1930s, would result in no change to the water resources above the reservoir.

Repairs to the outlet works mandated by the State would result in a minor (0.02 ac) affect to wetlands adjacent to the Gypsum Creek outlet channel below the dam, and would affect approximately 80 linear feet of the intermittent stream channel with the placement of rip-rap scour prevention measures along the intermittent channel. No other changes to the stream channel or operations of the reservoir would be expected. Therefore, stream health in the Project Area would be maintained at its current level.

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5.1.2 Alternative 3 – Rebuild and Increase Storage to 947 AF

This Alternative would address State dam safety requirements including repair of the dam, spillway and outlet works (see description under the No Action alternative), increase storage capacity of the reservoir to 947 AF, enlarge the water surface area to 32.2 acres and provide augmented stream flows to Gypsum Creek below the reservoir. Enlargement would cause the inundation of approximately 270 linear feet of the intermittent Gypsum Creek channel above the reservoir. In addition, the enlarged emergency spillway area would require rip-rap scour protection for about 80 linear feet in the existing stream channel, which would result in impacts to approximately 870 ft^2 (0.02 acres) of riparian wetlands below the dam. During construction activities for the enlargement, it is expected that an additional 85 linear feet of streambed and 0.02 acres of riparian wetlands below the outlet works may be temporarily affected for an equipment access crossing. Appropriate permitting and mitigation planning would be completed with the U.S. Army Corps of Engineers for these effects.

The increase in reservoir capacity allows for storage and releases that can be scheduled to maximize benefits to both the Town and Gypsum Creek. Water can be released during drier times during the late irrigation season, non-irrigation season and possible even during winter, subject to freezing issues mentioned previously. Specifics on reservoir releases are discussed below.

Further, the Town has agreed to mitigate the effects of this stream channel effect by implementing a bypass flow during spring runoff when the reservoir is filling in the amount of 0.1 to 0.3 cfs, with exact amount dependent on the water-year. This bypass flow during spring runoff and the subsequent releases would have the effect of creating a perennial flow below the reservoir in the 600-foot reach which is now intermittent. Therefore, the effects of the enlargement to the intermittent Gypsum Creek channel at the Forest-wide scale would be insignificant, and mitigation for the effects would be a stipulation in the new SUP, which offset the effects.

5.1.2.1 LEDE Reservoir

Based on the analysis presented in Section 4.1 of this document, there is expected to be about 1,160 AF (276 plus 884) of water available for storage in LEDE Reservoir on average.

Table 5.1.2.1 and Figure 5.1.2.1 below are an estimate of the LEDE Reservoir operation in an average year, but beginning with the initial filling of the reservoir. In exceptionally dry years, it may be necessary to further draw the reservoir down and deplete water kept in the reservoir as carry-over storage. It is assumed that the dry year event might occur less than once every ten years, based on a review of the last 30 years of record. In exceptionally wet years, more water would be run through the reservoir to maintain a full reservoir and thus maximize storage.

Although a portion of the reservoir will be used for municipal purposes, the LEDE facilities will be operated in a manner that is largely consistent with the historical irrigation use of the reservoir and the ditch. As outlined below, the facilities will divert,

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store, and release water in an amount and pattern that is similar to that associated with irrigation uses.

Table 5.1.2.1 LEDE Reservoir Operation—Average Year

		Post-project, current release conditions							
Month	**Water Surface Elevation (feet)** (1st of month)	**Acre-Feet of Storage** (1st of month)	**Acre-Feet of Release** required	**Acre-Feet of Release** run thru reservoir	**Seepage acre-feet**	**Acre-Feet of Storage** Added from Ditch	**Acre-Feet of Storage** Added from in-Basin	**Acre-Feet of Storage** **Total** [end of month]	**WSEL (feet)** [end of month] (without evap.)
January	9,512	231	0.0	0.0	17.0	0	0	214	9,510
February	9,510	214	0.0	0.0	17.0	0	0	197	9,510
March	9,510	197	0.0	0.0	17.0	0	0	180	9,508
April	9,508	180	0.0	0.0	17.0	0	0	163	9,508
May	9,508	163	0.0	0.0	17.0	75	50	271	9,514
June	9,514	271	0.0	0.0	17.0	600	100	954	9,541
July	9,541	950	61.4	172.0	17.0	200	50	950	9,541
August	9,541	950	122.8	150.0	17.0	10	30	700	9,533
September	9,533	700	118.8	120.0	17.0	0	30	474	9,524
October	9,524	474	122.8	50.0	17.0	0	15	299	9,516
November	9,516	299	34.5	0.0	17.0	0	0	248	9,512
December	9,512	248	0.0	0.0	17.0	0	0	231	9,512

Figure 5.1.2.1: Typical Reservoir Operation

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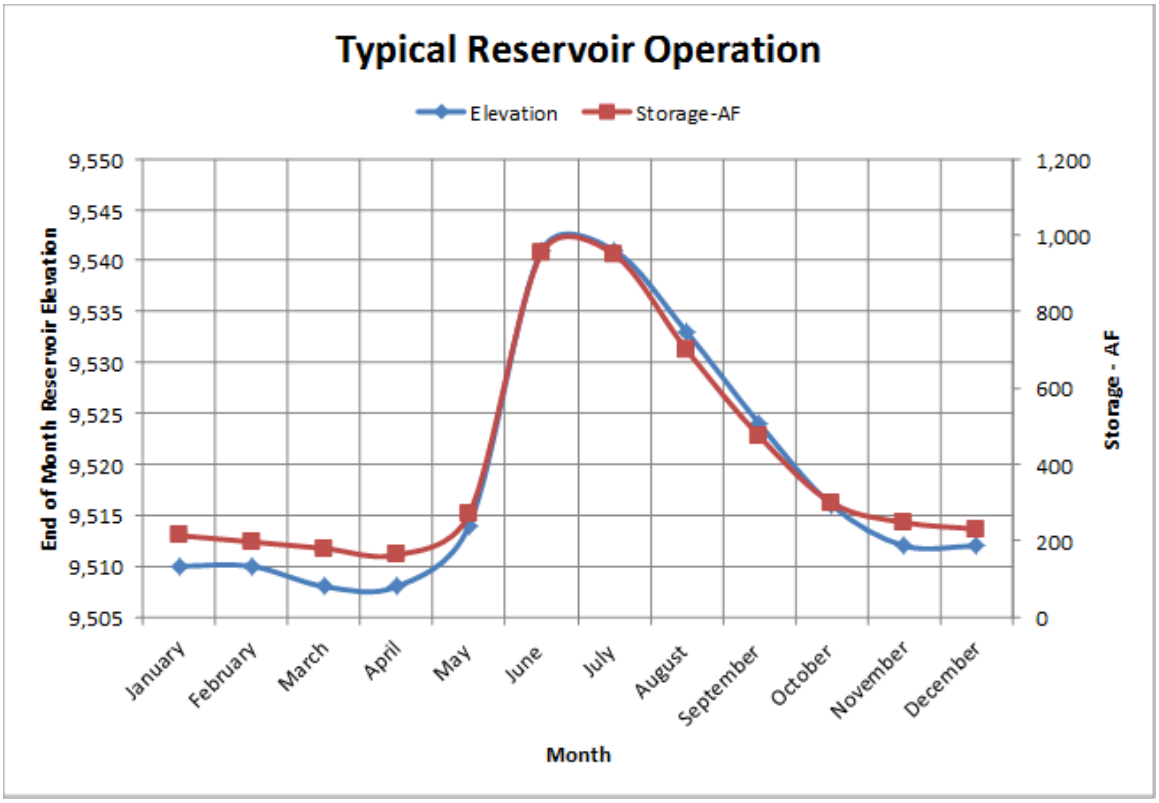

5.1.2.2 Gypsum Creek

Above LEDE Reservoir

Enlargement would cause the seasonal inundation of approximately 270 linear feet of the intermittent Gypsum Creek channel above the reservoir. The length of the inundation period varies with elevation, from a few weeks near the maximum storage elevation to most of the growing season at bottom of the impacted reach. Depending on the duration of inundation, portions of the stream bank would be subject either a shift or complete loss of riparian vegetation. The hydrologic regime would be seasonally shifted from a free flowing stream to standing water for some portion of the growing season. See the discussion below about adjustments to the reservoir release schedule to offset impacts to the inundated section of stream channel. The 0.42 acres of riparian wetlands to be inundated along the inlet channel would be mitigated offsite in accordance with a wetland mitigation plan approved by the USACE (see Project Record).

Below LEDE Reservoir

Below the reservoir, the enlarged emergency spillway area would require rip-rap to protect the existing stream channel from erosion, which would result in effects to approximately 870 ft^2 (0.02 acres) of riparian wetlands below the dam, which includes about 80 linear feet of the stream channel. During construction activities for the enlargement, it is expected that an additional 85 linear feet of streambed and 0.02 acres of riparian wetlands below the outlet works may be temporarily affected for an equipment

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access crossing. This wetland effect would also be addressed in the proposed mitigation plan completed with the USACE.

In order to offset the effects of stream channel inundation upstream of the reservoir, a bypass flow during spring runoff would be added to the reservoir release schedule. The downstream channel immediately below the reservoir has historically been dry during spring runoff when the reservoir is filling. The proposed releases during this period would range annually between 0.1 to 0.3 cfs, with the exact amount based on annual snowpack and expected basin water yield. This bypass flow during spring runoff, along with the subsequent irrigation-related releases, would be expected to improve stream habitat conditions for fish and aquatic macroinvertebrates, as well as conditions for wetland plant species along upper Gypsum Creek.

Historically, the Gypsum Creek minimum instream flow calls have occurred far down on Gypsum Creek, closer to the Eagle River confluence because of the senior diversions by agricultural rights near the Town. However, water released from storage will largely be released during the drier portion of the year, when it would most benefit Gypsum Creek's streamflow. Water may also be carried over from wet years to dry years for release during the dry years, which will also benefit the stream. In any event, the priority system in Colorado dictates that junior water rights held by Gypsum for the LEDE Ditch and LEDE Reservoir are not able to divert when there is an instream flow call.

5.1.2.3 Antones Cabin Creek

The proposed project would not change the historical operation of the LEDE Supply Ditch. Specifically, the ditch would continue to divert all water physically available during the snowmelt runoff period. This would maintain the current flows and associated stream health in Antones Cabin Creek above and below the point of diversion. In addition, the priority system in Colorado dictates that junior water rights held by the Town of Gypsum for the LEDE Ditch are not able to divert when there is an instream flow call.

5.1.2.4 Cumulative Effects

For stream health analyses, the temporal scale for assessing cumulative effects is within the next 5 to 10 years. The spatial scales are the Gypsum Creek watershed above the confluence with Red Creek, and the Antones Cabin Creek watershed. The past, present, and reasonably foreseeable actions that affect stream and wetland health in both watersheds include: water diversion/augmentation, cattle grazing, recreational use, and private land development.

For Gypsum Creek, the proposed action would have a net positive effect on stream flows, particularly in drought years, by augmenting in-stream flows via downstream irrigation diversions as well as with the bypass flow during reservoir filling. Other effects to stream health, such as sedimentation from construction activities, would be of short duration and largely captured in the reservoir or construction-related erosion control measures and would not be detectable lower at the downstream end of the analysis area. Permanent impacts to wetlands would be mitigated offsite, as approved in the wetland

mitigation plan, to be consistent with the no net loss policy in Executive Order 11990, Protection of Wetlands.

For Antones Cabin Creek, there are no ground disturbing activities or changes to the historic diversion operations. Consequently there are no direct or indirect effects that would create a cumulative effect in that watershed.

5.2 Wetlands and Riparian Areas

5.2.1 Alternative 1 – No Action

This No Action Alternative would provide for the continued use of the water resource currently allocated to LEDE, would retain the annual hydrologic function of filling and draining the basin, retain a wetland fringe and mudflats surrounding the reservoir, and in effect, would continue current reservoir operations. Maintaining the reservoir and the standard operations, which have been on-going since the 1930s, would result in no change to the wetlands or functions that now exist on the site.

5.2.2 Alternative 3 – Rebuild and Increase Storage to 947 AF

The LEDE Reservoir enlargement would permanently affect a small segment of riparian wetlands below the dam along the Gypsum Creek channel when the new outlet works are installed. Also, fringe wetlands around the expanded reservoir, a portion of the slope wetland on the northeast side of the reservoir, and the riparian wetland at the reservoir inlet would experience inundation in late spring each year. Table 5.3 provides a listing of the wetland effect locations and acreages.

Table 5.3: Expected Wetland Effects from LEDE Reservoir Enlargement.

Location	Wetland Type	Mechanism of Effect	Approximate Number of Acres
Northeast Slope Wetland	Slope/willow dominated	Inundation	1.24
Gypsum Creek Inlet	Riparian	Inundation	0.42
Reservoir Fringe	Lacustrine Fringe	Inundation	0.21
Gypsum Cr. Outlet	Riparian	Permanent Fill	0.02
Gypsum Cr. Outlet	Riparian	Temp. Constr.	0.02
Total			**1.91**

The primary functions of these wetland areas include food chain support, fish and wildlife habitat, and recreational values. Secondary functions include maintenance of water quality, groundwater recharge and discharge, shoreline anchoring and dissipation of erosive forces.

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Wetlands impacts are regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. The impacts described above would also be documented in the 404 Permit Application materials submitted to the Army Corps of Engineers (Project No. 201100950). Mitigation of these impacts must meet the goals of the Clean water Act and the requirement of Executive Order 11990.

The U.S. Forest Service and the Town of Gypsum have agreed that off-site compensatory mitigation for the anticipated effects of the enlargement would be the best alternative in order to ensure successful mitigation and replacement of functions and values in reasonably close proximity to the effect location. Elevation, shortened growing season and uncertainties posed by dam operations in response to water demands and fluctuating water levels within the basin make on-site mitigation difficult for some wetland functions.

Functions such as fish habitat, groundwater recharge and discharge, shoreline anchoring and dissipation of erosive forces would be replaced by the enlarged reservoir and by new wetland vegetation that would likely become established given the similarities of historic and proposed reservoir operations. In fact, carry-over storage expected from the enlargement would be likely to enhance fisheries and recreational opportunities by creating more stable aquatic habitats. However, analysis of the timing and duration of the expected inundation on the existing wetland plants around the reservoir indicates that 1.91 acres of slope and riparian wetlands may be affected either through mortality of plants or shifting of the composition of the wetland plant assemblage.

The wetland mitigation plan, based on the standards set forth by the Clean Water Act, would be developed in cooperation with the U.S. Army Corps of Engineers during the Individual Permit procurement for the LEDE Reservoir enlargement. It would describe in detail the mitigation activities designed to offset potential wetland effects. By complying with this plan, the long-term ground cover, soil structure, water budgets and flow patterns of wetlands around the reservoir would be effectively maintained and functional capability in the watershed context would be maintained or improved.

Historically, the cumulative effects of land use practices in the Central Rocky Mountains, including activities such as road construction, mining, timber cutting, and urbanization, have resulted in substantial losses of wetlands habitat in the region. The Proposed Action includes off-site mitigation for 1.91 acres of potential wetland effects. According to the functional assessment methodology employed by the USACE, the proposed mitigation measures are expected to greatly improve the functional condition of the restored area, and exceed the goal of no net loss of wetlands on the WRNF. The cumulative effects of the Proposed Action are therefore expected to result in a net benefit to wetland function in the watershed context.

5.3 Upland Vegetation

The direct and indirect effects of the Proposed Action and alternatives on vegetation are described below.

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5.3.1 Alternative 1 – No Action

This No Action Alternative would provide for the continued use of the water resource currently allocated to LEDE, retain mudflats surrounding the reservoir, and continue current reservoir operations. Therefore no effect to the existing upland vegetation assemblage would be expected.

5.3.2 Alternative 3 – Rebuild and Increase Storage to 947 AF

Enlargement of LEDE reservoir would result in both temporary and permanent loss of upland vegetation immediately adjacent to the reservoir two ways. First would be construction effects which would involve vegetation removal and earth-moving activities on the dam, spillway and the soil materials borrow-area northeast of the dam (Figure 2 in Appendix B). Second would be loss from inundation once the enlarged reservoir would be filled.

As noted in Section 4.4, inundation would result in permanent loss of vegetation; construction would result in temporary loss since most of the affected areas would be re-vegetated with native plant species found to be present on site prior to the proposed work. The only exception would be at the new spillway area and at the small incremental expansion of the dam toe. These two areas by law, would remain free of obstruction, including deep-rooted trees and shrubs. Grass and forbs would be permitted in those two sites. The vast majority of the enlargement would occur on the upstream face of the dam in areas normally inundated, thereby minimizing permanent vegetation effects to surrounding upland vegetation communities.

Table 5.4 provides a complete listing of the upland effect areas. Visual representation of these effects can be found in Figure 2.

Table 5.4 Summary of Effects to Upland Vegetation

Upland Vegetation Cover Type	Mechanism for Effect	Temporal Length of Vegetation Loss	Approximate Number of Acres Affected
Spruce/fir & Aspen Forests	Construction Disturbance	Temporary	6.94
Upland Meadow	Construction Disturbance	Temporary	3.03
Spruce/fir Forest	Inundation	Permanent	3.05
Upland Meadow	Inundation	Permanent	2.82
All Upland Habitats	**Total All Effect Types**		**15.84**

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5.4 Management Indicator Species

The detailed analysis of the effects of the Proposed Action and its alternatives are documented in the LEDE Reservoir Enlargement Project MIS Report incorporated herein by reference.

5.4.1 Alternative 1 – No Action

Alternative 1 would maintain existing conditions in the Project Area and would not affect any American elk habitats. Therefore there would be no effect to this species.

This Alternative would provide for the continued use of the water resource currently allocated to LEDE and would result in no change to the operations or the water resources above the reservoir. Diversions from Antones Cabin Creek would continue as they have historically.

Repairs to the outlet works mandated by the State would result in a 0.02 ac affect to wetlands adjacent to the Gypsum Creek outlet channel below the dam, and would affect approximately 80 linear feet of the intermittent stream channel with the placement of rip-rap along the intermittent channel for erosion prevention. Antones Cabin Creek would not be diverted during construction and natural runoff from the Gypsum Creek basin would be bypassed around the reservoir during construction. All construction activities would be managed in accordance with Colorado Department of Public Health and Environment (CDPHE) regulations and in compliance with Clean Water Act regulations, such that sediment controls and standard best management practices (BMPs) are in place to prevent sediment from entering Gypsum Creek or adjacent wetlands.

Maintaining the reservoir and the standard operations which have been on-going since the 1930's would result in no change to the operational hydrology in the Project Area, and therefore no change to current habitat conditions and population indices for aquatic species.

There would be no measurable, short-or long-term effects to any aquatic MIS species in the Project Area. Physical habitat quality would be expected maintain current status under Alternative 1. Short or long-term effects to trout or aquatic macroinvertebrate populations would not result in any measurable population trends at the Project or Forest-wide scale.

5.6.2 Alternative 3 – Rebuild and Increase Storage to 947 AF

The proposed enlargement of LEDE Reservoir would cause a total loss of approximately 12 acres of summer/overall range for American elk. This loss would mainly reduce forage and some hiding and thermal cover to a minor degree. Since no mapped winter range, no migration corridors or calving areas are located within in the Project Area, no sensitive habitats critical to the annual biological cycles of elk or seasonal nutritional needs would be affected. Reservoir enlargement may provide additional access to water for elk. The effects from loss of forage, cover and

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summer/overall range and increased access to water would have an insignificant affect individual elk, and no effects to the larger DAU or WRNF populations.

Enlargement would result in new inundation of 270 feet of intermittent stream channel along Gypsum Creek above the reservoir, and would replace it with a still-water environment, at least seasonally. The enlarged dam would affect 80 linear feet of the outlet channel with rip-rap as well. Antones Cabin Creek would not be diverted during construction and natural runoff from the Gypsum Creek basin would be bypassed around the reservoir during construction. All construction activities would be managed in accordance with Colorado Department of Public Health and Environment (CDPHE) regulations and in compliance with Clean Water Act regulations, such that sediment controls and standard best management practices (BMPs) are in place to prevent sediment from entering Gypsum Creek or adjacent wetlands. Therefore, the reservoir enlargement is not expected to contribute any increase to sedimentation to the stream.

Management of the reservoir would be changed to allow for augmentation of flows in Gypsum Creek during spring runoff when the reservoir is filling and has historically captured all flows in upper Gypsum Creek. There would be no increase in water diversions from Antones Cabin Creek as a result of the enlargement. Effects to steam habitat would be mitigated by implementing a bypass flow during spring runoff when the reservoir is filling in the amount of 0.1 to 0.3 cfs, with exact amount dependent on the water-year. The enlargement would also allow for late-summer and fall releases, which may improve habitat conditions for macroinvertebrates and adult trout and may improve conditions for fall-spawning brown and brook trout. However, it is unknown whether a statistically true or measurable effect could be noted.

The enlargement is expected to provide annual carry-over water storage in most years, creating a year-round pool likely to cover approximately 19 surface acres on average, and exceeding 10 feet in depth. This is likely to have the effect of allowing considerable over-winter survival of stocked trout.

The implementation of Alternative 3, with mitigation measures, would neither contribute towards nor negatively affect meeting aquatic MIS objectives at the Forest-wide scale. Physical habitat quality would be expected maintain current status under Alternative 3. Short or long-term effects to trout or aquatic macroinvertebrate populations as a result of the proposed alternatives would not result in any measurable population trends at the Project or Forest-wide scale.

Since there are no measurable short or long term effects to aquatic MIS as a result of this Alternative, no cumulative effects are expected.

5.5 Forest Service Sensitive Species

The Biological Evaluation (BE) for the LEDE Reservoir Enlargement found that the proposed action may potentially affect several sensitive species or their habitats. These findings were based assumed presence in the Project Area, because the presence/absence of several species could not be reasonably determined in surveys due to sparse populations, seasonal occurrence and other life history elements.

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5.5.1 Alternative 1 – No Action

Dam repair would largely maintain current conditions in the Project Area and have no effect to the majority of sensitive species. The exception to this would the four species of moonwort, northern leopard frog and boreal toad. Moonwort species may actually find preferred habitat on previously-disturbed, now stabilized habitats, such as the dam itself. If these species occur on the dam, then dam repairs would likely affect individuals during the repair process, but the repair itself would constitute a disturbance which these species apparently require for long-term viability. Therefore the repaired portions of the dam, once stabilized, would again become preferred habitat for these disturbance-related species.

Effects to aquatic habitat are the same as described for Water Resources and Aquatic MIS above. There are no anticipated effects above baseline condition that would positively or negatively affect populations or the viability of boreal toad, northern leopard frog, or Colorado River cutthroat trout, all of which have potential habitat in the project area. Construction activities may increase the potential of crushing individual northern leopard frogs or boreal toads that may be migrating through the project area but are not expected to affect populations or viability.

5.7.2 - Alternative 3 – Rebuild and Increase Storage to 947 AF

The Proposed Alternative was found to potentially affect individuals of most sensitive species with potential habitat in the Project Area, though none of the effects would cause a loss of viability in the planning area nor trend any species toward federal listing. Table 5.7.2 contains a summary of the determinations for sensitive species in the Project Area.

Further, the potential effect findings in the BE are mostly due to the changes in vegetation structure immediately around the reservoir accruing from construction activities and the 7.4 acres of proposed new inundation once the enlargement is complete.

Effects to aquatic habitat are the same as described for Water Resources and Aquatic MIS above. There are no anticipated effects above baseline condition that would positively or negatively affect populations or the viability of boreal toad, northern leopard frog, or Colorado River cutthroat trout, all of which have potential habitat in the project area. Construction activities may increase the potential of crushing individual northern leopard frogs or boreal toads that may be migrating through the project area but are not expected to affect populations or viability.

The BE report contains detailed discussion of all the listed species (see Project Record).

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Table 5.7.2: Summary of Determination of Effects on R2 Sensitive Species (mammals, birds, amphibians, fish and plants) Resulting from the Alternatives Proposed for LEDE Reservoir Enlargement and its Associated Activities, Eagle County, Colorado.

Sensitive Species	**Suitable Habitat Present?**	**Alt 1 No Action**	**Alt 3 Enlargement**
MAMMALS			
Townsend's big-eared bat *Corynorhinus townsendii*	Potentially	NI	MAII
fringed myotis *Myotis thysanodes*	Potentially	NI	MAII
hoary bat *Lasiurus cinereus*	Potentially	NI	MAII
American marten *Martes americana*	Potentially	NI	MAII
pygmy shrew *Sorex hoyi*	Potentially	NI	MAII
BIRDS			
northern goshawk *Accipiter gentilis*	Potentially	NI	MAII
boreal owl *Aegolius funereus*	Potentially	NI	MAII
northern harrier *Circus cyaneus*	Potentially	NI	NI
olive-sided flycatcher *Contopus cooperi*	Potentially	NI	MAII
flammulated owl *Otus flammeolus*	Potentially	NI	NI
AMPHIBIANS			
Boreal toad *Anaxyrus boreas boreas*	Yes	MAII	MAII
Northern leopard frog *Lithobates pipiens*	Yes	MAII	MAII
FISH			
Colorado River cutthroat trout *Oncorhynchus clarkii pleuriticus*	Yes	NI	NI
PLANTS			
Trianglelobe moonwort *Botrychium ascendens*	Potentially	MAII	MAII
Forkleaf moonwort *Botrychium* tax NOV. "*furcatum*"	Potentially	MAII	MAII
Narrowleaf moonwort *Botrychium lineare*	Potentially	MAII	MAII
Paradox moonwort *Botrychium paradoxum*	Potentially	MAII	MAII

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Yellow lady's slipper *Cypripedium parviflorum*	Potentially	NI	MAII
Altai cottongrass *Eriophorum altaicum var. neogaeum*	Potentially	NI	MAII
Hall fescue *Festuca hallii*	Potentially	NI	MAII
Colorado tansyaster *Machaeranthera coloradoensis*	Potentially	NI	MAII
Porter's feathergrass *Ptilagrostis porteri*	Potentially	NI	MAII
Dwarf raspberry *Rubus arcticus* ssp. *acaulis*	Potentially	NI	MAII
Hoary willow *Salix candida*	Marginal	NI	NI

NI = No impact; BI - Beneficial Impact; MAII = may 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; LI - Likely Impact (Likely to result in a trend towards federal listing or loss of viability in the planning area)

5.6 Threatened, Endangered, and Proposed Species

Table 5-8 contains a summary of the determinations found in the Biological Assessment (BA).

The effects of increased water depletions on the four fish species endemic to the Colorado River are also discussed below. Though the Project Area does not provide habitat for any of these species, waters affected by the enlargement are tributary to the Colorado River and there is designated critical habitat for all four species in the Colorado River near Grand Junction. The direct, indirect and cumulative effects of water depletions for each alternative are discussed below.

5.6.1 Alternative 1 – No Action

The dam repair alternative would have no effect to any of the aquatic or terrestrial threatened, endangered or proposed wildlife species because repairs would not directly or indirectly effect potential habitats for any of the species, and water depletions would not change in any way. Since there would be no direct or indirect effects there would be no cumulative effects as a result of this alternative.

5.8.2 Alternative 3 – Rebuild and Increase Storage to 947 AF

Enlargement of LEDE Reservoir would affect approximately 12 acres of suitable Canada lynx habitat. Specifically, this loss of habitat would come from construction activities and inundation (permanent loss of 7.37 acres of denning habitat, 4.27 acres of other habitat, and 0.09 acres of winter foraging habitat). These 12 acres of habitat would be converted to non-habitat. This loss would be insignificant (a total of 0.139% of all lynx habitat within the LAU), when considering the size and amount of habitat in the Red Table Lynx Analysis Unit. No changes to currently unsuitable lynx habitat would result from this alternative. No effects to Linkage Areas, the ability for individual lynx to

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move, find food or den would be expected from this alternative. All Standards and Guidelines for Canada lynx in the Southern Rockies Lynx Amendment and Forest Plan would be met with this alternative.

Approximately 10 acres of secondary habitat used by North American wolverine for hunting/foraging, movement, and dispersal would be affected (mature tree removal) by the enlargement of LEDE Reservoir. This habitat loss would have no effects to carrion or ungulates, and may be very minor changes on small to medium mammals, roots, berries, and plants that serve as food sources for North American wolverine. Likewise, this loss would have no effect on the ability for individual wolverine to find food or move/disperse. Overall these effects would be minor on this species.

The expansion of LEDE reservoir from 431 AF to 947 AF of storage would provide for an additional 516 AF of storage and an increase in water surface area of 7.4 acres. Potential effect of water depletions on the endangered fish species is a primary concern for the USFWS because increased depletions are likely to adversely affect these species in critical habitats along the Colorado River. Since the LEDE reservoir enlargement would cause increased depletions from evaporation and consumptive uses approximately equal to 167.9 AF, the BA concludes the project is "Likely to Adversely Affect" (LAA) these four fish species. This determination and the effect of water depletions as a whole are considered a cumulative effect to the Colorado River Basin. The Town of Gypsum has signed a Recovery Agreement with the USFWS as required to mitigate the effects of the water depletions. The Recovery Agreement was signed by the Service and the Water User. In the letter dated February 7, 2013, the Town of Gypsum, Colorado agreed to make a one-time contribution based on its share of the costs of the Recover Implementation Program to fund recovery actions specified in the Colorado River programmatic biological opinion (PBO). The Forest Service has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated. Therefore, the Service concludes that the subject project meets the criteria to rely on the Recovery Implementation Program Recovery Action Plan(RIPRAP) to offset depletion impacts and is not likely to jeopardize the continued existence of the species and is not likely to destroy or adversely modify designated critical habitat.

Table **5.8**: Summary of determination of effects for T&E Species for LEDE Reservoir enlargement and its associated activities, Eagle County, Colorado.

LISTED SPECIES	SUITABLE HABITAT PRESENT?	Alternative 1 No Action	Alternative 3 Enlargement
MAMMALS			
North American wolverine	Yes	NE	NLJ
Canada lynx	Yes	NE	NLAA
FISH			
Bontytail chub	No*	NE	LAA

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Colorado pikeminnow	No*	NE	LAA
Humpback chub	No*	NE	LAA
Razorback sucker	No*	NE	LAA

*No habitat in Project Area but water depletions may cause effects to habitats lower in the watershed.

NE= No effect; BE= Beneficial Effect; NLAA= Not likely to adversely affect; LAA= Likely to adversely affect or modify proposed critical habitat; NLJ = Not likely to jeopardize continued existence or adversely modify proposed critical habitat

5.7 Recreation

The direct and indirect effects of the Proposed Action and alternatives on recreation are described below.

5.7.1 Alternative 1 – No Action

Recreation would only be temporarily affected due to construction activities for the necessary dam repairs. Dam repair would require draining the reservoir completely, setting up a by-pass flow system to keep the work area drained while systematically removing the dam, installing the new outlet works, then rebuilding the dam to safety specifications set forth by the State. Work would commence after snowmelt and would continue until completed or until new snows precluded further work. If not complete in a single work season, construction efforts would be resumed the following spring with anticipated final completion no later than October. The reservoir would be drained for the entire duration of repair work and the dispersed camping area would also be closed for safety reasons during construction activities. Reservoir operations would resume the spring following final construction with refilling the reservoir and re-stocking it with fish.

Reservoir operations would not change, including spring filling, summer draw-down and seasonal put-and-take fishery opportunities. There would be limited winter storage and the reservoir could be drained annually. Overwinter survival for fish would seldom occur, if ever.

5.9.2 Alternative 3– Rebuild and Increase Storage to 947 AF

The schedule for draining, repairing the dam and enlarging the reservoir would be the same as that noted for a worst-case Alternative 1—a 2-year process. The dispersed camping area would remain closed to public use until sufficient re-vegetation had stabilized the borrow area and cut slopes.

During reservoir operations, the annual cycle of refilling the reservoir in late spring would continue, with drawdown being slower and less pronounced due to increased volume to meet demands. Carry-over storage would be expected during most years, which would provide over-winter habitat for fish stocked in the reservoir. Carry-over storage would also improve recreational boating opportunities. There would be no changes in the terrain around the reservoir, so the periodic late summer and fall

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drawdown would not adversely affect access to the shoreline for fishing and recreational purposes.

Because of the less pronounced drawdown and capacity for dry-year carryover, fishing and boating recreation would be considerably enhanced. The ability to over-winter stocked trout would also lead to multiple age-classes and increased size of catchable trout over time.

Enlargement is not expected to have any effect on other recreational uses in the Project Area such as hiking, hunting and mountain biking.

5.8 Summary of Environmental Consequences

A summary of the environmental consequences of the proposed action and the alternatives considered in this EA is provided in Table 5-10.

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Table 5.10 Summary Comparison of Environmental Consequences

Indicator	No Action (431 AF)	Alternative 2 (685 AF)	Alternative 3 (947 AF)	Alternative 4 (1040 AF)
Purpose and Need				
Dam Safety	▪ Meets dam safety requirement	▪ Meets dam safety requirement	▪ Meets dam safety requirement	▪ May require additional dam safety requirements
Long Term Storage Reservoir for Municipal Needs	▪ Does not meet identified need	▪ Does not meet identified need	▪ Provides adequate long term storage for Gypsum's projected water supply needs	▪ Provides adequate long term storage for Gypsum's projected water supply needs
Protect Water Rights	▪ Does not meet identified need	▪ Does not meet identified need	▪ Provides capacity to maximize Gypsum's water rights	▪ Provides capacity to maximize Gypsum's water rights
Practicable Implementation				
Adequate Physical Water Supply Available Annually?	Yes	Yes	Yes	May not fill to capacity in low-snowpack years
Problematic Structural or Construction Obstacles?	No	No	No	Yes—fill volume required is excessive and potential issues with lateral moraine on right abutment
Projected Construction Cost within Town Capability?	Yes	Yes	Yes	Marginal
Cost/Acre-Foot (Rated best to worst, #1 being best)	4	3	1	2
Environmental Effects		***Dropped from Further Analysis***		***Dropped from Further Analysis***
Hydrology	▪ No change from existing conditions	▪	▪ Expected carryover storage to dry year, high flow attenuation, water available for late summer/fall releases	▪
Wetlands and Riparian Areas	▪ No change from existing conditions	▪	▪ Temporary effect to 0.02 acres riparian wetland; permanent fill 0.02 acres of riparian wetland, inundates 1.87 acres of slope and riparian wetlands, increases seasonal open waters 7.4 acres, offsite mitigation to offset effects	▪
Vegetation	▪ No change from existing conditions	▪	▪ Approx. 15.8 acres uplands and 1.91 acres wetlands to be affected by construction and inundation; all to be mitigated via re-vegetation efforts	▪

Indicator	No Action (431 AF)	Alternative 2 (685 AF)	Alternative 3 (947 AF)	Alternative 4 (1040 AF)
Management Indicator Species	▪ No change from existing conditions	▪	▪ Reservoir expanded by 7.4 acres, carry-over storage; provides for releases to augment instream flows below reservoir; no positive or negative effect to any MIS species or population trends	▪
Forest Service Sensitive Species	▪ No change from existing conditions	▪	▪ Minor effects to individual plant, animal and fish, but no population or viability effects to any sensitive species; habitat type conversions to be mitigated via re-vegetation efforts	▪
Threatened and Endangered Species	▪ No change from existing conditions	▪	▪ Minor habitat loss for North American wolverine and Canada lynx, without effect to individual wolverine or lynx; water depletions likely to adversely affect 4 listed fish species; Recovery Agreement in place to mitigate effects of water depletions	▪
Recreation	▪ No change from existing conditions; camping, fishing, boating and hiking to be disrupted for 14 months of construction for dam repairs	▪	▪ Expanded and improved fishing and boating opportunities, increased attraction for camping in the area; all recreational activities disrupted for 24 months for construction, re-vegetation, refilling and dam safety testing	▪

6 Mitigation Measures and Best Management Practices

NEPA and CEQ regulations require the identification of all relevant and reasonable mitigation measures that could reduce the effects of the project, even if those measures are outside the jurisdiction of the Forest Service. CDQ regulations define mitigation as including the follow types of measures (40 CFR 1508.20):

- Avoiding effects by not taking certain actions or parts of an action;
- Minimizing effects by limiting the degree or magnitude of the action;
- Rectifying the effects by repairing, rehabilitating, or restoring the affected environment;
- Reducing or elimination the effect over time by preservation and maintenance operations during the life of the action; and
- Compensating for the effect by replacing or providing substitute resources.

The detailed analysis of alternatives, as presented in Chapter 3 of this EA, concludes that in-basin storage is the only available, practicable alternative for meeting all identified needs. This process has resulted in the selection of alternatives that avoid and minimize effects to wetlands and other resources.

The Proposed Action includes construction best management practices, such as minimizing disturbances to vegetation and soils during construction, placement of standard erosion control BMPs on disturbed areas, and the restoration and re-vegetation of disturbed areas that would effectively minimize and rectify effects due to construction activities.

The effects to the stream channel and aquatic species in Gypsum Creek would be mitigated by implementing a bypass flow during spring runoff when the reservoir is filling in the amount of 0.1 to 0.3 cfs, with exact amount dependent on the water-year. This would keep water in the intermittent section of the Gypsum Creek channel when it has historically been dried up. Enlargement would also allow for late summer and fall releases to Gypsum Creek which are not possible under current storage quantity limitations. Other operational activities, including fish stocking and dry-year carryover storage, would serve to compensate for and further reduce environmental effects of the enlargement on the existing Gypsum Creek stream channel.

The Proposed Action also includes off-site wetlands mitigation that would fully replace the food chain, water quality and wildlife habitat functions of the wetlands affected by the reservoir enlargement. The wetlands mitigation plan prepared for the USACE is incorporated by reference.

Finally, the Town of Gypsum signed a Recovery Agreement with the USFWS as required to offset effects to endangered fish species in the lower Colorado River due to increased water depletions.

7 Irreversible or Irretrievable Commitments of Resources

The irretrievable commitment of a resource is one which cannot be changed or reversed once it has occurred, resulting in a loss of future options. Typically the irreversible or irretrievable commitment of resources applies to the use or removal of nonrenewable resources such as minerals or cultural resources, or to functional values such as soil productivity that are renewable only over long periods of time.

No irreversible and/or irretrievable commitments of resources would occur as a result of the Proposed Action or the alternatives. The effects associated with the loss of vegetation of areas, including wetlands, inundated by the reservoir enlargement could be restored and reversed over time with reservoir drawdown to pre-project levels and re-vegetation.

8 Coordination and Consultation

Listed below are the Federal, state and local agencies that were consulted during the process of scoping and preparation of this document.

Sue Nall, Section Chief, US Army Corps of Engineers, Grand Junction, CO

Lesley McWhirter, Biologist, US Army Corps of Engineers, Grand Jct, CO

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10 References

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Dept. of the Interior, Fish & Wildlife Service, Washington, D.C.

USDA Forest Service. 2002. White River National Forest land and resource management Plan, 2002 revision. Glenwood Springs, Colorado.

USDA Forest Service. 2006. USDA Forest Service Handbook 2509.2—Watershed conservation practices handbook, zero code, Chapter 10, Chapter 20. Region 2 Amendment No. 2509.25—99—1. Effective May 5, 2006.

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APPENDICES

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