APPENDIX O
Trinidad Dam and Reservoir Project Operating Principles and Operating Criteria Amendment Final Environmental Assessment

TRINIDAD ENV-600

RECLAMATION

Managing Water in the West

Trinidad Dam and Reservoir Project Operating Principles and Operating Criteria Amendment

Final Environmental Assessment

U.S. Department of the Interior
Bureau of Reclamation
Eastern Colorado Area Office
Loveland, Colorado

Cooperating Agency:
U.S. Army Corps of Engineers
South Pacific Division
Albuquerque District
Albuquerque, New Mexico

November 2004

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Managing Water in the West

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Finding Of No Significant Impact

U.S. Department of the Interior
Bureau of Reclamation
Eastern Colorado Area Office
Loveland, Colorado

November 2004

INTRODUCTION

This Finding of No Significant Impact (FONSI) describes the Bureau of Reclamation's (Reclamation) environmental conclusions regarding a proposal to amend the Operating Principles and Operating Criteria for the Trinidad Dam and Reservoir Project to allow delivery of water for municipal and industrial (M&I) purposes, allow use of a portion of the irrigation capacity to replace evaporation and seepage losses of the recreation pool, and improve the effectiveness of stockwater deliveries.

Environmental effects of the Operating Principles and Operating Criteria Amendment Alternative (Amendment Alternative) and the No Action Alternative were evaluated under the provisions of the National Environmental Policy Act (NEPA), and are documented in the attached Environmental Assessment (EA).

Purpose and Need

The purpose of changing the Operating Criteria to include M&I uses is to allow the City of Trinidad (City) to utilize water rights that they have acquired to meet their water needs. The City has purchased water rights from irrigators who store water in the irrigation capacity at Trinidad Reservoir. The City operates its changed water rights in accordance with State law and the Operating Principles. However, the current Operating Criteria only addresses use of the irrigation capacity for irrigation purposes, and not for M&I purposes. The City is currently using some of its changed water rights for augmentation of city wells and has determined that their population growth may necessitate use of more of their water as early as 2005. The Operating Criteria need to be amended to be consistent with the changed water rights and amended Operating Principles. This will facilitate the City's ability to address their needs.

The purpose of amending the Operating Principles for the Trinidad Dam and Reservoir Project (Operating Principles) and the Operating Criteria to allow the irrigation capacity to be used to replace the recreation pool's evaporation and seepage losses is to improve recreational experience at the reservoir. The surface water elevation of Trinidad Reservoir is subject to a great deal of fluctuation. This is undesirable for management of the recreation facilities, recreation experience, and for optimizing the health and success of the fishery. Stabilizing water levels and keeping them higher during the recreation season by having an annual supply of water to replenish recreation pool evaporation and seepage losses would improve the recreation experience, recreation access, and the fishery.

The purpose of changing how stock water releases are managed is to make more effective stock water deliveries. The current Operating Principles allow releases for non-irrigation season stock watering within the Purgatoire River Water Conservancy District (District), however these releases cannot exceed 5 cubic feet per second (cfs). This has proven to be an impractical method for delivering the stock water. Because these releases occur outside of the irrigation season (October – March), there are typically very few if any releases for other purposes being made at the same time as these stock water releases. Consequently, the transit losses and evaporation of these releases are high, and very little, if any, of the releases reach the stock water ponds. Allowing stock water to be stored for periods during the non-irrigation season, and then releasing the water at a higher rate (> 5 cfs) will increase the amount of water that reaches the stock water ponds.

During the environmental review process, potential effects from the Proposed Action were identified, either by the public, other agencies, or Reclamation staff. Reclamation used potential effects to help focus the environmental review process, to structure the EA, and to identify opportunities for mitigating or avoiding adverse effects of the Proposed Action.

PREFERRED ALTERNATIVE

Reclamation evaluated the effects of two alternatives—the No Action Alternative and the Amendment Alternative. Reclamation has selected the Amendment Alternative as the Preferred Alternative. This alternative entails approval of amendments to the existing Operating Principles adopted by the Arkansas River Compact Administration (ARCA) in May and December 2003, and approval of amendments to the Operating Criteria to implement 1998 and 2003-proposed amendments of the Operating Principles. The proposed amendments would:

- Allow the City to use a portion of the irrigation capacity for M&I purposes (through approval of proposed amendments to the Operating Criteria; amendments to Operating Principles to allow for this were approved in 1998)
- Allow the State of Colorado Division of Parks and Outdoor Recreation (State) to utilize 700 acre-feet (af) of the irrigation capacity to replace evaporation and seepage losses of the recreation pool (a.k.a. permanent fishery pool) (through approval of amendments to the Operating Principles adopted by ARCA in May and December 2003 and amendments to the Operating Criteria)
- Allow more effective delivery of stock watering during the non-irrigation season by allowing stock water to be stored in Trinidad Reservoir and released at higher rates than the 5 cfs rate presently allowed (through approval of amendments to the Operating Principles adopted by ARCA in May and December 2003).

FINDING

Having evaluated potential significant impacts associated with the Preferred Alternative, Reclamation has determined that no significant impacts are anticipated to occur. Furthermore, Reclamation makes the following specific findings:

- No significant adverse impacts to hydrology are expected as a result of the Preferred Alternative, based on the following:
  - **Trinidad Reservoir.** Reservoir elevations are generally expected to be higher and remain higher during the irrigation season and will not be noticeably different during the non-irrigation season when compared to historic or no action conditions.
  - **Purgatoire River.** No impacts to the Purgatoire River downstream of the Hoehne headgate will occur. Upstream of the Hoehne headgate, minor decreases in average flow are expected during the irrigation season, and minor increases in average flow are expected during the non-irrigation season. In addition, changes in stockwater deliveries will result in higher but minor, short duration (6-9 days) non-irrigation season flows between the dam and District headgates.
  - **Arkansas River.** The Arkansas River will not be impacted.

- No significant adverse impacts to prime farmlands are expected as a result of the Preferred Alternative. The effected lands can still be used for agricultural or ranch purposes, but irrigation water can no longer be delivered to them.

- The Preferred Alternative will not result in a material depletion at the state line, and consequently will not impact the Arkansas River Compact.

- Analysis determined that the Preferred Alternative would have no affect on piping plover, interior least tern, black-footed ferrets, Arkansas darter, and lesser-prairie chickens. Bald eagles may be affected, but any effects will be minor and are anticipated to be beneficial due to improved winter forage habitat.

- The majority of State of Colorado species of concern within the action area will not be impacted. Some water-related species, such as the plains minnow, suckermouth minnow, flathead chub, yellow mud turtle, and the northern river otter, may experience very minor, insignificant negative and/or beneficial impacts due to river flow and reservoir storage changes.

- The Preferred Alternative would result in higher and more stable average minimum reservoir levels throughout the year, including during historically low reservoir volume periods such as late summer and fall. This would benefit recreation at the reservoir.

- The Preferred Alternative will result in the City having sufficient water resources for growth through 2020 and beyond, therefore no socioeconomic impacts are anticipated.

- The Preferred Alternative is expected to result in hydrologic changes that are within the range of historic storage and flow levels. Consequently, this is not the type of undertaking that would have an effect on cultural resources.

- The Preferred Alternative will have no effects on Indian trust assets or Indian sacred sites.

This **Finding of No Significant Impact** has therefore been prepared and is submitted to document environmental review and evaluation of the Proposed Action in compliance with the National Environmental Policy Act of 1969, as amended.

Approved By:

Dawn Wuchner

Area Manager
Eastern Colorado Area Office

11/12/04
Date

ACRONYMS

af	acre-feet
APE	Area of Potential Effects
ARCA	Arkansas River Compact Administration
City	City of Trinidad
cfs	cubic feet/second
CDOW	Colorado Division of Wildlife
Compact	Arkansas River Compact
Corps	Army Corps of Engineers
District	Purgatoire River Water Conservancy District
EA	environmental assessment
EIS	environmental impact statement
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FWS	United States Fish and Wildlife Service
M&I	municipal and industrial
mgd	million gallons per day
MLIC	Model Land and Irrigation Company
NEPA	National Environmental Policy Act
NRCS	Natural Resource Conservation Service
Operating Criteria	Operating Criteria for the Trinidad Dam and Reservoir Project
Operating Principles	Operating Principles for the Trinidad Dam and Reservoir Project
Reclamation	Bureau of Reclamation
SHPO	State Historic Preservation Officer
State	State of Colorado Division of Parks and Outdoor Recreation
USGS	United States Geological Survey

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Species List Request

Fish and Wildlife Service Species List Concurrence

Biological Assessment

Fish and Wildlife Service Biological Assessment Concurrence

CHAPTER ONE
Purpose and Need

The U. S. Bureau of Reclamation (Reclamation) proposes to approve amendments to the existing Operating Principles for the Trinidad Dam and Reservoir Project (Operating Principles) adopted by the Arkansas River Compact Administration (ARCA) in May and December, 2003, and approve amendments to the Operating Criteria for the Trinidad Dam and Reservoir Project (Operating Criteria) to implement 1998 and 2003-proposed amendments of the Operating Principles. The proposed changes would:

- Allow the City of Trinidad (City), Colorado to use a portion of the irrigation capacity for municipal and industrial (M&I) purposes (through approval of proposed amendments to the Operating Criteria; amendments to Operating Principles to allow for this were approved in 1998)
- Allow the State of Colorado Division of Parks and Outdoor Recreation (State) to utilize 700 acre-feet (af) of the irrigation capacity to replace evaporation and seepage losses of the recreation pool (a.k.a. permanent fishery pool) (through approval of amendments to the Operating Principles adopted by ARCA in 2003 and potential amendments to the Operating Criteria)
- Allow more effective delivery of stock water during the non-irrigation season by allowing stock water to be stored in Trinidad Reservoir and released at higher rates than the 5 cubic feet/second (cfs) rate presently allowed (through approval of amendments to the Operating Principles adopted by ARCA in 2003).

The Operating Principles are a set of principles for operating the Trinidad Dam and Reservoir Project. The principles are signed by Reclamation, the U. S. Army Corps of Engineers, Albuquerque District (Corps), the chairman of ARCA, the Purgatoire River Water Conservancy District (District) and the governor of Kansas. The Operating Criteria are specific criteria for managing the irrigation capacity of the reservoir. Reclamation and the District are the signatories to the Operating Criteria.

This EA (environmental assessment), prepared in compliance with the National Environmental Policy Act (NEPA), could lead to a FONSI (*Finding of No Significant Impacts*) if environmental effects of the proposed action are found to be insignificant, or to an EIS (*environmental impact statement*) if effects are found to be significant. In the chapters to follow, background on the matter is provided (Chapter 1), alternative plans outlined (Chapter 2), affected environment discussed (Chapter 3) and effects of the alternatives analyzed (Chapter 3). The EA concludes with a brief description of the consultation and coordination done during the study (Chapter 4).

PURPOSE & NEED

The purpose and need for each of the three elements of the proposed action is presented below.

The purpose of changing the Operating Criteria to include M&I uses is to allow the City to utilize water rights that they have acquired to meet their water needs. The City has purchased water rights from irrigators who store water in the irrigation capacity at Trinidad Reservoir. The City operates its changed water rights in accordance with State law and the Operating Principles. However, the current Operating Criteria only addresses use of the irrigation capacity for irrigation purposes, and not for M&I purposes. The City is currently using some of its changed water rights for augmentation of city wells and has determined that their population growth may necessitate use of more of their water as early as 2005.

The Operating Criteria need to be amended to be consistent with the changed water rights and amended Operating Principles. This will facilitate the City's ability to address their needs.

The purpose of amending the Operating Principles and Operating Criteria to allow the irrigation capacity to be used to replace the recreation pool's evaporation and seepage losses is to improve the recreational experience at the reservoir. The surface water elevation of Trinidad Reservoir is subject to a great deal of fluctuation. This is undesirable for management of the recreation facilities, recreation experience, and for optimizing the health and success of the fishery. Stabilizing water levels and keeping them higher during the recreation season by having an annual supply of water to replenish recreation pool evaporation and seepage losses would improve the recreation experience, recreation access, and the fishery.

The purpose of changing how stock water releases are managed is to make more effective stock water deliveries. The current Operating Principles allow releases for non-irrigation season stock watering within the District, however these releases cannot exceed 5 cfs. This has proven to be an impractical method for delivering the stock water. Because these releases occur outside of the irrigation season (October – March), there are typically very few if any releases for other purposes being made at the same time as these stock water releases. Consequently, the transit losses and evaporation of these releases are high, and very little, if any, of the releases reach the stock water ponds. Allowing stock water to be stored for periods during the non-irrigation season, and then releasing the water at a higher rate (> 5 cfs) will increase the amount of water that reaches the stock water ponds.

BACKGROUND

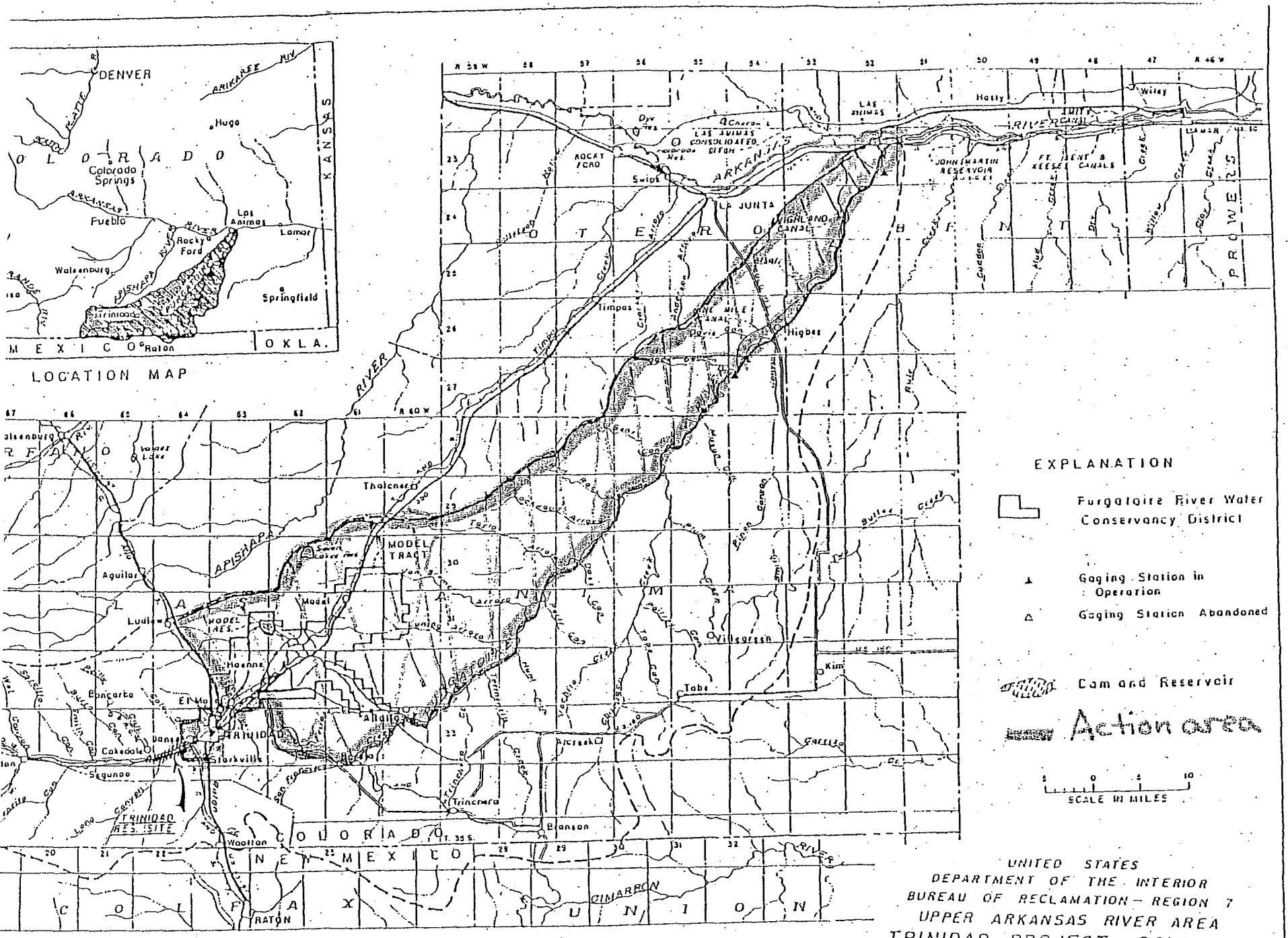
Trinidad Dam and Reservoir are located on the upper Purgatoire River, a tributary of the Arkansas River, about 2.75 miles upstream and southwest of the City of Trinidad in south central Colorado (see Location Map). This project was authorized under the 1958 Flood Control Act for the purposes of flood control, irrigation and recreation. The Corps completed construction of the dam and began filling the reservoir in 1976.

The Corps owns and operates the reservoir, with responsibility for flood control and recreation. Reclamation is responsible for administering a repayment contract with the District, which manages the irrigation capacity of the reservoir. The Corps has an agreement with the State for management of recreation at the reservoir. Water rights are administered by the State of Colorado.

The District manages water deliveries made from the irrigation capacity of Trinidad Reservoir. They operate within defined boundaries in the basin and contract with entities that use water from the irrigation capacity.

The repayment contract between Reclamation and the District outlines the roles, responsibilities and provisions for management of the irrigation capacity by the District. The repayment contract specifies that management of the irrigation capacity will be in compliance with the Operating Principles and Operating Criteria. The repayment contract between Reclamation and the District anticipated the City's use of the irrigation capacity for M&I purposes, however the original Operating Principles and Operating Criteria only provided for irrigation uses. In 1998, the Operating Principles were amended to allow for use of the irrigation capacity for M&I purposes by the City. However, the current Operating Criteria need to be amended to allow management of the irrigation capacity for M&I purposes.

Similarly, the current Operating Principles and Operating Criteria do not allow management of the irrigation capacity for replacement of the evaporation and seepage losses from the recreation pool.



Location Map

Stock watering is addressed in the original Operating Principles and Operating Criteria. However, the management allowed by these documents needs to be changed to allow more stock water to reach the stock watering ponds.

The City is located in south central Colorado along the Purgatoire River (see Location Map), downstream of Trinidad Reservoir. The City has 3,000 af of reserved storage space in Trinidad Reservoir. In anticipation of future water needs, the City has acquired irrigation water rights to fill the majority (up to 2,800 af) of their reserved storage space. The City is expected to continue to grow in population based on both the State of Colorado's (2003) and the City's (Black and Veatch 2001) projections.

1998 OPERATING PRINCIPLES AMENDMENT

In 1998, Reclamation executed amended Operating Principles for Trinidad Dam and Reservoir. The amendments provided for the M&I use of the irrigation capacity by the City. On November 16, 1998, Reclamation notified the City that when it withdraws water under its rights from irrigation use and makes it available for municipal and industrial use, Reclamation will complete appropriate NEPA compliance. On April 11, 2000, the District requested that Reclamation adopt changes to the Operating Criteria proposed by the City to allow the City to implement changes necessary to convert certain water rights owned by the City to M&I use. It is Reclamation's understanding that the City has current and near term needs to use the water for certain limited municipal purposes (to provide water to a private golf course and well augmentation). Therefore, concurrent with analysis of the 2003 proposed amendments to the Operating Principles, Reclamation is analyzing the City's change of water use from irrigation to municipal use.

The no action alternative considered in this analysis will consist of the pre-1998 version of the Operating Principles. Use of the pre-1998 version is necessary to adequately analyze all of the proposed amendments, including the 1998 M&I changes for which NEPA compliance has not yet been completed.

ISSUES

The following issues have been identified through public comments and Reclamation's internal scoping regarding the proposed action.

- Effects on the flows of the Purgatoire River and its tributaries downstream of Trinidad Reservoir;
- Changes in Arkansas River flows below its junction with the Purgatoire River;
- Changes in Trinidad Reservoir surface elevation and storage levels;
- Effects on recreation at Trinidad Reservoir;
- Effects of changing water used for irrigation purposes to M&I, especially on agriculture economies, prime farmlands, and City of Trinidad development;
- Effects on local socioeconomics;
- Effects of the proposed stock watering changes on the livestock industry;
- Compliance with the Arkansas River Compact;

- Impacts on Federally-listed threatened and endangered species;
- Impacts on cultural resources.

These issues are analyzed in Chapter 3.

CHAPTER TWO
Alternatives

Chapter 2 presents the two alternative plans analyzed in this EA: the *Operating Principles and Operating Criteria Amendment Alternative*—in which changes would be made to the Trinidad Dam and Reservoir Operating Principles and Operating Criteria—and the *No Action Alternative*—in which the Operating Principles and Operating Criteria would not be changed.

OPERATING PRINCIPLES AND OPERATING CRITERIA AMENDMENT ALTERNATIVE (AMENDMENT ALTERNATIVE)

In the Amendment Alternative, Reclamation would execute amended Operating Principles and Operating Criteria to allow for changes in irrigation capacity storage and releases from the reservoir for M&I, recreation, and stock watering uses. The specific changes to the Operating Principles and Operating Criteria are outlined below.

Municipal and Industrial

The alternative would amend the Operating Criteria to permit operation for M&I uses consistent with previous changes to the Operating Principles. Specifically, the consumptive use portion of irrigation water rights acquired by the City may be stored as part of the irrigation capacity and released for M&I use by the City. The Operating Principles and Operating Criteria would recognize the two irrigation water rights acquired by the City, which involve 948 acres from the John Flood Ditch system and 373.7 acres of the Model Land and Irrigation Company (MLIC) system for a total maximum annual delivery to the City of 2,802 af. Water attributable to the historic return flows associated with the acquired water rights will be released in a manner that maintains the historic return flow patterns to the Purgatoire River. The acreage listed above associated with the water rights acquired by the City will not be eligible for deliver of water from the District's water supply or be a part of the District's irrigable area.

Recreation/Permanent Fishery Pool Evaporation and Seepage Losses

The alternative would allow water in the irrigation capacity to be used to replace evaporation and seepage from the permanent fishery pool. If the State acquires rights to water stored in the irrigation capacity, acquired water could be used to replace the permanent fishery pools evaporation and seepage losses. Specifically, the Operating Principles and Operating Criteria would recognize the irrigation water rights the State has acquired, which involve 805.46 acres of the MLIC system for a total maximum annual delivery to the State of 1,708 af. Water attributable to the historic return flows associated with the acquired water rights will be released in a manner that maintains the historic return flow patterns to the Purgatoire River. The acreage listed above associated with the water rights acquired by the City will not be eligible for deliver of water from the District's water supply or be a part of the District's irrigable area.

Stock Watering

The District would be allowed to release stored water from the reservoir at rates that they determine would be sufficient to deliver water to stock ponds. The District has indicated that diversion rates of approximately 60 cfs are necessary in the larger canals to allow water to run down the canals to reach the stock ponds. The sum total of diversions would continue to be limited to 1,200 af. Based on information

provided by the District, the releases are most likely to involve three periods of releases during the non-irrigation season for durations of three days for each period.

NO ACTION ALTERNATIVE

In this alternative, the Operating Principles and Operating Criteria would not be amended to provide for M&I, recreation pool evaporation and seepage losses, and changes in stock watering.

CHAPTER THREE
Affected Environment and Environmental Consequences

Chapter 3 describes hydrology, prime farmlands, Arkansas River Compact, threatened and endangered species, recreation, economic and social environment, and cultural resources of the Trinidad Reservoir, City of Trinidad and Purgatoire River area. These are the resources that could be significantly affected by the proposed action. This description is followed by an analysis of the effects of the alternatives (explained in Chapter 2). Effects of the No Action Alternative are presented first, followed by effects of the Proposed Action.

Scoping determined that Indian trust assets (legal interests in property and rights held in trust by the U.S. for Indian tribes or individuals), environmental justice (adverse effects to a particular social-economic group, including low-income or minority populations), floodplains, wetlands, and migratory birds would not be affected by either of the alternatives in this EA. In addition, no actions were identified that when combined with either the No Action or Amendment alternative would have potentially significant cumulative effects.

SUMMARY OF IMPACTS

Table 3.1 provides a summary of the environmental effects analyzed in Chapter 3 of the EA.

Table 3.1 Summary of Environmental Effects.

Resource	No Action Alternative	Amendment Alternative
Hydrology • Trinidad Reservoir	**M&I.** The City's John Flood and MLIC water continued to be used primarily for agricultural irrigation – no change from current use.	**M&I.** Only a small portion of the City's Trinidad water rights are expected to be used initially. Water will be used for well augmentation and potentially to fulfill the City's contract with Coastal LLC for golf course watering. Further use of the City's Trinidad water rights is not expected for several years. The City's initial water use will result in small amounts of additional storage in the reservoir and result in increased reservoir water volume during late-summer, fall and winter months when compared to no action.
	Recreation Pool. Recreation pool expected to drop several thousand af between exchanges to replenish the pool, which are expected to be several years apart. Pool estimated to lose 1,060 af annually to evaporation and seepage.	**Recreation Pool.** The recreation pool will most likely be filled or nearly filled each spring and slowly lose volume throughout the rest of the year. Fluctuation in the pool volume would most likely be limited to a few hundred acre-feet annually.
	Stockwater. A portion of the 1,200 af allowable for stockwatering is expected to be unused. The	**Stockwater.** The full 1,200 af available for stockwatering is expected to be used. Because the

Table 3.1 Summary of Environmental Effects.

Resource	No Action Alternative	Amendment Alternative
	unused portion would remain in the reservoir's irrigation capacity.	reduced reservoir volume after releases results in less evaporation, over time the effects of the releases on reservoir content decrease.
• Purgatoire River	M&I. No change in river flows from historic conditions are expected.	M&I. No impact to the Purgatoire River below the Hoehne headgate (13 miles below Trinidad Dam). The following river changes are expected between the dam and Hoehne headgate: - Release of historic agricultural return flows from Trinidad Reservoir will result in higher river flows between the dam and Hoehne headgate during the non-irrigation season. - When water is stored for M&I purposes, flows in the Purgatoire River between the dam and Model headgate (approximately 8 miles) will be reduced during the irrigation season. Storage of the majority of the City's water rights is not expected for a number of years. - M&I water use is not expected to result in additional return flows; the City is expected to re-use water to extinction.
	Recreation Pool. The State is expected to conduct exchanges every few years to replace evaporation and seepage losses. When exchanges occur, Purgatoire River water will be diverted and stored in the recreation pool. During diversion (most likely mid-April to mid-June), flows will be reduced in the Purgatoire River below Trinidad Dam.	**Recreation Pool.** No affect on the Purgatoire River below Hoehne headgate. The following effects upstream of Hoehne headgate are expected: - Release of historic agricultural return flows from Trinidad Reservoir will result in higher river flows between the dam and Hoehne headgate during the non-irrigation season. - The consumptive use portion (65%) of the water purchased by the State will no longer flow between the dam and the Model headgate.
	Stockwater. Some diversion of stockwater and gains to the river is expected to occur; gains not diverted will remain in the river.	**Stockwater.** Releases of approximately 70 cfs for 9 days would be released from the reservoir during the non-irrigation season and diverted with river gains at District headgates. Gains occurring outside the period of releases during the non-irrigation season would remain in the river.
• Arkansas River	Exchanges by the State will result in temporarily reduced Purgatoire River flows into the Arkansas River. Exchange water will increase flows in the Arkansas River above the confluence with the Purgatoire River. No affect to the Arkansas below the confluence with the Purgatoire River.	The Amendment Alternative is not expected to result in any impact to the Arkansas River.
Prime Farmlands	All prime farmlands within MLIC would remain available for irrigated cultivation. The MLIC has a total of 6,177 acres; a substantial portion has been determined to be prime farmland. However, MLIC is considered to be a "water short" irrigator, i.e. they have insufficient water to	Initially, the City is only expected to dry-up 373.7 acres of the 1,321.7 total acres to be dried-up once full M&I use of Trinidad water occurs. Approximately 247.7 of the 373.7 are classified by NRCS as "prime farmland when irrigated". Of the 805.46 acres to be dried-up in connection with the

Table 3.1 Summary of Environmental Effects.

Resource	No Action Alternative	Amendment Alternative
	adequately irrigate all of the farmland they are permitted to irrigate. As a result, a portion of the MLIC is not irrigated each year, which most likely includes prime farmlands.	State's water purchase, approximately 458 acres are considered "prime farmland when irrigated".
Arkansas River Compact	Because any exchanges conducted by the State are expected to leave the Arkansas River whole below the confluence with the Purgatoire River, the No Action Alternative is not expected to cause material depletions at the state line.	The Amendment Alternative is not expected to result in any hydrologic changes to the Purgatoire River below the District or any changes to the Arkansas River. Consequently, no material depletions at the state line are expected as a result of this alternative.
Threatened & Endangered Species		
• Bald Eagles	No effect – Arkansas River flow changes due to exchanges are outside of winter roosting season. Arkansas River only effected between Lake Meredith and confluence with Purgatoire River – no nesting bald eagles known in this reach of the Arkansas.	Not likely to adversely effect – winter historic return flow releases from Trinidad Reservoir have the potential to enhance aquatic, wetland, and riparian habitat between the reservoir and Hoehne headgate which may benefit wintering bald eagles.
• Piping Plover	Not likely to adversely effect – Potential changes in hydrology due to exchanges would not have measurable adverse effects because they would be brief events that are highly intermittent and would occur when flows are already naturally high, the spring runoff season.	No effect – not known to nest along the Purgatoire River and Arkansas River flows will not be altered.
• Interior Least Tern	No effect – there are no known populations of interior least tern on the effected portions of the Arkansas and Purgatoire rivers.	No effect – not known to nest along the Purgatoire River and Arkansas River flows will not be altered.
• Black-footed Ferret	No effect – environmental effects under no action are expected to be limited to stream channels, outside of habitat for the species.	No effect – there have been no confirmed sightings of the species in Colorado since 1946, therefore it is unlikely they would inhabit any restored grasslands within the District.
• Arkansas Darter	Not likely to adversely effect – minor additional flow during the runoff season would not affect habitat requirements of the darter.	No effect – species is not found in the Purgatoire River basin and Arkansas River flows will not be altered.
• Lesser Prairie-chicken	No effect - environmental effects under no action are expected to be limited to stream channels, outside of habitat for the species.	No effect – only known populations are well outside of the action area.
Recreation	Each successive year after an exchange, no action will contribute progressively less towards achieving the State's desire for a reservoir surface area of 700 to 1,000 acres, because evaporation and seepage won't be replaced until another exchange occurs.	The State's purchase of water rights to be dedicated to replacing recreation pool losses and the City's storage of M&I water would result in higher and more stable average minimum reservoir levels. This will help keep the reservoir surface area at or near the State's desired level longer during the year, and especially during historically low reservoir volume periods such as late summer and fall.
Social and Economic Environment	Negative socioeconomic impacts due to limited water supply (inability to use M&I water from Trinidad Reservoir) is only expected if City of Trinidad population growth is high through 2020;	No socioeconomic impacts are anticipated as a result of the Amendment Alternative – the City of Trinidad will have sufficient water resources for growth through 2020 and beyond. The City will

Table 3.1 Summary of Environmental Effects.

Resource	No Action Alternative	Amendment Alternative
	no impacts are expected if growth is moderate or low.	have to invest in the infrastructure to make use of M&I water in Trinidad Reservoir.
Cultural Resources	Potential hydrologic changes in Arkansas River flow due to State exchanges would not constitute a federal undertaking. Flows would be brief and well within the channel capacity of the river. Consequently, this is not the type of activity that would be expected to cause impacts to cultural resources.	The proposed changes in operations are expected to result in hydrologic changes that are within the range of historic storage and the channel capacity of the river. Consequently, this activity has no potential to cause effects to cultural resources.

HYDROLOGY

Affected Environment

Trinidad Reservoir

Trinidad Dam and Reservoir regulates the flow of the upper Purgatoire River basin for flood control and other purposes. The total capacity of the Reservoir is 123,224 acre–feet (af) of which 51,000 af is reserved exclusively for flood control purposes. The reservoir has an approximate capacity of 71,024 af at the top of conservation pool, but has only reached full capacity of the conservation pool during one year (1999) since it began filling in 1976. Typically, storage peaks during March or April. Irrigation releases begin after mid-April each year and reservoir storage generally declines from this time through September or October when the lowest storage levels typically occur. Storage levels begin building in mid-October until peaking again in March or April.

During the irrigation season, irrigation releases to the river are made pursuant to the District's water rights and in accordance with the Operating Principles. These releases consist of both inflows passed through the reservoir and releases from the reservoir's irrigation storage capacity. During the non-irrigation season, most of the inflows are stored for release during the irrigation season.

Recreation Pool

In 1994, the Corps enlarged the 4,500 af permanent recreation pool after determining that there was unallocated capacity in the reservoir. The permanent recreation pool was increased by 11,467 af for a total of 15,967 af. The State assumed responsibility for securing water to fill the additional pool capacity, while the City remains responsible for maintaining the original 4,500 af. Transmountain water diversion purchases and exchanges were used to fill the additional capacity from 1995 to 1998. No additional purchases and exchanges have occurred since this initial filling. Currently, seepage and evaporation account for an approximately 1,060 af annual reduction in the recreation pool.

Fluctuation of the City's portion (4,500 af) of the recreation pool is typically limited to several hundred acre-feet. The City fills their portion of the recreation pool with Antonio Lopez ditch water rights dedicated to this purpose. However, hydrologic conditions often result in years when only limited amounts of water can be stored under this water right. Consequently, the City's portion of the recreation pool is generally filled under favorable hydrologic conditions and the volume then progressively decreases until hydrologic conditions are again favorable to fill the pool.

Purgatoire River

The Purgatoire River flows 146 miles from Trinidad Reservoir before joining the Arkansas River (Corps 1994). Flows in the Purgatoire River below Trinidad Reservoir are dependent on releases from the reservoir, inflows from tributaries, and return flows from irrigation, M&I and other uses in the basin.

Table 3.2 contains mean monthly streamflow data for the Purgatoire River at four gage sites below Trinidad Reservoir. The first gage (USGS No. 07124410) is just downstream of the Trinidad Dam, the second gage (USGS No. 07126300) is approx. 65 miles below the dam, the third (USGS No. 07126485) is near Rock Crossing (approx. 90 miles downstream of the dam), and the fourth (USGS No. 07128500) is near Las Animas, CO (just upstream of the confluence with the Arkansas River). The table reflects Purgatoire River gage data subsequent to the 1976 completion of the Trinidad Dam.

Table 3.2. Mean Monthly Streamflow in cfs as Recorded at USGS Gages Along the Purgatoire River – 1977 to 2001.

Gage No.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
07124410 (Trinidad Dam)	2.69	2.94	3.01	31.9	167	206	178	152	115	24.6	5.61	2.44
07126300 (~65 Miles Below Dam)	29.1	31.1	38.9	90.2	139.6	98.2	88.6	144	60	36.3	34.9	30.6
07126485 (Rock Crossing)	32.6	35	46.1	90.2	133	102	77.8	122	44.3	40.4	40.9	34.5
07128500 (Las Animas, CO)	31.6	31.8	42.4	80.7	134.6	99	77.6	140.6	45.5	35	39.2	30.8

City of Trinidad Municipal and Industrial

The City's demand for M&I water is primarily a function of the municipality's population. Between 1990 and 2000, the City' population grew by approximately 5.8% based on census data (State of Colorado 2003). Prior to this, the City's population had declined after peaking in the 1930's and 1940's. A report prepared for the City (Black and Veatch 2001) projected that the City would experience a growth trend through 2020. The report projected that under a high growth scenario the City may be expected to grow by 3.5% by 2020; under a low growth scenario population would be expected to grow by 2%.

In 2000, the City's estimated average daily demand was 2.88 million gallons per day (mgd), or approximately 3,226 af per year. Delivery of this amount is within the capability of the City's existing supply system, which has a maximum capacity of 5,746 af. Based on the Black and Veatch (2001) data, the City is expected to need approximately 7,975 af under the high growth scenario and 4,693 af under the low growth scenario by 2020.

The City owns a number of John Flood Ditch and MLIC water shares. The City has been given a State water decree for a change in use, irrigation to M&I, and change in the point of diversion, Model Ditch headgate to Trinidad Reservoir. The City has traditionally leased this water back to irrigators along the

John Flood and MLIC ditches. In some cases, the City has entered into long-term agreements with irrigators for use of the City's water. The City is currently using a small amount of its change water rights for augmentation.

Stockwater

Stockwatering is an identified use in the Operating Principles and Operating Criteria. Water may be released from the reservoir inflow in the amount necessary, when added to stream gains below the dam, to make up to 5 cfs (as measured at the State of Colorado's Trinidad gage [PURTRICO] located upstream of the Baca Ditch diversion) available for stockwater diversion. The total reservoir inflow release for stockwatering is not to exceed 1,200 af in any one non-irrigation season.

This method of delivering stockwater has proven to be ineffective in conveying water to stock ponds. Often during the non-irrigation season, there are minimal flows in the Purgatoire River below Trinidad Reservoir. When releases are made for stockwater, transit and evaporation losses deplete the releases before they reach the intended stock ponds. Soils in the unlined ditches are often dry and unsaturated at this time of year (Jan.-April) and are capable of absorbing a significant amount of the stockwater. In addition, the width of some of the District canals (ex.: Baca is ~10 ft.; Enlarged South Side is ~21 ft.) further diminishes the effectiveness of the 5 cfs stockwatering deliveries, because these relatively wide ditches disperse the flow over more soil surface, which increases the transit losses.

Because there is not sufficient flow to transport water to stock ponds, water is being diverted into ditches and cattle are allowed to drink from pools in the ditches. Cattle accessing water in the ditch, and associated hoof action on the soils, degrades the ditches, increases seepage, which further decreases the effectiveness of deliveries to stock ponds.

No Action Alternative

Trinidad Reservoir

- M&I – The existing Operating Criteria do not provide for current and future use of the City's changed water rights for M&I use. As a result, the City would most likely continue to lease the majority of their water to irrigators for agricultural uses, for the foreseeable future. Because the City would not be storing water in their Trinidad Reservoir account and this water would continue to be used for irrigation, this particular component is not expected to measurably alter Trinidad Reservoir storage and release patterns.

  The City would be expected to continue to seek the means to use this water for M&I purposes because of their long-term involvement and investment in securing this water source. Because the nature of any future Trinidad M&I or other water use are undetermined, the effects of these actions cannot be predicted.

- Recreation Pool – The recreation pool volume would be expected to fluctuate several thousand acre-feet under no action due to the lack of a dedicated supply to replenish pool losses. The State would most likely seek water exchanges to replace losses to their portion of the recreation pool. The most likely source of water for an exchange would be transmountain diversions that can be diverted to the Arkansas River. An exchange of this nature requires a number of favorable hydrologic conditions to occur in order to successfully exchange this water to Trinidad Reservoir. In general, the State would purchase transmountain diversion water to make the Arkansas River "whole" in exchange for storing water in Trinidad Reservoir's recreation pool. Based on their experience with initially filling their portion of the recreation pool, the State estimates that in wet years conditions for exchanges may occur 4 out of 10 years (Pers. Comm. Paul Flack 2003). In

normal and dry years, the opportunity to successfully execute an exchange is expected to be less than in wet years. Limited opportunities to exchange water may result in significant declines in the recreation pool volume between exchange fillings. Estimates indicate that evaporation and seepage result in an average annual depletion of 1,060 af from the recreation pool (U.S. Army Corps of Engineers 1994). Consequently, during the timeframes when exchanges are not available, the pool volume may drop by several thousand acre-feet.

- Stockwater – Stockwater releases would continue to be limited to the provisions in the existing Operating Principles and Operating Criteria, i.e. releases at a rate of 5 cfs or less not to exceed 1,200 af. A portion of the 1,200 af allowed for stockwatering is expected to be used even though the effectiveness of the current stockwatering practice is limited. Unused portions of the 1,200 af available for stockwatering would remain in the reservoir irrigation capacity and be used for irrigation during the irrigation season.

Purgatoire River

- M&I – The existing Operating Criteria do not provide for current and future use of the City's changed water rights for M&I use, although minor amounts are being used for augmentation. Therefore, this is not expected to result in any change in Purgatoire River flows. The historic irrigation return flows to the Purgatoire River associated with Trinidad's John Flood and MLIC water rights, in particular, would be maintained because the subject water will most likely be leased back to irrigators.

- Recreation Pool – The State will most likely not proceed with purchase of the MLIC water rights if the Operating Principles and Operating Criteria are not amended to allow the State to use MLIC irrigation water to replenish the recreation pool. MLIC would retain ownership of the water rights and would be expected to continue to use the water for agricultural purposes. Although MLIC has removed acreage from production in anticipation of this water sale, they are a water short irrigator and could still make full agricultural use of the water being considered for sale. Consequently, no change in Purgatoire River flows is anticipated since this water would be expected to be used in a manner similar to past practices.

  When the State conducts a water exchange, water would be diverted and stored in Trinidad Reservoir. This will reduce flows in the Purgatoire River below Trinidad Reservoir. Exchanges typically occur during the peak of spring runoff, therefore during an exchange Purgatoire River flows would most likely be affected sometime during the mid-April to mid-June timeframe. Exchanges would typically only be necessary for a few days, when conditions are appropriate, to replenish the State's portion of the recreation pool (Pers. Comm. Paul Flack 2003).

- Stockwatering – Gains (typically less than 3 cfs) to the Purgatoire River below the Trinidad Dam and above the Trinidad gage, which can be diverted for stockwater use, will most likely only be diverted occasionally for stockwatering purposes under no action. Although the current stockwatering methods are not very effective, some diversion and use of the water is expected to continue. Any gains that are not diverted would remain in the river and be available for use by water districts and diverters downstream of the District. Essentially, current patterns of stockwater use would continue and no change in Purgatoire River flows would be expected due to stockwatering under no action.

Arkansas River

The State is expected to seek water exchanges to replenish their portion of the recreation pool. These exchanges will most likely involve working with Colorado Springs Utilities to exchange water in Lake Meredith for storage of native flows in Trinidad Reservoir's recreation pool. At the time that water

begins to be diverted and stored in the recreation pool under the exchange, releases would be made from Lake Meredith to the Arkansas River. The Arkansas River would therefore be made "whole" below the confluence of the Purgatoire and Arkansas rivers. The release of exchange water from Lake Meredith will result in a net increase in Arkansas River flows below Lake Meredith and above the confluence of the Arkansas and Purgatoire rivers. Exchanges are most likely to occur between mid-April and mid-June and the exchange would probably occur over several days (Pers. Comm. Paul Flack 2003).

Amendment Alternative

Trinidad Reservoir

- M&I – Initially, the City is only expected to use a small portion of their John Flood and MLIC water rights, and therefore will only need a portion of their Trinidad Reservoir storage capacity. At the outset, the City plans to continue augmenting well use by using their Trinidad water rights. The City would use water from three wells for non-potable water uses, such as watering school and park lawns. The water from these wells is considered a depletion of the Purgatoire River. Consequently, the City would augment Purgatoire River flows by making releases from Trinidad Reservoir to replace water used from the wells. The maximum amount of water to be used for this purpose is 60 af. To meet this need, the City would store the necessary amount of water in their Trinidad Reservoir capacity and release it as needed.

  The City also has an agreement with Coastal LLC to provide raw water for a golf course. Water would be diverted directly from the Purgatoire River and used to water the golf course. At this time, construction of the diversion and golf course has not occurred. It is difficult to determine when construction of these facilities will occur and use of water will begin. The developer was originally scheduled to begin diverting water in September of 2003. Once this need is developed, water will be stored in the City's Trinidad Reservoir capacity and released as needed for direct diversion and use on the golf course.

  Finally, the City does not currently have the facilities necessary to convey water from Trinidad Reservoir to their existing water treatment plant. In addition, the existing water treatment plant would need to be expanded to be capable of treating water from Trinidad Reservoir in addition to their current water supplies. A report prepared for the City, Black and Veatch (2001) recommended that a new water treatment facility be constructed to treat Trinidad water, rather than expanding the existing facility. The City supports this recommendation, and has begun the initial project planning for construction of a new water treatment plant. However, a number of major project planning and administrative steps must still be completed to undertake the project, including passing resolutions to proceed with this project, developing funding for the project, and site selection and acquisition. The high potential for variability in the outcomes of these initial planning steps suggests that the City's use of Trinidad water in a water treatment plant is not yet a reasonably foreseeable action. Consequently, use of the majority of the City's reservoir capacity is not expected to occur for a number of years.

  When the City uses Trinidad Reservoir M&I water, the City's storage account would accrue water for later M&I releases. Water in this account would be released as the City needs it. Unlike irrigation water, M&I water is typically released year-round rather than just during the irrigation season. This would result in more water volume in the reservoir during late-summer, fall and winter months.

- Recreation Pool – Under the Amendment Alternative, that portion of the MLIC water rights to be purchased by the State would accrue to the recreation pool rather than the irrigation capacity. Accrual of water in the recreation pool would be greatest during spring months, and lower during

all other times of the year. Consequently, the pool would probably be fullest at the beginning of summer and lose volume until the following spring fill begins. Fluctuation in the pool volume would probably be limited to several hundred af, assuming that annual reservoir inflows are sufficient to replace all or most of the annual estimated evaporation and seepage losses of 1,060 af. The net effect of this action is consistently higher reservoir elevations throughout the year.

- Stockwatering – Under the Amendment Alternative, the full 1,200 af available for stockwatering is expected to be delivered. The District anticipates that releases of approximately 70 cfs would be made for stockwatering, and result in approximately 9 days of releases. Reclamation modeled these releases assuming three 3-day releases of approximately 70 cfs (Appendix A). The model indicated that the reduced reservoir surface area after these stockwater releases resulted in less evaporation. Because there would be less evaporation after these stockwater releases and there would be more evaporation without these releases, the effects of the releases on reservoir content decrease over time.

  Given that a portion of the stockwater allowance is expected to be used under no action and that reduced evaporation "boosts" reservoir content after releases, stockwatering under the Amendment Alternative is expected to only slightly decrease non-irrigation season reservoir content.

Purgatoire River

- M&I – There would be no impact to the Purgatoire River below the Hoehne headgate (13 miles below Trinidad Dam) and most likely only minor changes to river flows between the dam and Hoehne headgate as a result of the M&I amendments, for the following reasons:

  1. Regardless of whether the City uses all or only part of their John Flood and MLIC water rights, the historic return flows associated with the historic agricultural use of this water is protected. The City's water decree requires that when they store M&I water, releases must be made from the reservoir in quantity (35% of the total water considered) and timing similar to agricultural historic return flows. Agricultural return flows are believed to accrue to the Purgatoire River beginning at and downstream of the Hoehne headgate. Consequently, there should be no impact to the Purgatoire River below Hoehne headgate due to M&I amendments.

     The 35% historic return flows are broken down into 25% irrigation season return flows and 10% winter return flows. The irrigation season return flows (25%) represent no major change in flow patterns for the Purgatoire River. The non-irrigation season return flows of 10% do represent a change in flow patterns. When derived from irrigation as under the no action, these return flows would reach the river below the Hoehne headgate during the non-irrigation season. Under the Amendment Alternative, these return flows will be released from the reservoir during the non-irrigation season and supplement flows in the 13 mile reach upstream of the Hoehne headgate.

  2. The City is expected to continue to lease back a portion, possibly a majority, of their water rights for agricultural use, because the City's use of M&I water from Trinidad Reservoir will most likely be limited for the reasonably foreseeable future. Currently, the City only has firm plans to make use of a portion of their John Flood and MLIC water rights by making releases to augment their well use and potentially to fulfill an agreement to provide releases for watering a golf course (see the M&I component under Trinidad Reservoir above for more detail on the City's anticipated water use). Consequently, little or no change in Purgatoire River flow is expected, and no change in flow downstream of the District would occur.

However, when the City does store water for M&I purposes, the reduced irrigation releases will reduce flows in the Purgatoire River between the dam and the MLIC headgate, an eight-mile reach, during the irrigation season.

3. No additional return flows to the Purgatoire River are expected as a result of the City's M&I water use available under this alternative. Water decree No. 88CW061 allows the City to use the consumptive portion of the water right to extinction, or in other words re-use the water to the point that no return flows reach the Purgatoire River. The City has, in fact, proposed to re-use the water once they begin using it. Water released from the waste water treatment plant into the Purgatoire River would be diverted approximately 1.5 miles downstream to irrigate a golf course.

- Recreation Pool – Similar to the M&I amendments, the recreation pool amendments would have no effect on Purgatoire River flows below the Hoehne headgate, but would change river flows between Trinidad Dam and the MLIC headgate (approximately eight miles).

  1. Under the Amendment Alternative, the State would be allowed to use that portion of the water removed from irrigable lands that is considered the consumptive use portion, which has been determined by the State to be 65% of the water right. The historic return flows attributed to the Purgatoire River, estimated at 35%, would be released from Trinidad Reservoir at a rate and time similar to historic return flows to keep the river "whole" or maintain historic flows in the river. Consequently, the recreation pool amendments will have no effect on the Purgatoire River below the Hoehne headgate, the beginning point of historic return flows.

  2. Purgatoire River flows between the Trinidad Reservoir outlet and the diversion for the Model Ditch, a distance of roughly eight river miles, will continue to flow with the 35% historic return flows, but will no longer have flows related to the 65% of consumptive use water transferred to the recreation pool. This water would have been in this eight mile stretch of the river during the irrigation season, and involves of a maximum of 700 af annually.

  3. The 35% historic return flows are broken down into 25% irrigation season return flows and 10% winter return flows. The irrigation season return flows (25%) represent no major change in flow patterns for the Purgatoire River. The non-irrigation season return flows of 10% do represent a change in flow patterns. When derived from irrigation as under the no action, these return flows would reach the river below the Hoehne headgate during the non-irrigation season. Under the Amendment Alternative, these return flows will be released from the reservoir during the non-irrigation season and supplement flows in the 13 mile reach upstream of the Hoehne headgate.

- Stockwater – Under the Amendment Alternative, multiple "slugs" of water would be released from the reservoir for stockwatering purposes. The releases are anticipated to occur in multi-day (2-3) releases, two to three times during the non-irrigation season. Historically, releases for stockwatering were often around 80 cfs, however the District expects there may be a need for releases as high as 100 cfs. The total quantity of water available for releases would remain at 1,200 af, just as under the no action alternative. Therefore, at a rate of 100 cfs, the 1,200 af would be depleted in approximately six days. At 70 cfs, the 1,200 af would be depleted in approximately nine days.

  During those days that stockwater is diverted, the gains to the Purgatoire River between Trinidad Dam and the Trinidad Gage (generally less than 3.5 cfs) would also be diverted. If stockwater

diversions are made for six to nine days, there would be no gains downstream of the diversion point during those days. (The diversion point will vary depending on which ditch/headgate is used to deliver the stockwater.) However, the gains would not be diverted for approximately 141-144 days during the non-irrigation season and would continue downstream.

Arkansas River

The three Amendment Alternative elements are not expected to result in any impact to the Arkansas River.

PRIME FARMLANDS

The Farmland Protection Policy Act of 1980 and Council on Environmental Quality guidance issued in 1980 direct Federal agencies to evaluate the impact of their actions on prime farmlands.

Affected Environment

The MLIC has a total of 6,177 acres, a portion of which are prime farmland. The prime farmland designation for these acres is contingent upon irrigation water, i.e. if the lands are not irrigated, the soils themselves do not meet the criteria for designation as prime farmland.

The City has acquired 43 percent of the Johns Flood water rights over the years, beginning in 1981. The City typically leases this water for irrigation purposes on a year-to-year basis to various farmers that use the Johns Flood ditch system (the Johns Flood Ditch Company was dissolved in 1985). It is likely that some of the acreage that has been irrigated in the past with Johns Flood water leased from the City was used on prime farmland. However, there is no specific irrigable acreage associated with this lease water, which is subject to change in location of use annually and has changed over time.

No Action Alternative

All prime farmlands within MLIC would remain available for irrigated cultivation. The MLIC does not hold sufficient water rights to adequately irrigate all of their lands in most years. Consequently, it is reasonable to expect that some of the MLIC farmlands will experience short or long-term dry-up due to changes in operations to address water shortages and unfavorable hydrologic conditions.

Continued delivery of the City's Johns Flood lease water to irrigators could mean that prime farmlands that would otherwise not be irrigated, would receive water. Delivery of this water will not have a direct impact on maintaining or losing prime farmland on the whole.

Amendment Alternative

Initially, the City's use of M&I water from Trinidad Reservoir is expected to be limited. Full development of this water source is expected to be several years in the future. The portions of the City's water that are not used for M&I purposes are to be leased back to irrigators for agricultural use. When there is a request for delivery of M&I water, the City is required to notify the District to inform them of which lands in the District will be dried-up in connection with the M&I deliveries. The number of acres to be dried-up is proportionate to the number of acre-feet being used for M&I purposes. The City's subject water rights indicate that for the 2,802 af of water secured by the City, dry-up of 1,321.7 acres will be required. Specific parcels to be dried-up are not specified. Initially, the City has indicated the need to dry-up 373.7 acres in response to M&I water use, and has identified specific parcels for this purpose (Wheeler 2002). Approximately 247.7 of these acres are classified by the Natural Resource Conservation Service (NRCS) as prime farmland when irrigated. There is some potential for the specific lands identified for dry-up by the City to change from year to year, because the water decree does not

identify specific lands for dry-up. If this occurs, the portion of dry-up acreage that is prime farmland when irrigated will also vary.

Under the Amendment Alternative, the State is expected to implement their agreement with MLIC for transfer of certain water rights. The agreement involves the transfer of 700 af of water, which is calculated to be the equivalent water used to irrigate 805.46 acres. The agreement for this transaction identifies specific acres to be dried-up. Of the 805.46 acres to be dried-up, approximately 458 acres are considered prime farmland when irrigated. Note that completion of this transfer is dependent on the issuance of a water decree for the change in ownership, use and diversion of the subject water.

The stockwatering component of the Amendment Alternative is not expected to have any direct effects on prime farmland.

The primary significance of removing prime farmland from production is often the economic impact on individual farmers from losing their most productive lands and loss of the nation's most economically productive farmlands. However, the Amendment Alternative is not expected to involve impacts in either of these respects with regards to the MLIC lands. In this case, the land owner has willingly identified those lands that provide the least benefit to the farms operations. Although they may include prime farmland, the identified lands have features, such as excessive erosion and high ditch maintenance costs, that make them the least attractive lands for the farmer to cultivate. Consequently, changing the land use on these lands does not negatively affect the farmer, instead the farm operator can recognize economic gain from the sale of water associated with those lands and improved operational efficiency by removal of the farmer's least economically viable lands.

The City's future use of the Johns Flood water for M&I purposes will mean that less water is available to lease for irrigation purposes. Johns Flood lease water is not dedicated to specific lands and therefore any specific effects of not delivering irrigation water cannot be determined. However, less availability of irrigation water is not expected to result in the loss of prime farmlands or preclude the use of any prime farmlands; they can still be cultivated and irrigated.

ARKANSAS RIVER COMPACT

Affected Environment

The Arkansas River Compact (Compact) was enacted into law by Congress in 1949 for the purpose of settling disputes, avoiding future conflict and equitably apportioning the waters of the Arkansas River between the states of Colorado and Kansas. The Compact is not intended to impede or prevent future development of the Arkansas River basin, as long as the waters of the Arkansas River are not materially depleted in usable quantity or availability for use to water users in the states of Colorado and Kansas. The Compact also established the ARCA to administer the Compact. ARCA is a signatory to the Trinidad Reservoir Operating Principles. ARCA approves amendments to the Operating Principles, which also must be approved by the other signatories to the Operating Principles (Reclamation, Corps, the District, and the State of Kansas).

No Action Alternative

Operation of the irrigation capacity and recreation pool would remain essentially the same as they are currently. No change in the hydrologic regime for the Purgatoire River below Trinidad Dam and Reservoir is expected and any exchanges conducted by the State are expected to leave the Arkansas River "whole". As a result, there are no depletions to the Arkansas River or other

hydrologic effects associated with the No Action Alternative that are expected to result in a material depletion.

Amendment Alternative

Amendment of the Operating Principles to allow M&I use by the City of Trinidad was approved by the signatories to the Operating Principles in 1998. On May 23, 2003, ARCA adopted amendments to the Operating Principles that would permit the irrigation capacity to be used to replace evaporation and seepage from the permanent fishery pool. Finally, ARCA adopted amendments to the Operating Principles that permit the proposed operational changes for stockwatering on December 9, 2003. ARCA's approval of the proposed actions indicates that ARCA members do not expect that these amendments to the Operating Principles will result in material depletions. The analysis described in the Hydrology section of this chapter also concludes that the Amendment Alternative will not result in any material depletions. The three components of the proposed action are not expected to result in hydrologic changes to the Purgatoire River downstream of the District or any change in the hydrology of the Arkansas River.

THREATENED AND ENDANGERED SPECIES

Affected Environment

Four species listed as threatened or endangered under the Endangered Species Act (ESA) may be present in the action area. Two species have been identified as candidates for listing. No critical habitat has been designated nor proposed in the action area. The Fish and Wildlife Service (FWS) concurred with this species list on July 31, 2003.

Threatened or Endangered Species

Bald eagle (*Haliaeetus luecocephalus*)	Threatened
Piping plover (*Charadrius melodis*)	Threatened
Interior least tern (*Sterna antillarum*)	Endangered
Black-footed ferret (*Mustela nigripes*)	Endangered

Candidate Species

Arkansas darter (*Etheostoma cragini*)
Lesser prairie-chicken (*Tympanuchus pallidicinctus*)

Bald Eagle

Bald eagles are large, opportunistic birds of prey that feed largely upon fish and waterfowl. Bald eagles are associated with rivers, lakes, and reservoirs where large trees provide perch sites for roosting and for locating and securing prey. Fish are the primary source of food. Under adverse conditions, bald eagles will search for prey in upland areas and will also feed on carrion. If severe winter conditions persist, bald eagles will concentrate in areas with open water or migrate further south.

Nesting and wintering bald eagles are found in close association with water that provides a reliable food source and isolation from human disturbance. Bald eagles wintering in Colorado are thought to originate in the central provinces of Canada and the Great Lakes states. Migrant and wintering bald eagles begin to arrive in the Arkansas River basin in mid- to late-October and begin to leave the area for breeding areas in the north by early March. Adult migrants tend to winter repeatedly in the same area but remain mobile when seeking food during changing winter weather conditions. The Colorado Division of Wildlife

(CDOW) (2003) estimates that approximately 800 bald eagles winter in Colorado. Wintering and migrating bald eagles can be expected to occur throughout the lower Arkansas River basin.

Bald eagles nest near rivers, lakes, and reservoirs where they select nesting sites free from disturbance. Cottonwood trees are preferred nesting trees in the lower Arkansas River basin. Nests are large and re-used annually. Nesting activities begin in early to mid-March, eggs are laid in late March to early April, and both adults incubate the eggs. Eggs hatch in mid-May and fledging takes place after ten to eleven weeks with immature birds remaining near the nest for another six weeks. The number of active bald eagle nests is increasing in Colorado. In 2001, there were about 51 nesting pairs (CDOW 2003). There are no known active nests in Las Animas County (Pers. Comm. Jeremy Gallegos 2003). The bald eagle has been downlisted to threatened and has been proposed for de-listing.

Piping Plover

The piping plover is a migratory shorebird that breeds along prairie rivers, alkali lakes and ponds of the northern Great Plains, on sandy beaches along the Great Lakes, and on the beaches of the Atlantic coast. Its primary food is aquatic invertebrates. Piping plover populations have fluctuated drastically since 1900 primarily as the result of market hunting. Populations rebounded by the 1920s; however, human encroachment, an increase in the recreational use of sandbars and beaches, channelization and impoundment of rivers, and the resultant modification and destruction of habitat have caused numbers to decline again.

The piping plover is one of three small plovers that can be found in Colorado. In eastern Colorado, piping plovers occur primarily as migrants and arrive in early April. Most non-breeding piping plovers leave Colorado by the end of May.

The piping plover's historic breeding habitat in eastern Colorado included the South Platte and Arkansas rivers. Piping plovers can also be found breeding on sandy lake and reservoir shorelines, river sandbars, and sandy wetland pastures. Breeding piping plovers arrive in eastern Colorado in late April. Piping plovers are known to nest with interior least terns at John Martin Reservoir on the lower Arkansas River (Pers. Comm. Kevin Kaczmarek 2003). The piping plover is listed as threatened.

Interior Least Tern

The interior least tern is the smallest member of the tern family and breeds in southeastern Colorado in the La Junta-Lamar area and in colonies of piping plovers at John Martin Reservoir (Pers. Comm. Kevin Kaczmarek 2003). Breeding least terns are normally associated with unvegetated shorelines, sandbars, and mudflats of rivers and reservoirs. The occurrence of breeding least terns is localized and is highly dependent upon the presence of dry, exposed sand and gravel bars and favorable river flows that support a forage base and isolate the bars from the banks. Characteristic riverine nesting sites are dry, flat, sparsely vegetated sand and gravel bars within a wide, unobstructed, water-filled river channel. This swallow-like aquatic bird feeds primarily on small fish, such as shiners (*Notropis* spp.) and plains killifish (*Fundulus kansae*), from shallow water in rivers and lakes.

Least terns arrive on breeding sites in mid-May. Both sexes share egg incubation that takes 19 to 25 days. Winter habitat for the interior least tern is currently unknown. The interior least tern is listed as endangered.

Black-footed Ferret

The black-footed ferret is a small carnivore about the size of a mink and is considered to be the most endangered mammal in North America. The historic range of the black-footed ferret coincides with that of the three species of prairie dogs upon which it depends for food and shelter and includes the short and mid-grass prairies of the Great Plains (Schroeder 1987). Black-footed ferrets inhabit prairie dog towns

utilizing abandoned burrows with approximately 90% of their diet consisting of prairie dogs. The remainder of their diet is composed of mice, ground squirrels, rabbits, rats, birds, reptiles, and insects. The demise of the black-footed ferret in the mid-1900s coincided with attempts to rid the Great Plains of prairie dogs. What was believed to be the last known black-footed ferret died in 1979 in captivity in South Dakota and the species was presumed extinct until it was rediscovered in Wyoming in 1981(Nebraska Game and Parks Commission 1996). The last record of a black-footed ferret in Colorado was from 1946 (CDOW 2003).

Historically, black-footed ferrets were never abundant (because few people saw or recorded them) in Colorado, but they likely ranged statewide. Prairie dog towns/complexes consisting of more than 80 acres within four miles of one another should be surveyed for the presence of black-footed ferrets (FWS 1993). Small isolated prairie dog colonies are located north and east of Trinidad Reservoir (Pers. Comm. Kevin Kaczmarek 2003). The black-footed ferret is listed as endangered.

Arkansas Darter

The following information was taken from the CDOW webpage (http://wildlife.state.co.us/species_cons/index.asp). The Arkansas darter is a three-inch member of the walleye and perch family. Its body displays 12 to 14 dusky stripes along the sides with fine black specks on the back and a dark, vertical wedge-shaped spot beneath the eye. During the April-May breeding season, males display bright orange underneath.

Arkansas darters feed on a variety of aquatic invertebrates and plant material including small seeds. They prefer shallow, clear streams with sandy substrates, spring-fed pools, and abundant rooted aquatic vegetation.

Arkansas darters may spawn throughout spring and summer. Spawning takes place in shallow water over a bottom of coarse gravels. Eggs are usually deposited in open areas on organic material covering sandy substrates. Arkansas darters become sexually mature in a year or less.

The Arkansas darter has a very restricted natural range and is the only darter native to the Arkansas River drainage. It is found only in tributaries to the Arkansas River in Colorado, Kansas, Missouri, and Oklahoma. The species is found in the upper Arkansas River, springs adjacent to Fountain Creek, Horse Creek, upper Arkansas River at John Martin Reservoir, Big Sandy Creek, Rush Creek, Black Squirrel Creek, and Chico Creek drainages. The darter has never been recorded from the Purgatoire River drainage and appears to be restricted to Arkansas River tributaries that enter the river from the north (Pers. Comm Jim Melby 2003).

Arkansas darters are susceptible to predation by introduced fish and degradation of water quality. The Arkansas darter is a candidate species.

Lesser Prairie-chicken

The following information was taken from the CDOW webpage (http://wildlife.state.co.us/species_cons/index.asp). The lesser prairie chicken is mostly brown in color with horizontal barring, short rounded tails and about the size of a small chicken. Males have reddish air sacs on their necks that are inflated during mating courtship displays. Lesser prairie chickens historically occupied the grasslands of Texas, Oklahoma, New Mexico, Kansas, and southeastern Colorado. They prefer sandy grasslands having an abundance of mid-height grasses, sandsage, and yucca. During summer, they feed on grasshoppers and other insects. During winter, their food source consists of seeds, leaves, grain, and milo from agricultural areas.

Lesser prairie chickens are polygamous with males attracting females to leks with elaborate dancing

displays. Males also inflate their red air sacs and display their yellow combs. Hens typically lay 12 eggs.

Populations have declined as a result of conversion of grasslands and overgrazing. In Colorado, most of the birds are found in the Comanche National Grassland near the Town of Campo in the southeastern corner of the state. Smaller groups of birds are found south of the Town of Holly, east of the Town of Eads, and south of the Cimarron River. One group of birds was released in sandsage-yucca habitat east of the City of Pueblo in an effort to establish another population. The lesser prairie chicken is not found in Las Animas County (Pers. Comm. Kevin Kaczmarek 2003). The lesser prairie chicken is a candidate species.

No Action Alternative

As described in the Hydrology section, exchanges conducted by the State to replenish their Trinidad Reservoir recreation pool would reduce flows in the Purgatoire River between Trinidad Reservoir, when flows are stored, and the Arkansas River when they store and exchange flows. Flows in the Arkansas River between Lake Meredith and the confluence of the Arkansas and Purgatoire rivers (a river distance of approximately 40 miles) would increase when exchanged flows are released to replace stored water at Trinidad Reservoir. These exchanges are expected to occur during spring run-off (mid-April to mid-June) and to take a few days to complete. Environmental and administrative conditions permitting exchanges are estimated to occur a possible 4 out of 10 years in wet years and less in average and dry years based on the State's past experience.

The No Action Alternative is not expected to result in any other hydrologic or operational changes within or outside of the District.

Bald Eagle

The No Action Alternative would have no effect on bald eagles because changes in flows associated with exchanges are expected to occur outside of the winter roosting season for bald eagles in the Arkansas Basin and there are no known nesting bald eagles in the effected reach.

Piping Plover

Piping plover are known to breed at John Martin Reservoir and may breed along the Arkansas River upstream of John Martin Reservoir. Piping plover at John Martin Reservoir would not be affected by exchanges because the Arkansas River will be "whole" or unaffected below the confluence of the Arkansas and Purgatoire rivers. Since piping plover generally arrive in the Arkansas Valley in late April, there is potential for changes in Arkansas River flows due to exchanges to affect nesting piping plover upstream of John Martin Reservoir. However, because the exchanges will be relatively brief events (most likely limited to a few days), highly intermittent (only in years when all conditions are appropriate, which will most likely only be certain wet years) and occur early in the breeding/nesting season during the spring run-off season (high flow period), piping plover may be affected, but are not likely to be adversely affected because any potential changes in hydrology would not have measurable adverse effects on nesting plovers. In addition, it is important to note that during high flow years, sand and gravel bars used by piping plover are typically partially or entirely submerged, forcing birds to nest at the highest suitable elevations and less likely to be affected by minor increases in flows.

Interior Least Tern

There are no known populations of nesting least terns along the affected portions of the Purgatoire or Arkansas rivers. However, if nesting terns are present and nesting on the Arkansas River upstream of John Martin Reservoir during exchanges, effects would be similar to those described for plovers and are not likely to adversely affect interior least tern.

Black-footed Ferret

The no action would have no effect on black-footed ferrets because the effects under no action are expected to be limited to stream channels, outside of the habitat for the species.

Arkansas Darter

Because the exchanges are expected to be relatively brief events (most likely limited to a few days), highly intermittent (only in years when all conditions are appropriate, which will most likely only be certain wet years) and occur during the spring run-off season (high flow period), Arkansas darters are not likely to be adversely affected because minor additional flow during the runoff season would not affect habitat requirements of the darter.

Lesser Prairie-chicken

Stream channel effects resulting under no action would be well outside the known habitat for this species; no effect to the species would occur.

Amendment Alternative

On February 20, 2004, the FWS concurred with the following findings related to threatened, endangered and candidate species within the action area.

Bald Eagle

The eagle may occasionally visit the Purgatoire River valley and Trinidad Reservoir during winter. Once water is used for M&I and recreation pool purposes and non-irrigation season historic return flow releases are being made from the reservoir, there will be higher flows in the reach of river (a maximum of 3.2 cfs in winter) between Trinidad Dam and the Hoehne Headgate (13 river miles below the dam and where return flows to the river are assumed to begin) during the non-irrigation season, enhancing aquatic, wetland, and riparian habitat necessary to support prey species utilized by eagles.

The proposed recreation pool and stock watering changes have the potential to individually affect the recreation pool and irrigation capacity, but cumulatively the proposed changes result in no adverse effect to the elevation level of Trinidad Reservoir. Recreation pool use of water from the irrigation capacity to replace evaporation and seepage will maintain higher winter storage levels in Trinidad Reservoir. Stock water releases are currently only partially used, but under the proposed action, full use of the 1,200 af allowance is expected. This would result in an annual reduction in reservoir volume of several hundred acre-feet during the winter months. Therefore, when considered together, these actions will very nearly or fully offset each other. Consequently, they are expected to result in either no effects or possibly a minor increase in storage.

Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action may affect but not adversely affect (beneficially affect) the bald eagle.

Interior Least Tern and Piping Plover

These two species are addressed in common because of their similarity in habits and habitat requirements. Terns and plovers nest at John Martin Reservoir on the Arkansas River downstream of its confluence with the Purgatoire River. Neither species is known to nest along the Purgatoire River (Pers. Comm. Kevin Kaczmarek 2003). There would be no change in flows in the Purgatoire River below the District during the months when terns and plovers would be nesting at John Martin Reservoir.

Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the interior least tern or the piping plover.

Black-footed Ferret

Ferrets cohabitate with prairie dogs in large colonies. Only small, isolated prairie dog colonies are located within the action area and those occur outside of the District. The proposed action does include activities that would encourage changes in land use from cultivated use to grassland or pasture use within the District. This change in land use could create potential habitat for prairie dogs, that might result in potential black-footed ferret habitat.

Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the black-footed ferret. We anticipate potential development of prairie dog and black-footed ferret habitat. However, since there have been no confirmed sightings of ferrets in the state since 1946, it is unlikely that ferrets would inhabit the restored grasslands.

Arkansas Darter

The Arkansas darter is not found in the Purgatoire River basin (Pers. Comm. James Melby 2003). The proposed action is not expected to alter Arkansas River flows.

Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the Arkansas darter.

Lesser Prairie-chicken

The lesser prairie-chicken is not known to occur in Las Animas County. The closest known populations are found in Baca County.

Based upon the analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the lesser prairie-chicken.

SPECIES OF CONCERN

Affected Environment

The State of Colorado has designated certain wildlife species that have low or declining populations within the State as state endangered (SE), state threatened (ST), or state species of special concern (SC). (Species listed by both the State of Colorado and the federal government are addressed in the Threatened and Endangered Species section.) The following species designated by the state are known to occur or are likely to occur in the action area for the proposed action.

Swift fox	*Vulpes velox*	SC
Northern pocket gopher	*Thomomys talpoides macrotis*	SC
Botta's pocket gopher	*Thomomy bottea rubidus*	SC
Black-tailed prairie dog	*Cynomys ludovicianus*	SC
Townsend's big-eared bat	*Corynorhinus townsendii*	SC
Northern river otter	*Lontra canadensis*	ST
Long-billed curlew	*Numenius americanus*	SC
Wolverine	*Gulo gulo*	SE
Greater sage grouse	*Centrocercus urophasianus*	SC
Mountain plover	*Charadrius montanus*	SC
Peregrine falcon	*Falco peregrinus anatum*	SC

Ferruginous hawk	*Buteo regalis*	SC
Greater sandhill crane	*Grus canadensis tabida*	SC
Western yellow-billed cuckoo	*Coccyzus americanus*	SC
Burrowing owl	*Athene cunicularia*	ST
Plains sharp-tailed grouse	*Tympanuchus phasianellus*	SE
Plains minnow	*Hybognathus placitus*	SE
Suckermouth minnow	*Phenacobious mirabilis*	SE
Flathead chub	*Platygobio gracilus*	SC
Great plains narrowmouth toad	*Gastrophryne olivacea*	SC
Plains leopard frog	*Rana blairi*	SC
Yellow mud turtle	*Kinosternon flavescens*	SC
Triploid checkered whiptail	*Cnemidphorus neotesselatus*	SC
Massasauga	*Sistrurus cantenatus*	SC
Texas horned lizard	*Phryonosoma cornutum*	SC

No Action Alternative

The majority of species listed by the State of Colorado as likely to occur or known to occur in the project area would not be impacted by the No Action Alternative, because they are species that would not be impacted by minor hydrologic changes, such as the burrowing owl, swift fox, or Texas horned lizard. Species that could be imperiled by hydrologic changes expected to occur as result of the State's water exchanges from Lake Meredith to Trinidad Reservoir, specifically the plains minnow, suckermouth minnow, flathead chub, yellow mud turtle, and northern river otter, are not expected to be substantively impacted. The changes due to the exchanges will result in Arkansas and Purgatoire river flows and Trinidad Reservoir storage that are well within the historic flow and reservoir storage ranges. In addition, the changes would be short-term (a few days), result in relatively minor flow changes, and occur approximately four out of ten years. Consequently, any impacts to these species would be expected to be minor.

Amendment Alternative

The majority of species listed by the State of Colorado as likely to occur or known to occur in the project area would not be impacted by the Amendment Alternative, because they are species that would not be impacted by hydrologic or potential land changes expected under the Amendment Alternative. The plains minnow, suckermouth minnow, flathead chub, yellow mud turtle, and the northern river otter may be present in the reach of the Purgatoire River (Trinidad Dam to Hoehne headgate) or Trinidad Reservoir where hydrologic changes would occur as a result of the Amendment Alternative. However, the relatively minor change in flows and patterns of storage would not be expected to adversely impact these species, because the changes are well within the historic flow and reservoir storage ranges. A few species, such as the northern pocket gopher, Botta's pocket gopher, black-tailed prairie dog, and plains sharp-tailed grouse, may be able to occupy lands that would no longer be cultivated due to the City's purchase of irrigation water for M&I use if lands are allowed to revert to grasslands.

RECREATION

Affected Environment

In 2001, the Trinidad Lake State Park Management Plan Update Report (Colorado State Parks 2001) was completed by the State. The following are excerpts from the report.

> The Trinidad Lake State Park (State Park) has been managed by the State since 1980 through an agreement with the Corps. The State Park is located in south central Colorado three miles west of

the City of Trinidad, off Highway 12. Situated in Las Animas County, the largest county in the state, the State Park is approximately twelve miles north of the Colorado/New Mexico state line, and two hundred miles nearly due south of Denver. The 2,500 acre State Park, at an average altitude of 6,300 feet, offers a spectacular backdrop of the Sangre de Cristo Mountains, Culebra Range. The State Park is bordered by the Scenic Highway of Legends and the Santa Fe National Historic Trail.

The State Park is the only area on the Purgatoire River that is set aside specifically for large scale, water-based recreation. The fluctuating reservoir averages 800 surface acres and can balloon to over 1400 surface acres in wet years. It is open to all forms of water related recreation. The closest lakes of this size are Lake Pueblo State Park, 100 miles to the north and John Martin State Park, 100 miles to the east. The area is located three miles from a major artery into the state, Interstate 25. The State Park provides water-based recreational opportunities, such as sailing, water skiing, boating, shore fishing, and camping facilities to regional travelers and tourists.

Water is stored in Trinidad Lake for irrigation purposes from October 15 through April 15 every year. Irrigation releases begin after April 15, and the lake is usually drawn down through the six-month irrigation season. Determining factors during this period include local precipitation and the size of the snowpack in the Sangre de Cristo Mountains, Culebra Range.

Another factor affecting lake levels is the susceptibility of the Purgatoire River Valley to flash floods. A flash flood in August of 1981 caused the lake level to rise over 17 vertical feet in a three-day period. A rain/snow event on April 29th, 30th and May 1st of 1999 resulted in a 43 foot vertical rise in the lake level during the month of May. It is difficult to estimate or predict lake levels or even establish an average due to the varying conditions.

The original recreation pool assigned to the project was 4,500 af and offers about 284 surface acres for recreation. When the lake is filled with irrigation water, it can hold over 71,000 af and expands to over 1,400 surface acres. There is 84 vertical feet of fluctuation between the top of the original recreation pool and the top of the irrigation pool. The ideal lake size from a recreational standpoint is between 700 and 1,000 surface acres.

Storage in Trinidad Lake began in 1979 and since then has reached a high elevation of 6,230 feet in 1999, and a low elevation of 6,145.91 feet in September of 1989. Water levels tend to be highest in March and April and lowest in September and October.

The State Park is economically valuable to the City and Las Animas County. In 1994, an Economic Impact and Perception Report completed for the Colorado State Park System indicated that each individual visitor spends at a Colorado State Park is approximately $75.00 on trip costs that included entrance and camping fees, lodging, groceries, gas, licenses, and other miscellaneous expenses. It is estimated that the State Park generates approximately 15 million dollars in the regional economy. Table 3.3 is the State Park's visitation and revenue figures for the last ten-year period.

Table 3.3 Trinidad Lake State Park Comparison of Visitation, Revenue and Lake Elevations.

Year	Visitors	Revenue	Year Average Elevations	Year Average Surface Acres	Average Elevations *May-September*	Average Surface Acres *May-September*
1990	149,724	$51,018.10	6151.3	327	6151.3	327
1991	144,022	$54,809.45	6158.7	397	6150.9	323
1992	151,087	$55,570.50	6160.5	419	6157.6	388
1993	176,172	$72,099.20	6173.2	575	6179.5	674
1994	199,989	$81,013.70	6176.5	621	6179.4	674
1995	206,760	$90,629.60	6180.5	680	6185.9	744
1996	182,388	$92,306.25	6170.9	529	6162.4	447
1997	166,869	$109,805.30	6173.2	575	6178.5	662
1998	171,825	$136,640.05	6179.8	674	6179.8	674
1999	198,429	$138,792.47	6210.5	1109	6225.9	1359
2000	199,755	$171,663.67	6212.9	1146	6212.9	1146

No Action Alternative

As described and displayed above, there is a correlation between reservoir volume and the amount of recreation use at Trinidad Reservoir. Typically, higher visitation rates are associated with greater reservoir volume. Under no action, the recreation pool is expected to fluctuate several thousand acre-feet, declining in volume each year until an exchange can be used to replenish the volume lost to evaporation and seepage. Because the opportunity to exchange is expected to be several years apart, the negative impacts to the pool size and potentially to visitation will increase each successive year after an exchange has occurred until the pool is replenished.

The impact of recreation pool volumes are most evident when the irrigation capacity is empty or nearly empty. At these times, the recreation pool represents the major, or possibly the only, volume of water in Trinidad Reservoir. Typically, the irrigation capacity reaches its highest annual level from mid-March to mid-April and then drops over the course of the irrigation season. The irrigation capacity is typically at its lowest level in mid-October and gains volume during the non-irrigation season as water is accumulated in the irrigation capacity. Consequently, the recreation pool has the greatest opportunity to impact visitation in the late summer and fall when the irrigation capacity volume is at its lowest level. The lower the recreation pool volume is during this time of the year, the less value it may provide in attracting visitors to the reservoir.

Each successive year after an exchange, the No Action Alternative will contribute progressively less towards achieving the State's desire for a reservoir surface area of 700 to 1,000 acres, or 21,188 af and 40,716 af of reservoir storage respectively. When the recreation pool is full after an exchange, the State's minimum desired level of 700 surface acres will only be achieved when there is at least 5,221 af in the irrigation capacity. To achieve 700 surface acres after one year's evaporation and seepage losses (1,060 af), a minimum of 6,281af in the irrigation capacity would be necessary; after five years of losses (5,300 af), 10,521 af of storage in the irrigation capacity would be necessary; and after ten years losses (10,600 af), 15,821 af would be necessary. Each year that the State is unable to conduct an exchange, the opportunity to reach the State's minimum desired reservoir surface area and the duration that the lake may be at or above the minimum desired reservoir surface area lessens.

Amendment Alternative

Under the Amendment Alternative, the recreation pool volume will be relatively more stable than under no action. Fluctuation in the pool volume would probably be limited to several hundred af, assuming that annual reservoir inflows are sufficient to replace all or most of the annual estimated evaporation and seepage losses of 1,060 af. Accrual of water in the recreation pool would be greatest during spring months and lower during all other times of the year. Consequently, the pool will probably be fullest at the beginning of summer and lose volume until the following spring fill begins. The net effect of having a dedicated water supply for the recreation pool is consistently higher reservoir elevations throughout the year.

The City's storage and use of M&I water under the Amendment Alternative will alter reservoir storage patterns in a manner that will benefit recreation. M&I water would be expected to primarily be stored during spring/early runoff seasons and then used throughout the following year to meet City water demands. This change in storage pattern from irrigation use of the water, spring storage and release during the irrigation season, will result in storage of water through a greater part of the year than irrigation water which is stored for a shorter period of time. So, whenever M&I water is stored longer than it would if it had been in the irrigation capacity, the additional volume in the reservoir will contribute to an improved recreation experience.

Under the Amendment Alternative, both factors mentioned above will contribute to reaching the State's desired surface area for the reservoir. The recreation pool volume will be more stable, minimizing the quantity of other water needed to reach the State's minimum desired reservoir surface area of 700 acres. In addition, conversion of irrigation capacity water to M&I water will mean that higher reservoir levels are sustained longer annually. This will help keep the reservoir surface area at or near the State's desired level longer during the year, and especially during historically low reservoir volume periods such as late summer and fall.

SOCIAL AND ECONOMIC ENVIRONMENT

Affected Environment

In the early 1900's the region flourished due to the coal mining industry. Mining camps and "coke towns" were located throughout much of Las Animas County. After World War II, there was a rapid decline of the mining industry, which contributed to a decline in the population and economy of the region. Today, the major economic base is ranching, farming, methane gas extraction, land development and related construction. Economic recovery in the Trinidad area has been slow. Currently, approximately 10,300 people live in the City; the population of Las Animas County is estimated at 17,385 (Colorado State Parks 2001).

No Action Alternative

Projections through 2020 by Black and Veatch (2001) indicate that the City's demand for water will most likely continue to grow based upon population growth. They estimate that the City's population will grow between 2% and 3.5% by 2020. Growth at the 3.5% rate would result in the need to supplement the City's existing water supply before 2020. If growth is low to moderate, the City's current water supplies should be sufficient to meet the City's need through 2020. The City would only be expected to experience socioeconomic impacts due to insufficient water supply if they experience a high rate of population growth. At low and moderate levels of growth, the water supply is expected to be sufficient and no impact on socioeconomic conditions is anticipated.

The City will most likely continue to seek authority to use their MLIC and John Flood water rights given the amount of time and money they have invested to secure them in the past.

Amendment Alternative

Amendment of the Operating Principles to allow M&I use of City owned water stored within Trinidad Reservoir's irrigation capacity is not expected to result in any negative socioeconomic impacts. The City would have sufficient water resources available to address all levels of population growth through 2020, and most likely for a number of years beyond this timeframe. The infrastructure to use water stored in Trinidad Reservoir would need to be developed to make use of the City's water.

CULTURAL RESOURCES

Affected Environment

The National Historic Preservation Act and 36 CFR Part 800 (the federal regulations, which implement the Act) require Reclamation to consider effects to cultural resources within the Area of Potential Effects (APE). The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist". The APE for this undertaking includes Trinidad Reservoir, the Purgatoire River downstream of Trinidad Reservoir and the District.

Much of the land surrounding Trinidad Reservoir has been surveyed for cultural resources and found to contain both prehistoric and historic sites. The Corps has investigated and documented a number of these sites both prior to construction of the reservoir and for post-construction undertakings. In 1994, the Corps, in consultation with the Colorado State Historic Preservation Officer (SHPO), committed to inspect, survey, and mitigate impacts to sites on lands expected to be inundated by enlargement of Trinidad Reservoir's recreation pool (Corps 1994). This commitment includes all lands below the reservoir's maximum high water level.

The presence of cultural resources along the Purgatoire River downstream of Trinidad Reservoir and within the District has not been determined.

No Action Alternative

No operational changes of the irrigation capacity or recreation pool are proposed under the No Action Alternative; there would be no undertaking and no effects to cultural resources under this alternative.

Amendment Alternative

The proposed amendments to the Operating Principles and Operating Criteria would modify storage in Trinidad Reservoir, flow in the Purgatoire River downstream of Trinidad Reservoir and water deliveries within the District. However, the changes in each of these locations are relatively minor and are within the historic operational levels for the reservoir, river and District conveyance system. Furthermore, changes in reservoir levels will not inundate new areas and are limited to lands for which the Corps has already reached agreement on cultural resources protection with the Colorado SHPO. No construction activities are proposed in association with this alternative. Given this information, the proposed action has no potential to cause effects to cultural resources.

CHAPTER FOUR
Consultation and Coordination

SCOPING

Reclamation, in coordination with the Corps, developed a mailing list of entities with potential interest in the proposed action (see Appendix B). A scoping letter describing the proposed action, purpose and need for the action and potential environmental concerns was mailed to each of the entities on the mailing list. The scoping letter also invited comments on the proposed action. Responses to the scoping letter were received from three entities: the states of Kansas and Colorado, and the District.

The following issues related to the proposed action were identified by Reclamation and Corps resource specialists, and in the responses to the scoping letter.

- Effects on the flows of the Purgatoire River and its tributaries downstream of Trinidad Reservoir;
- Changes in Arkansas River flows below its junction with the Purgatoire River;
- Changes in Trinidad Reservoir surface elevation and storage levels;
- Effects on recreation at Trinidad Reservoir;
- Effects of changing water used for irrigation purposes to M&I, especially on agriculture economies, prime farmlands, and City development;
- Effects on local socioeconomics;
- Effects of the proposed stock watering changes on the livestock industry;
- Compliance with the Arkansas River Compact;
- Impacts on Federally-listed threatened and endangered species;
- Impacts on cultural resources.

These are analyzed in Chapter 3.

COOPERATING AGENCY

The U.S. Army Corps of Engineers, South Pacific Division, Albuquerque District participated in this analysis as a cooperating agency, and provided expertise and support related to historic and current operation of Trinidad Dam and Reservoir, resource analysis, agency jurisdiction, mapping, and document reviews.

KEY CONTACTS AND CONSULTATIONS

In additions to those who provided comments, the following were consulted about providing information for the EA. They are:

Jeffrey J. Kahn, Bernard Lyons Gaddis & Kahn, who provided information on the City's water rights and planning.

Jim Fernandez, Utilities Superintendent, City of Trinidad, who provided information on the City's water planning and development.

Thelma Lujan, Administrative Staff, District, who provided information on the District's boundaries and operations.

Paul Flack, Colorado State Parks, who provided information related to the State's acquisition of MLIC water rights and water exchanges for the purpose of filling the recreation pool of Trinidad Reservoir.

Lee Neve, Soil Survey Project Leader, Natural Resources Conservation Service, who provided information on prime farmlands associated with lands to be dried up.

Kevin Salter, State of Kansas, who provided information related to the effects of operational changes and compliance with ARCA.

FWS, who provided information on species within the action area and written concurrence with the findings in Reclamation's *Biological Assessment for Amendment of Operating Principles and/or Operating Criteria at Trinidad Reservoir*.

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Kaczmarek, Kevin, 2003. Wildlife Manager, Wildlife Programs-Habitat, Southeast Region, Lamar, Division of Wildlife, Department of Natural Resources, State of Colorado.

Melby, Jim, 2003. Wildlife Manager, Wildlife Programs-Aquatics, Pueblo Service Center, Pueblo, Division of Wildlife, Department of Natural Resources, State of Colorado.

APPENDIX A

Modeling of Stock Water Alternatives

Trinidad Project,
Trinidad, Colorado

Modeling of Stock Water Alternatives

Eastern Colorado Area Office
Bureau of Reclamation
July 2004

Trinidad Project
Modeling of Stock Water Alternatives
Eastern Colorado Area Office
Bureau of Reclamation
July, 2004

I. Introduction

The Trinidad Dam and Reservoir Project (Project) was authorized for construction by the Corps of Engineers (COE) pursuant to Public Law 85-500, 85th Congress (1958). The Project consists principally of a multipurpose dam and reservoir with an irrigation component. Repayment of costs allocated to irrigation were to be in accordance with Reclamation law, hence the irrigation aspects of the development are the responsibility of the Bureau of Reclamation (Reclamation). The irrigation portion of the Project is operated by the Purgatoire River Water Conservancy District (District) in accordance with the Operating Principles. The Operating Principles are signed by the District, the COE, Reclamation, the State of Kansas (Kansas) and the Arkansas River Compact Administration (ARCA).

Diversion of flows during the non-irrigation season for the purpose of stock watering was contemplated in the original planning and analysis of the irrigation portion of the Project by Reclamation. Under the current stock watering practice, inflows are passed through the reservoir at a rate that, when added to the gains below the reservoir, produces not more than 5 cfs for stock watering measured at the Trinidad gage. Diverting stock water at a rate of not more than 5 cfs does not allow water to reach stock ponds on some of the ditches that are included in the District and which historically diverted stock water. The District has been pursuing an amendment to the Operating Principles for the Trinidad Project to change the current stock watering practice.

Concerns have been raised by some of the parties to the Operating Principles about potential effects of alternative stock watering practices as compared to the current practice. Reclamation agreed to analyze, to the degree feasible, potential effects of alternative stock watering practices as compared to the practice currently in the Operating Principles. Reclamation, in cooperation with the COE, will also address the current and alternative practices in an Environmental Assessment. The analysis and results presented below are in response to that commitment by Reclamation.

II. Background

Reclamation's pre-Project analysis acknowledged that the ditches that formed the District diverted an average of 1,500 acre-feet annually during the non-irrigation season. Historic flow records, including those used for the pre-project analysis, indicate that stock water diversions occurred as part of winter irrigation diversions and at rates and times when the divertible flow in the Purgatoire River was sufficient

to reach fields and stock ponds down the lengths of the canals. The pre-project planning modeled the shift of irrigation diversions during the non-irrigation season to storage, the release of stored water at effective rates during the irrigation season , the benefits and effects of the proposed shift of irrigation diversions, and the gains and losses between pre-project operations and operations of the Project as planned. The 1,500 acre-foot stock water allowance was modeled as directly diverted by the ditches during the non-irrigation season at a constant rate of 5 cfs. The planning also assumed the stock water allowance to be non-depletive.

The allowance for stock watering and the modeling was reflected in the original Operating Principles language at IV. D. 2. District Operation, Non-irrigation Season, which has remained unchanged through the current Operating Principles, amended 1997. Sub-paragraphs (a) and (c) read:

> '(a) During the non-irrigation season the District will provide an allowance for stock watering purposes of not more than a daily mean flow of five second-feet or its volume equivalent measured at a gage to be located near and above the Baca River headgate. If the stream gains from the Trinidad Dam to said gage are insufficient to fulfill the allowance, an equivalent volume of reservoir inflow will be released to satisfy stock water demands within the allowance.'
>
> '(c) During the non-irrigation season, the District will exercise the direct flow water rights and the District storage right only at such times and to the degree as necessary to assure:
>
> (1) That the maximum possible storage of reservoir inflow is accrued.
>
> (2) The stock water allowance is distributed in a manner determined equitable by the District.'

The rate of 5 cfs would result in approximately 1,500 acre-feet over the non-irrigation season (approximately 150 days, November through March) which was the amount originally identified in the pre-project planning studies. The volume amount was later reduced as a result of the Division 2 Water Court ordering in 1986, in Case No. 86CW25, that certain of the Hoehne's rights to stock watering be terminated. Hoehne had historically diverted 200 to 300 acre-feet during the non-irrigation season. Reclamation's 1996 review of Project operations determined that the stock-watering allowance should be reduced to 1,200 acre-feet as a result of the case.

Under the current stock watering practice, stock water diversions are limited to 5 cfs, measured at the Purgatoire River gage above the Baca canal diversion. This rate is inadequate to deliver water to stock ponds on many of the canals given canal sizes, lengths and seepage rates.

The District has proposed that an amendment to the Operating Principles be adopted allowing stock water to be temporarily accumulated in the reservoir and released at

rates adequate to deliver the water down the canals to stock ponds to be able to more effectively and equitably provide stock water to its constituents. The total allowance would continue to be 1,200 acre-feet for the non-irrigation season.

The project began operation in 1979 with irrigation available to all project lands by 1985. During the early years of the project operation the District apparently released water from the reservoir during the non-irrigation season at sufficient rates to allow for stock water deliveries to make it down the canals and reach the stock ponds while not exceeding the overall stock water allowance. Records of deliveries for water years 1988 through 1991 and 1993 were available and indicate that between one and six stock water deliveries were made during the non-irrigation seasons of those years at overall rates up to approximately 80 cfs. The gross deliveries for those years varied between 387 and 980 acre-feet for the whole non-irrigation season, well within the 1,500 acre-feet contemplated in the pre-project planning studies (see Table 1) as well as being within the later 1,200 acre-feet allowance.

In late 1993 the Colorado State Engineer determined that stock watering was not being conducted in accordance with the Operating Principles and directed the District to make future stock water releases at the rates specified in the Operating Principles unless the operating Principles were amended to allow releases at a higher rate.

III. Modeling & Analysis Methodology

A. Modeling Methodology

The purpose of the modeling and analysis was to determine, to the extent feasible, if alternative stock watering practices produced differences in gains or losses to the river system below the District service area. The level of detail and the drawing of absolute conclusions were hampered by the lack of data available and the complexity of modeling a conclusive gain/loss study. Rather than conclusive gain/loss numbers, the following modeling and analysis gives an indication of the magnitude of the gains or losses and the trends.

The overall method for modeling was to take historic data, including historic stock water releases, withhold those releases in the reservoir to produce a river regime below the reservoir without stock water releases and then reintroduce those releases to the system at rates prescribed in the alternatives selected for modeling. The releases were then to be routed into select canals and losses applied to them.

The modeling was intended to produce relative reservoir elevations under the different alternatives, potentially available flows for stock watering, changes to available flows downstream of stock water diversions, and losses in the canals. The canal loss analysis attempted to use preliminary data from the ongoing USGS canal loss study. This data was taken during steady state canal flows in the summer at significantly higher flows than were modeled for stock water

deliveries. Due to the lack of data, evaporative losses in the canals and the timing and effects of return flows were not analyzed. It can be surmised, however, that given the overall volume of stock water diverted does not change between the alternatives, the differences in return flow timing is likely negligible over a complete year between the two alternatives.

B. Alternative Descriptions

Two scenarios were selected for modeling. The two scenarios were selected as representing the range of stock watering practice from the existing 5 cfs limitation to releases from the reservoir at an effective rate to allow stock water to reach stock ponds. Both scenarios limited over all stock water diversions to 1,200 acre-feet. Assumptions for each of the alternatives were made for modeling purposes. The assumptions are for modeling purposes only and should not be construed as limits on future operations or as advocating a position by Reclamation on the District's determination of appropriate rates or timing for future stock watering.

The first scenario models current stock watering practice under the existing language in the Operating Principles limited to maximum stock water diversions rates of 5 cfs and a total maximum diversion of 1,200 acre-feet.

The second scenario models an alternative stock watering practice wherein the District would be allowed to release stored water from the reservoir at rates that they determine would be effective. The District has indicated that diversion rates of approximately 60 cfs are necessary in the larger canals to allow water to run down the canals to reach the stock ponds. In order to stay within the overall limit of 1,200 acre-feet, the stock water diversions were limited to 3 periods during the non-irrigation season and durations of three days for each period.

A comparison of the alternatives and assumptions is given in Table 2.

C. Data Availability

The initial period of record selected for modeling was from water year 1985 through water year 2000, inclusive, based upon data availability from the COE on reservoir inflow, storage, release and evaporation.. Data on Purgatoire River flows below the dam (PURBTRCO) and at the Trinidad gage (PURTRICO) were retrieved from the Colorado State Department of Natural Resources web page. Data for the Trinidad gage was not available for the water years of 1987 through 1993. This reduced the period of record for modeling to water years 1985, 1986 and 1994 through 2000 inclusive.

Data on canal losses were obtained from the USGS from their ongoing canal loss study. These data were very limited and preliminary in nature, were for water years 2000, 2001 and 2003, and were for select reaches measured by the USGS. The data were also gathered during the irrigation season, at higher flows than

would be seen during stock watering operations. The measurements taken in some lower canal reaches are influenced by return flows from an upper canal resulting in gains for the lower canal that would not necessarily be seen during the non-irrigation season. The measurements were also taken when the canals had been running at a steady state for a number of days. The data thus could not provide information on how much water or time would be necessary to provide the initial wetting of a canal prism before water could move further down the canal and reach a destination such as a stock pond. Locations of stock ponds were also not available at the time this modeling was conducted.

D. Model Development

A spreadsheet model was developed to model relative flows for the two scenarios. The model was to be developed in 5 separate segments:

1. Reduction of historic data by removal of historic stock watering releases;
2. Reintroduction of stock water under the current Operating Principles language;
3. Reintroduction of stock water under the alternate practice;
4. Routing of stock water under the current Operating Principles language to the canals and demonstration of losses;
5. Routing of stock water under the alternate practice to the canals and demonstration of losses.

The first segment in the model determined what the historic reservoir evaporation loss rates were, then withheld historic deliveries of stock water to the river to determine what the river gains would have been from the reservoir to the Trinidad gage without stock water releases (example in Table 3).

After these were determined, the second segment modeled stock water releases at rates that would have produced 5 cfs available for stock watering diversions at the Trinidad gage. This scenario limited the releases of inflow from the reservoir to the amount necessary to produce the 5 cfs at the Trinidad gage but not to exceed the reservoir inflow. Releases were made as needed to allow stock watering diversions continuously from mid November to mid March. The resultant flow available for stock water diversion was 1,200 acre-feet. It was assumed that the ditches would divert the total 1,200 acre-feet over the non-irrigation season. Flow that might have been available below the Trinidad gage after removing the amount diverted for stock watering was also modeled (example in Table 4). It is assumed that these amounts would have contributed to flows available to downstream users after water for stock watering had been diverted into the ditches.

The third segment modeled the alternative stock water practice by making releases from the reservoir at three periods during the non-irrigation season. Historic records indicate that, prior to 1994, the District made stock water releases

from one to six times during the non-irrigation season. For modeling purposes, three periods were assumed. Records also indicate that the duration of the periods ranged from one to five days. The District has also indicated that it is necessary to divert at rates of at least 60 cfs to get water down some of the larger canals to the stock ponds concurrently with diversions to the smaller canals. For simplification of modeling the releases were made at a constant rate of approximately 65 cfs for the three days in each period in order to make 1,200 acre-feet available for stock water diversions at the Trinidad gage. This represents one end of the range of periods, durations and rates which could be determined by the District to be appropriate for a particular stock watering season. It is fully anticipated that, under actual operations, the appropriate periods, durations and rates that would be the most effective for the District would vary considerably based upon hydrology and the demands at the time. Available flow below the Trinidad gage after removing the amount diverted for stock watering was again modeled for comparison to the current practice (example in Table 5.). Again, it is assumed that these amounts would have contributed to flows available to downstream users after water for stock watering had been diverted into the ditches.

The Trinidad gage was used due to the lack of detailed information about gains in the reaches between the gage and the various headgates and to be consistent with the modeling of the current stock water practice. The District amendment calls for the measurements to be made at the diversion structures.

The fourth and fifth segments of the spreadsheet model would have routed the stock water diversions available under the two alternatives to the ditches, indicated losses in the canals at the available diversion rates and whether there was appreciable flow in successive canal reaches given the losses. Relationships for loss at given flow rates were derived from the measured losses for the individual reaches for which data was available. Due to the preliminary nature of the canal loss information obtained from the USGS Canal Loss Study, and that the USGS data were collected under differing conditions, the results produced in these segments were anticipated to only be able to provide an indication of trends. For example, due to the influence of return flows from upper canals during the irrigation season, certain lower canal reaches showed gains that would not likely exist during low winter stock water deliveries. The mathematical modeling of these reaches did not appear to be representative of actual losses and flows that would exist in a stock watering situation. Due to the lack of sufficient long term data for the period of stock water deliveries, the canal losses modeling was determined to be inconclusive and was not pursued. None of the tables include any modeling of canal losses.

IV. Results

The results are presented in the three aspects modeled as described above;

1. the relative effects on evaporative loss at the reservoir under the two alternatives;
2. the relative amounts of water available downstream of the stock water diversions, and;
3. the relative service to the canals with stock water diversions at the rates modeled in the alternatives.

Table 6 presents a summary of the rates of stock water releases modeled for the alternatives. For both alternatives the overall stock water diverted was kept within the 1,200 acre-foot allowance. Since the current stock watering has been operated as limited to diversions of the 5 cfs or inflow, there is no release from storage in this case. The releases from the reservoir for the alternate stock water practice range from 543 to 749 acre-feet to augment the gains to allow for the 1,200 acre-foot allowance to be diverted. These amounts of reservoir release for stock watering to augment the gains are based upon assumed rates and timing of stock water diversion and the particular years modeled. The District has indicated that when the gains are sufficient, their preference would be to conduct stock watering, without making reservoir releases, potentially at lower rates and over a longer period of time within the non-irrigation season. Also, the District has indicated that they would likely time their stock water diversions to take advantage of natural high flow situations thus reducing the amount of reservoir releases.

Differences in evaporative loss from the reservoir between the alternatives were modeled and are presented in Table 7. The modeled differences range from 2 to 5 acre-feet, or approximately 1% of the total evaporative loss of the reservoir during the non-irrigation seasons modeled, and are considered to be insignificant. Under the alternate stock watering practice there is a small gain in the rate of storage over the current practice when releases are not being made stock watering. However, when a release is made for stock watering at the modeled rate, it results in lowering the content of the reservoir. The slightly increased storage rate results in the content climbing back up faster than under the current practice. The alternate practice content, however, never returns to, or exceeds, the content under the current practice (see example in Figure 1 for water year 1985). The reservoir surface area is then less, resulting in modeled evaporative loss that is less under the alternate practice.

The gains between the reservoir and the Trinidad gage that become available below the stock water diversions are presented in Table 8. Under current practice, so long as the allowance has not been exceeded, whenever water is available at the Trinidad gage the District has the ability to divert those flows, up to 5 cfs, for stock watering purposes. If the gains are less than 5 cfs, they are augmented by bypasses of inflow to make the 5 cfs available. In order to divert 1,200 acre-feet, limited to a maximum rate of 5 cfs, the District must divert for a total of 121of the approximately 150 days of the non-irrigation season. Thus for only approximately 30 of the non-irrigation season would the gains be fully available below the District service area and during the 121 days of stock water diversion only the portion of the gains that is above 5 cfs would be available below the stock water diversions.

Under the alternate stock water practice, diversions for stock water only occur for a very limited number of days. In the modeling, three periods of three days each, or nine days, were modeled. This would theoretically leave up to 141 days of the 150 day non-irrigation season where the gains from the reservoir to the Trinidad gage could be available downstream of the District service area. (Note that Table 8 indicates less than 141 days of gains available. This is due to the historic gage records used having unexplained days of zero flow.) Other scenarios where the District might choose to divert stock water at effective rates for longer times than modeled, while still staying within the 1,200 acre-feet allowance, would still leave a large percentage of the non-irrigation season where the full amount of the gains would be available downstream of the District service area. While the rates at which this water would be available, as indicated in the model, are small, they would still serve to maintain the wetted perimeter of the downstream channel. Maintaining the wetted perimeter would result in less water being necessary to rewet it when the spring runoff season comes and would again likely result in more water, moving more quickly, down the river during runoff.

The canal loss analysis was inconclusive. Due to the data having been taken at higher flow rates than would be the case for stock watering, being taken in the summer with different antecedent moisture conditions in the canals and the influence of return flows, the mathematical modeling did not appear to give realistic results that could be used to compare the alternatives. The differences between alternatives would presumably be in evaporative loss and in return flow timing. It is unlikely that either of these would be significantly or perhaps even measurably different between the alternatives given the small volumes of water and flow rates involved. Given the geometry of certain canals (bottom widths of the Picketwire and Enlarged South Side are approximately 10 feet and 21 feet respectively) it can be concluded that 5 cfs flows in these canals are not effective in trying to deliver stock water down these canals to the stock ponds. This is supported by the fact that the larger canals have historically not taken stock water when limited to the 5 cfs rate.

V. Conclusions

It appears from the results of the modeling effort that the effects of changing the stock watering practice from the current one to an alternate practice that allows the District to release stored water at more effective rates is minimal if not negligible. If anything, the modeling results indicate that, under the alternate practice, there would be a reduction in evaporative loss at the reservoir and an increase in the amount of the gains originating between the reservoir and the Trinidad gage that would be available to the river downstream of the stock water diversions. While the canal loss analysis was inconclusive, examination of the canal geometry and recent practice supports the observation that the current 5 cfs limitation on diversions does not result in water reaching segments of many of the canals. The 5 cfs limitation does not appear to allow the most effective and equitable use of the stock watering allowance.

Table 1
Trinidad Project
Summary of Historic Stock Watering for Select Water Years
(Non-Irrigation Season)

Item / Water Year	Baca[2]	El Moro[2]	Ditches Enlarged S. Side	John Flood[3]	Picketwire[2]	Max. Overall Rate of SW Diversions (cfs)[1]	Total Stock Water Diversion (acft)
Daily Max. Stock Water Diversion Rates for Each Ditch (cfs)							
1988	4.00	1.00	58.31	17.85	22.46	74.87	980
1989	4.01	1.33	39.17	10.42	29.95	76.17	791
1990	4.08	2.00	52.34	0.00	25.00	77.24	713
1991	11.70	2.00	75.97	28.20	63.32	75.97	980
1993	4.00	0.00	40.00	15.00	20.00	79.00	387
No. of Days Stock Water Diverted for Each Ditch							Total Days of SW Diversions[1]
1988	7	7	7	10	7		17
1989	4	3	6	9	9		18
1990	5	4	6	0	6		9
1991	5	3	4	3	4		16
1993	3	0	3	3	3		3
No. of Stock Water Release Periods to Ditches During Non-Irrigation Season							Total No of Release Periods[1]
1988	2	2	2	3	2		5
1989	1	1	2	3	3		6
1990	2	2	2	0	2		2
1991	1	1	1	1	1		4
1993	1	0	1	1	1		1

(Source: Colorado State, Div. of Water Res., Div. 2 Records)

[1] Not all ditches diverted at the same time or during the same periods.

[2] Baca and El Moro ditches are diverted through the Picketwire ditch. Picketwire rates do not include Baca or El Moro.

[3] John Flood is diverted through the Model Ditch.

Table 2.
Trinidad Project
Comparison of Assumptions for Stock Watering Alternatives Modeled

Item	Alternative Description	
	Current Operating Principles	Alternate Stock Watering
Period of Stock Water Diversions*	November 15 - March 15	3 Periods of 3 Days Each Between November 15 - March 15
Rate of Reservoir Release	Rate necessary, with river gains, to produce 5 cfs at Trinidad gage.	Rate necessary, with river gains, not to exceed total volume at Trinidad gage.
Rate of Stock Water Diversion	Maximum of 5 cfs	Rate necessary not to exceed total volume at Trinidad gage.
Total Volume of Stock Water Divertible	1,200 acre-feet	1,200 acre-feet
Flow Available Downstream of Stock Water Diversions	Gains when no stock water being diverted or flow above 5 cfs	Gains when no stock water being diverted

* Consistent with historic practice, the period of stockwatering within the Non-irrigation Season was limited to 120 days between Nov. 15 & Mar 15 for the purposes of modeling. The Non-irrigation Season is defined in the Operating Principles as that period of the year other than the Irrigation Season. The Irrigation Season is limited in the Operating Principles to not beginning prior to April 1 nor ending later than October 15, except as modified by the District with the consent of the Secretary of Interior.

Table 3
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Historic Operation

Date (Source/Note ->) /1	Historic Reservoir Operation: Historic Gross Content (acre-feet) (COE)	Inflow (cfs) (COE)	Release (cfs) (COE)	Evap. (acre-feet) (COE)	Change In Content (acre-feet)	Surface Acres at Content (acres)	Daily Evap. Rate (acft/acre)	Inflow Stored (cfs)	Stock Water Released From Storage (cfs) /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Historic Gage Flows: Hist. Below Trinidad Dam (PURBTRCO) (cfs) (SEO)	Hist. at Trinidad (PURTRICO) (cfs) (SEO)	Flows w/o Historic SW Releases /2: Gage Below Trinidad Dam (cfs)	Gage At Trinidad (cfs)
	Total Days of Diversion/availability														
	Totals (acre-feet)			575.23						280	7,687				
	Max Rates (cfs)														
	Mean Rate when Diverting (cfs)														
10/31/84	25,201														
11/01/84	25,265	36	0	5.95	64	762	0.0078	36	0	0	71	0.1	3.2	0.1	3.2
11/02/84	25,345	47	0	13.88	80	763	0.0182	47	0	0	164	0.1	3	0.1	3.0
11/03/84	25,396	32	0	13.88	51	763	0.0182	32	0	0	227	0.1	3	0.1	3.0
11/04/84	25,475	42	0	3.97	79	765	0.0052	42	0	0	310	0.1	2.5	0.1	2.5
11/05/84	25,548	40	0	5.95	73	766	0.0078	40	0	0	389	0.1	2.8	0.1	2.8
11/06/84	25,629	46	0	9.92	81	767	0.0129	46	0	0	480	0.1	2.8	0.1	2.8
11/07/84	25,687	35	0	11.9	58	768	0.0155	35	0	0	549	0.1	2.8	0.1	2.8
11/08/84	25,753	39	0	11.9	66	769	0.0155	39	0	0	626	0.1	2.8	0.1	2.8
11/09/84	25,789	22	0	5.95	36	769	0.0077	22	0	0	670	0.1	2.8	0.1	2.8
11/10/84	25,840	30	0	7.93	51	770	0.0103	30	0	0	730	0.1	2.8	0.1	2.8
11/11/84	25,922	44	0	5.95	82	772	0.0077	44	0	0	817	0.1	3.2	0.1	3.2
11/12/84	25,987	37	0	7.93	65	773	0.0103	37	0	0	890	0.1	3.2	0.1	3.2
11/13/84	26,061	43	0	11.9	74	774	0.0154	43	0	0	975	0.1	2.8	0.1	2.8
11/14/84	26,098	23	0	7.93	37	774	0.0102	23	0	0	1,021	0.0	2.8	0.0	2.8
11/15/84	26,158	32	0	3.97	60	775	0.0051	32	0	0	1,084	0.0	3.2	0.0	3.2
11/16/84	26,224	36	0	3.97	66	777	0.0051	36	0	0	1,155	0.0	3.2	0.0	3.2
11/17/84	26,269	25	0	3.97	45	778	0.0051	25	0	0	1,205	0.0	3.5	0.0	3.5
11/18/84	26,328	33	0	5.95	59	778	0.0076	33	0	0	1,270	0.0	3.5	0.0	3.5
11/19/84	26,358	23	5	5.95	30	779	0.0076	18	0	0	1,306	4.3	3.5	0.0	0.0
11/20/84	26,395	28	7	5.95	37	779	0.0076	21	0	0	1,348	6.4	3.2	0.0	0.0
11/21/84	26,447	33	4	5.95	52	780	0.0076	29	0	0	1,406	2.9	2.7	0.0	0.0
11/22/84	26,500	29	0	5.95	53	781	0.0076	29	0	0	1,464	0.1	2.1	0.1	2.1
11/23/84	26,575	40	0	5.95	75	781	0.0076	40	0	0	1,543	0.1	2.3	0.1	2.3
11/24/84	26,627	29	0	5.95	52	782	0.0076	29	0	0	1,601	0.1	2.5	0.1	2.5
11/25/84	26,680	29	0	5.95	53	783	0.0076	29	0	0	1,659	0.0	2.3	0.0	2.3
11/26/84	26,732	29	0	5.95	52	783	0.0076	29	0	0	1,717	0.0	2.3	0.0	2.3
11/27/84	26,755	14	0	5.95	23	784	0.0076	14	0	0	1,745	0.0	2.5	0.0	2.5
11/28/84	26,800	25	0	5.95	45	785	0.0076	25	0	0	1,795	0.1	2.3	0.1	2.3
11/29/84	26,837	21	0	5.95	37	786	0.0076	21	0	0	1,837	0.0	2.1	0.0	2.1
11/30/84	26,883	25	0	5.95	46	786	0.0076	25	0	0	1,887	0.1	1.9	0.1	1.9
12/01/84	26,936	28	0	3.97	53	787	0.0050	28	0	0	1,943	0.1	2.1	0.1	2.1
12/02/84	26,981	24	0	3.97	45	788	0.0050	24	0	0	1,991	0.1	2.3	0.1	2.3
12/03/84	27,034	28	0	3.97	53	788	0.0050	28	0	0	2,047	0.0	2.1	0.0	2.1
12/04/84	27,041	24	19	3.97	7	788	0.0050	5	0	0	2,057	19.0	18	0.0	0.0
12/05/84	26,996	8	29	3.97	-45	788	0.0050	0	21	42	2,057	30.0	47	1.0	18.0
12/06/84	26,981	23	29	3.97	-15	788	0.0050	0	6	54	2,057	30.0	56	1.0	27.0
12/07/84	26,981	30	28	3.97	0	788	0.0050	2	0	54	2,061	28.0	33	0.0	5.0
12/08/84	27,056	59	19	3.97	75	789	0.0050	40	0	54	2,140	19.0	24	0.0	5.0
12/09/84	27,125	36	0	3.97	69	790	0.0050	36	0	54	2,211	0.1	3.8	0.1	3.8
12/10/84	27,178	28	0	3.97	53	791	0.0050	28	0	54	2,267	0.1	3	0.1	3.0
12/11/84	27,201	30	17	3.97	23	791	0.0050	13	0	54	2,293	19.0	14	2.0	0.0
12/12/84	27,224	42	29	3.97	23	792	0.0050	13	0	54	2,319	32.0	26	3.0	0.0
12/13/84	27,277	39	10	3.97	53	793	0.0050	29	0	54	2,377	9.7	13	0.0	3.0

Table 3
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Historic Operation

Date (Source/Note ->) /1	Historic Reservoir Operation: Historic Gross Content (acre-feet) (COE)	Inflow (cfs) (COE)	Release (cfs) (COE)	Evap. (acre-feet) (COE)	Change In Content (acre-feet)	Surface Acres at Content (acres)	Daily Evap. Rate (acf/acre)	Inflow Stored (cfs)	Stock Water Released From Storage (cfs) /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Historic Gage Flows: Hist. Below Trinidad Dam (PURBTRCO) (cfs) (SEO)	Hist. at Trinidad (PURTRICO) (cfs) (SEO)	Flows w/o Historic SW Releases /2: Gage Below Trinidad Dam (cfs)	Gage At Trinidad (cfs)
	Total Days of Diversion/availability														
	Totals (acre-feet)			575.23						280	7,687				
	Max Rates (cfs)														
	Mean Rate when Diverting (cfs)														
12/14/84	27,331	29	0	3.97	54	794	0.0050	29	0	54	2,435	0.1	2.3	0.1	2.3
12/15/84	27,392	32	0	3.97	61	795	0.0050	32	0	54	2,498	0.1	2.5	0.1	2.5
12/16/84	27,438	25	0	3.97	46	796	0.0050	25	0	54	2,548	0.1	2.5	0.1	2.5
12/17/84	27,453	9	0	3.97	15	796	0.0050	9	0	54	2,566	0.1	2.3	0.1	2.3
12/18/84	27,507	29	0	3.97	54	798	0.0050	29	0	54	2,624	0.1	2.8	0.1	2.8
12/19/84	27,568	32	0	3.97	61	799	0.0050	32	0	54	2,687	0.1	2.5	0.1	2.5
12/20/84	27,637	37	0	3.97	69	800	0.0050	37	0	54	2,760	0.1	2.5	0.1	2.5
12/21/84	27,668	17	0	3.97	31	801	0.0050	17	0	54	2,794	0.1	2.3	0.1	2.3
12/22/84	27,691	13	0	3.97	23	801	0.0050	13	0	54	2,820	0.1	1.9	0.1	1.9
12/23/84	27,753	33	0	3.97	62	803	0.0049	33	0	54	2,885	0.1	2.3	0.1	2.3
12/24/84	27,792	21	0	3.97	39	804	0.0049	21	0	54	2,927	0.1	1.9	0.1	1.9
12/25/84	27,854	33	0	3.97	62	805	0.0049	33	0	54	2,992	0.1	2.5	0.1	2.5
12/26/84	27,931	40	0	3.97	77	807	0.0049	40	0	54	3,071	0.1	3	0.1	3.0
12/27/84	28,016	45	0	3.97	85	808	0.0049	45	0	54	3,160	0.1	2.5	0.1	2.5
12/28/84	28,102	45	0	3.97	86	810	0.0049	45	0	54	3,249	0.1	2.5	0.1	2.5
12/29/84	28,164	33	0	3.97	62	811	0.0049	33	0	54	3,314	0.0	2.5	0.0	2.5
12/30/84	28,211	25	0	3.97	47	812	0.0049	25	0	54	3,364	0.0	2.3	0.0	2.3
12/31/84	28,274	33	0	3.97	63	814	0.0049	33	0	54	3,429	0.0	2.8	0.0	2.8
01/01/85	28,313	21	0	1.98	39	814	0.0024	21	0	54	3,471	0.0	1.9	0.0	1.9
01/02/85	28,328	8	0	0	15	814	0.0000	8	0	54	3,487	0.0	2.5	0.0	2.5
01/03/85	28,344	8	0	0	16	815	0.0000	8	0	54	3,503	0.0	3	0.0	3.0
01/04/85	28,391	24	0	0	47	816	0.0000	24	0	54	3,551	0.0	3	0.0	3.0
01/05/85	28,454	32	0	0	63	817	0.0000	32	0	54	3,614	0.0	2.5	0.0	2.5
01/06/85	28,509	28	0	0	55	818	0.0000	28	0	54	3,670	0.0	2.3	0.0	2.3
01/07/85	28,572	32	0	0	63	819	0.0000	32	0	54	3,733	0.0	2.5	0.0	2.5
01/08/85	28,651	40	0	0	79	820	0.0000	40	0	54	3,812	0.0	2.5	0.0	2.5
01/09/85	28,706	28	0	0	55	821	0.0000	28	0	54	3,868	0.0	1.9	0.0	1.9
01/10/85	28,738	16	0	0	32	822	0.0000	16	0	54	3,900	0.0	2.3	0.0	2.3
01/11/85	28,777	20	0	0	39	823	0.0000	20	0	54	3,940	0.0	2.3	0.0	2.3
01/12/85	28,801	12	0	0	24	823	0.0000	12	0	54	3,964	0.0	2.8	0.0	2.8
01/13/85	28,858	28	0	0	55	824	0.0000	28	0	54	4,020	0.0	2.8	0.0	2.8
01/14/85	28,904	24	0	0	48	825	0.0000	24	0	54	4,068	0.0	2.5	0.0	2.5
01/15/85	28,952	24	0	0	48	825	0.0000	24	0	54	4,116	0.0	3	0.0	3.0
01/16/85	29,007	28	0	0	55	827	0.0000	28	0	54	4,172	0.0	3	0.0	3.0
01/17/85	29,055	24	0	0	48	827	0.0000	24	0	54	4,220	0.0	2.8	0.0	2.8
01/18/85	29,119	32	0	0	64	828	0.0000	32	0	54	4,283	0.0	3	0.0	3.0
01/19/85	29,175	28	0	0	56	830	0.0000	28	0	54	4,339	0.0	2.8	0.0	2.8
01/20/85	29,215	20	0	0	40	830	0.0000	20	0	54	4,379	0.0	2.3	0.0	2.3
01/21/85	29,247	16	0	0	32	831	0.0000	16	0	54	4,411	0.0	2.1	0.0	2.1
01/22/85	29,287	20	0	0	40	831	0.0000	20	0	54	4,451	0.0	2.5	0.0	2.5
01/23/85	29,336	25	0	0	49	832	0.0000	25	0	54	4,501	0.0	2.3	0.0	2.3
01/24/85	29,384	24	0	0	48	833	0.0000	24	0	54	4,549	0.0	2.3	0.0	2.3
01/25/85	29,448	32	0	0	64	834	0.0000	32	0	54	4,612	0.0	2.5	0.0	2.5
01/26/85	29,496	24	0	0	48	835	0.0000	24	0	54	4,660	0.0	2.1	0.0	2.1

Table 3
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Historic Operation

Date (Source/Note ->) /1	Historic Reservoir Operation: Historic Gross Content (acre-feet) (COE)	Inflow (cfs) (COE)	Release (cfs) (COE)	Evap. (acre-feet) (COE)	Change in Content (acre-feet)	Surface Acres at Content (acres)	Daily Evap. Rate (acft/acre)	Inflow Stored (cfs)	Stock Water Released From Storage (cfs) /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Historic Gage Flows: Hist. Below Trinidad Dam (PURBTRCO) (cfs) (SEO)	Hist. at Trinidad (PURTRICO) (cfs) (SEO)	Flows w/o Historic SW Releases /2: Gage Below Trinidad Dam (cfs)	Gage At Trinidad (cfs)
	Total Days of Diversion/availability														
	Totals (acre-feet)			575.23						280	7,887				
	Max Rates (cfs)														
	Mean Rate when Diverting (cfs)														
01/27/85	29,552	28	0	0	56	836	0.0000	28	0	54	4,716	0.0	2.3	0.0	2.3
01/28/85	29,601	25	0	0	49	837	0.0000	25	0	54	4,766	0.0	1.9	0.0	1.9
01/29/85	29,633	16	0	0	32	837	0.0000	16	0	54	4,798	0.0	1.9	0.0	1.9
01/30/85	29,650	8	0	0	17	837	0.0000	8	0	54	4,814	0.0	1.5	0.0	1.5
01/31/85	29,666	8	0	0	16	838	0.0000	8	0	54	4,830	0.0	2.3	0.0	2.3
02/01/85	29,674	4	0	0	8	838	0.0000	4	0	54	4,838	0.0	4	0.0	4.0
02/02/85	29,690	8	0	0	16	838	0.0000	8	0	54	4,854	0.0	3.8	0.0	3.8
02/03/85	29,747	29	0	0	57	839	0.0000	29	0	54	4,912	0.0	4	0.0	4.0
02/04/85	29,787	20	0	0	40	839	0.0000	20	0	54	4,952	0.0	2.8	0.0	2.8
02/05/85	29,820	16	0	0	33	840	0.0000	16	0	54	4,984	0.0	3	0.0	3.0
02/06/85	29,852	16	0	0	32	840	0.0000	16	0	54	5,016	0.0	2.5	0.0	2.5
02/07/85	29,884	16	0	0	32	840	0.0000	16	0	54	5,048	0.0	2.3	0.0	2.3
02/08/86	29,933	26	0	0	49	841	0.0000	25	0	54	5,098	0.0	2.3	0.0	2.3
02/09/85	29,966	21	4	0	33	841	0.0000	17	0	54	5,132	3.7	2.3	0.0	0.0
02/10/85	30,015	29	4	0	49	842	0.0000	25	0	54	5,182	2.7	2.3	0.0	0.0
02/11/85	30,056	20	0	0	41	842	0.0000	20	0	54	5,222	0.0	2.3	0.0	2.3
02/12/85	30,104	25	0	0	48	843	0.0000	25	0	54	5,272	0.0	2.5	0.0	2.5
02/13/85	30,178	37	0	0	74	844	0.0000	37	0	54	5,345	0.0	2.5	0.0	2.5
02/14/85	30,244	33	0	0	66	845	0.0000	33	0	54	5,410	0.0	1.9	0.0	1.9
02/15/85	30,317	37	0	0	73	845	0.0000	37	0	54	5,483	0.0	1.7	0.0	1.7
02/16/85	30,391	37	0	0	74	846	0.0000	37	0	54	5,556	0.0	1.7	0.0	1.7
02/17/85	30,449	29	0	0	58	847	0.0000	29	0	54	5,614	0.0	1.3	0.0	1.3
02/18/85	30,506	29	0	0	57	848	0.0000	29	0	54	5,672	0.0	1.5	0.0	1.5
02/19/85	30,563	29	0	0	57	848	0.0000	29	0	54	5,730	0.0	1.3	0.0	1.3
02/20/85	30,613	25	0	0	50	849	0.0000	25	0	54	5,780	0.0	1.3	0.0	1.3
02/21/85	30,671	29	0	0	58	850	0.0000	29	0	54	5,838	0.0	1.5	0.0	1.5
02/22/85	30,720	25	0	0	49	850	0.0000	25	0	54	5,888	0.0	1.5	0.0	1.5
02/23/85	30,794	37	0	0	74	851	0.0000	37	0	54	5,961	0.0	1.9	0.0	1.9
02/24/85	30,844	25	0	0	50	851	0.0000	25	0	54	6,011	0.0	2.1	0.0	2.1
02/25/85	30,911	33	0	0	67	851	0.0000	33	0	54	6,076	0.0	1.9	0.0	1.9
02/26/85	30,919	20	16	0	8	852	0.0000	4	0	54	6,084	18.0	13	0.0	0.0
02/27/85	30,919	24	24	0	0	852	0.0000	0	0	54	6,084	25.0	23	1.0	0.0
02/28/86	30,952	25	25	0	33	852	0.0000	0	0	54	6,084	9.2	13	0.0	0.0
03/01/85	31,002	25	0	0	50	852	0.0000	25	0	54	6,134	0.1	3	0.1	3.0
03/02/85	31,043	21	0	0	41	853	0.0000	21	0	54	6,176	0.1	3.5	0.1	3.5
03/03/85	31,077	17	0	0	34	853	0.0000	17	0	54	6,210	0.0	3.2	0.0	3.2
03/04/85	31,119	22	0	1.98	42	854	0.0023	22	0	54	6,254	0.1	2.8	0.1	2.8
03/05/85	31,152	18	0	1.98	33	854	0.0023	18	0	54	6,290	0.1	2.5	0.1	2.5
03/06/85	31,202	26	0	1.98	50	855	0.0023	26	0	54	6,342	0.0	2.8	0.0	2.8
03/07/85	31,219	10	0	3.97	17	855	0.0046	10	0	54	6,362	0.0	2.8	0.0	2.8
03/08/86	31,252	20	0	5.95	33	855	0.0070	20	0	54	6,402	0.0	2.5	0.0	2.5
03/09/85	31,302	29	0	5.95	50	856	0.0070	29	0	54	6,460	0.0	2.8	0.0	2.8
03/10/85	31,344	25	0	7.93	42	856	0.0093	25	0	54	6,510	0.0	3.2	0.0	3.2
03/11/85	31,412	38	0	7.93	68	857	0.0093	38	0	54	6,585	0.0	5.7	0.0	5.7

Table 3
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Historic Operation

Date (Source/Note ->) /1	Historic Reservoir Operation: Historic Gross Content (acre-feet) (COE)	Inflow (cfs) (COE)	Release (cfs) (COE)	Evap. (acre-feet) (COE)	Change in Content (acre-feet)	Surface Acres at Content (acres)	Daily Evap. Rate (acf/acre)	Inflow Stored (cfs)	Stock Water Released From Storage (cfs) /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Historic Gage Flows: Hist. Below Trinidad Dam (PURBTRCO) (cfs) (SEO)	Hist. at Trinidad (PURTRICO) (cfs) (SEO)	Flows w/o Historic SW Releases /2: Gage Below Trinidad Dam (cfs)	Gage At Trinidad (cfs)
Total Days of Diversion/availability															
Totals (acre-feet)				575.23						280	7,687				
Max Rates (cfs)															
Mean Rate when Diverting (cfs)															
03/12/85	31,487	42	0	7.93	75	858	0.0092	42	0	54	6,668	0.1	6	0.1	6.0
03/13/85	31,538	29	0	7.93	51	859	0.0092	29	0	54	6,726	0.2	4.8	0.2	4.8
03/14/85	31,596	33	0	7.93	58	859	0.0092	33	0	54	6,791	0.2	4.2	0.2	4.2
03/15/85	31,655	33	0	7.93	59	860	0.0092	33	0	54	6,856	0.2	4	0.2	4.0
03/16/85	31,731	42	0	7.93	76	861	0.0092	42	0	54	6,939	0.2	4.2	0.2	4.2
03/17/85	31,781	29	0	7.93	50	862	0.0092	29	0	54	6,997	0.2	3.8	0.2	3.8
03/18/85	31,841	34	0	7.93	60	863	0.0092	34	0	54	7,064	0.2	4	0.2	4.0
03/19/85	31,883	25	0	7.93	42	864	0.0092	25	0	54	7,114	0.2	4.2	0.2	4.2
03/20/85	31,967	46	0	7.93	84	865	0.0092	46	0	54	7,205	0.2	4	0.2	4.0
03/21/85	32,018	30	0	7.93	51	865	0.0092	30	0	54	7,265	0.2	3.5	0.2	3.5
03/22/85	32,061	25	0	7.93	43	866	0.0092	25	0	54	7,315	0.2	3.8	0.2	3.8
03/23/85	32,103	25	0	7.93	42	866	0.0092	25	0	54	7,365	0.2	3.5	0.2	3.5
03/24/85	32,163	35	0	9.92	60	867	0.0114	35	0	54	7,434	0.2	3.2	0.2	3.2
03/25/85	32,214	34	0	15.87	51	868	0.0183	34	0	54	7,501	0.2	3.2	0.2	3.2
03/26/85	32,239	25	0	23.8	25	868	0.0274	25	0	54	7,551	0.2	4	0.2	4.0
03/27/85	32,290	38	0	23.8	51	868	0.0274	38	0	54	7,626	0.2	4	0.2	4.0
03/28/85	32,341	31	0	9.92	51	869	0.0114	31	0	54	7,687	0.2	4	0.2	4.0
03/29/85	32,290	30	54	3.97	-51	868	0.0046	0	24	101	7,687	54.0	43	0.0	0.0
03/30/85	32,205	37	74	9.92	-85	867	0.0114	0	37	175	7,687	74.0	65	0.0	0.0
03/31/85	32,095	21	74	5.95	-110	866	0.0069	0	53	280	7,687	74.0	65	0.0	0.0

See list of footnotes after Table 5.

Table 4
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases of Inflow to Make 5 cfs Available

Date (Source/Note ->) /1	Reservoir Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release (cfs) /4, /5, /8	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /5, /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ 5 cfs SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ 5 cfs SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs)	Cummulative Flow Avail For Stock water at Trinidad gage (acre-feet)	Flow Avail. Below Stock wate Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												120		32	
	Totals (acre-feet)				574.57				0	7,708				1,190		261
	Max Rates (cfs)												6		22	
	Mean Rate when Diverting (cfs)												5		4	
10/31/84	25,201									0						
11/01/84	25,266	761	36.00	0.00	5.94	65	36	0	0	71	0.1	3.2	0	0	3.2	6.3
11/02/84	25,346	762	47.00	0.00	13.86	79	47	0	0	164	0.1	3	0	0	3.0	12.3
11/03/84	25,395	763	32.00	0.00	13.87	50	32	0	0	227	0.1	3	0	0	3.0	18.2
11/04/84	25,475	763	42.00	0.00	3.98	79	42	0	0	310	0.1	2.5	0	0	2.5	23.2
11/05/84	25,548	765	40.00	0.00	5.94	73	40	0	0	389	0.1	2.8	0	0	2.8	28.8
11/06/84	25,630	768	46.00	0.00	9.91	81	48	0	0	480	0.1	2.8	0	0	2.8	34.3
11/07/84	25,687	767	35.00	0.00	11.89	58	35	0	0	549	0.1	2.8	0	0	2.8	39.9
11/08/84	25,753	768	39.00	0.00	11.89	65	39	0	0	626	0.1	2.8	0	0	2.8	45.4
11/09/84	25,790	769	22.00	0.00	5.95	38	22	0	0	670	0.1	2.8	0	0	2.8	51.0
11/10/84	25,842	769	30.00	0.00	7.92	52	30	0	0	730	0.1	2.8	0	0	2.8	56.5
11/11/84	25,923	770	44.00	0.00	5.93	81	44	0	0	817	0.1	3.2	0	0	3.2	62.9
11/12/84	25,989	772	37.00	0.00	7.92	65	37	0	0	890	0.1	3.2	0	0	3.2	69.2
11/13/84	26,062	773	43.00	0.00	11.89	73	43	0	0	975	0.1	2.8	0	0	2.8	74.8
11/14/84	26,100	774	23.00	0.00	7.93	38	23	0	0	1,021	0	2.8	0	0	2.8	80.3
11/15/84	26,156	774	32.00	1.80	3.97	56	30	0	0	1,081	1.8	5	5	10	0.0	80.3
11/16/84	26,220	775	36.00	1.80	3.96	64	34	0	0	1,149	1.8	5	5	20	0.0	80.3
11/17/84	26,262	777	25.00	1.50	3.97	43	24	0	0	1,196	1.5	5	5	30	0.0	80.3
11/18/84	26,319	777	33.00	1.50	5.94	57	32	0	0	1,258	1.5	5	5	40	0.0	80.3
11/19/84	26,348	778	23.00	5.00	5.95	30	18	0	0	1,294	5	5	5	50	0.0	80.3
11/20/84	26,388	779	28.00	5.00	5.95	40	23	0	0	1,340	5	5	5	60	0.0	80.3
11/21/84	26,438	779	33.00	5.00	5.94	50	28	0	0	1,396	5	5	5	69	0.0	80.3
11/22/84	26,484	780	29.00	2.90	5.94	46	26	0	0	1,448	3	5	5	79	0.0	80.3
11/23/84	26,552	780	40.00	2.70	5.94	68	37	0	0	1,522	2.8	5	5	89	0.0	80.3
11/24/84	26,598	781	29.00	2.50	5.94	47	27	0	0	1,575	2.8	5	5	99	0.0	80.3
11/25/84	26,644	782	29.00	2.70	5.94	46	26	0	0	1,627	2.7	5	5	109	0.0	80.3
11/26/84	26,691	782	29.00	2.70	5.94	46	26	0	0	1,679	2.7	5	5	119	0.0	80.3
11/27/84	26,708	783	14.00	2.50	5.94	17	12	0	0	1,702	2.5	5	5	129	0.0	80.3
11/28/84	26,746	783	25.00	2.70	5.94	38	22	0	0	1,746	2.8	5	5	139	0.0	80.3
11/29/84	26,776	784	21.00	2.90	5.93	30	18	0	0	1,782	2.9	5	5	149	0.0	80.3
11/30/84	26,813	784	25.00	3.10	5.93	38	22	0	0	1,825	3.2	5	5	159	0.0	80.3
12/01/84	26,859	785	28.00	2.90	3.98	46	25	0	0	1,875	3	5	5	169	0.0	80.3
12/02/84	26,897	786	24.00	2.70	3.96	38	21	0	0	1,917	2.8	5	5	179	0.0	80.3
12/03/84	26,943	787	28.00	2.90	3.96	46	25	0	0	1,967	2.9	5	5	188	0.0	80.3
12/04/84	26,977	787	24.00	5.00	3.96	34	19	0	0	2,005	5	5	5	198	0.0	80.3
12/05/84	26,989	788	8.00	0.00	3.97	12	8	0	0	2,021	1	18	5	208	13.0	106.1
12/06/84	27,030	788	23.00	0.00	3.97	42	23	0	0	2,067	1	27	5	218	22.0	149.8
12/07/84	27,088	788	30.00	0.00	3.97	56	30	0	0	2,127	0	5	5	228	0.0	149.8
12/08/84	27,199	789	59.00	0.00	3.97	113	59	0	0	2,244	0	5	5	238	0.0	149.8
12/09/84	27,264	791	36.00	1.20	3.98	65	35	0	0	2,313	1.3	5	5	248	0.0	149.8
12/10/84	27,312	792	28.00	2.00	3.98	48	26	0	0	2,365	2.1	5	5	258	0.0	149.8
12/11/84	27,357	794	30.00	5.00	3.98	48	25	0	0	2,415	7	5	5	268	0.0	149.8
12/12/84	27,427	794	42.00	5.00	3.98	69	37	0	0	2,488	8	5	5	278	0.0	149.8
12/13/84	27,496	796	39.00	2.00	3.98	69	37	0	0	2,561	2	5	5	288	0.0	149.8

Table 4
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases of Inflow to Make 5 cfs Available

Date (Source/Note -> /1	Reservoir Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release (cfs) /4, /5, /8	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /5, /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ 5 cfs SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ 5 cfs SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs)	Cummulative Flow Avail For Stock water at Trinidad gage (acre-feet)	Flow Avail. Below Stock wate Diversions (cfs) /7	Cummulative Flow Avail Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												120		32	
	Totals (acre-feet)				574.57				0	7,708				1,190		261
	Max Rates (cfs)												5		22	
	Mean Rate when Diverting (cfs)												5		4	
12/14/84	27,544	797	29.00	2.70	3.99	48	26	0	0	2,613	2.8	5	5	298	0.0	149.8
12/15/84	27,599	799	32.00	2.50	3.99	55	30	0	0	2,672	2.6	5	5	307	0.0	149.8
12/16/84	27,639	799	25.00	2.50	3.99	41	23	0	0	2,717	2.6	5	5	317	0.0	149.8
12/17/84	27,648	800	9.00	2.70	3.99	9	6	0	0	2,729	2.8	5	5	327	0.0	149.8
12/18/84	27,697	800	29.00	2.20	3.98	49	27	0	0	2,782	2.3	5	5	337	0.0	149.8
12/19/84	27,752	801	32.00	2.50	3.98	55	30	0	0	2,841	2.6	5	5	347	0.0	149.8
12/20/84	27,816	803	37.00	2.50	3.98	64	35	0	0	2,909	2.6	5	5	357	0.0	149.8
12/21/84	27,841	804	17.00	2.70	3.99	24	14	0	0	2,937	2.8	5	5	367	0.0	149.8
12/22/84	27,856	805	13.00	3.10	3.99	16	10	0	0	2,957	3.2	5	5	377	0.0	149.8
12/23/84	27,912	805	33.00	2.70	3.98	56	30	0	0	3,017	2.8	5	5	387	0.0	149.8
12/24/84	27,944	806	21.00	3.10	3.98	32	18	0	0	3,053	3.2	5	5	397	0.0	149.8
12/25/84	28,000	807	33.00	2.50	3.98	57	31	0	0	3,113	2.6	5	5	407	0.0	149.8
12/26/84	28,072	808	40.00	2.00	3.98	71	38	0	0	3,188	2.1	5	5	417	0.0	149.8
12/27/84	28,152	810	45.00	2.50	3.98	80	43	0	0	3,272	2.6	5	5	426	0.0	149.8
12/28/84	28,232	811	45.00	2.50	3.97	80	43	0	0	3,356	2.6	5	5	436	0.0	149.8
12/29/84	28,289	813	33.00	2.50	3.98	57	31	0	0	3,416	2.5	5	5	446	0.0	149.8
12/30/84	28,329	814	25.00	2.70	3.98	40	22	0	0	3,460	2.7	5	5	456	0.0	149.8
12/31/84	28,386	814	33.00	2.20	3.97	57	31	0	0	3,521	2.2	5	5	466	0.0	149.8
01/01/85	28,420	815	21.00	3.10	1.98	34	18	0	0	3,557	3.1	5	5	476	0.0	149.8
01/02/85	28,431	815	8.00	2.50	0.00	11	6	0	0	3,568	2.5	5	5	486	0.0	149.8
01/03/85	28,443	816	8.00	2.00	0.00	12	6	0	0	3,580	2	5	5	496	0.0	149.8
01/04/85	28,486	817	24.00	2.00	0.00	44	22	0	0	3,624	2	5	5	506	0.0	149.8
01/05/85	28,545	817	32.00	2.50	0.00	59	30	0	0	3,683	2.5	5	5	516	0.0	149.8
01/06/85	28,595	818	28.00	2.70	0.00	50	25	0	0	3,733	2.7	5	5	526	0.0	149.8
01/07/85	28,653	819	32.00	2.50	0.00	59	30	0	0	3,792	2.6	5	5	536	0.0	149.8
01/08/85	28,728	820	40.00	2.50	0.00	74	38	0	0	3,866	2.5	5	5	545	0.0	149.8
01/09/85	28,777	822	28.00	3.10	0.00	49	25	0	0	3,916	3.1	5	5	555	0.0	149.8
01/10/85	28,804	823	16.00	2.70	0.00	26	13	0	0	3,941	2.7	5	5	565	0.0	149.8
01/11/85	28,838	823	20.00	2.70	0.00	34	17	0	0	3,975	2.7	5	5	575	0.0	149.8
01/12/85	28,857	824	12.00	2.20	0.00	19	10	0	0	3,994	2.2	5	5	585	0.0	149.8
01/13/85	28,909	824	28.00	2.20	0.00	51	26	0	0	4,045	2.2	5	5	595	0.0	149.8
01/14/85	28,951	825	24.00	2.50	0.00	43	22	0	0	4,088	2.5	5	5	605	0.0	149.8
01/15/85	28,995	825	24.00	2.00	0.00	44	22	0	0	4,132	2	5	5	615	0.0	149.8
01/16/85	29,046	826	28.00	2.00	0.00	52	26	0	0	4,184	2	5	5	625	0.0	149.8
01/17/85	29,090	827	24.00	2.20	0.00	43	22	0	0	4,227	2.2	5	5	635	0.0	149.8
01/18/85	29,149	828	32.00	2.00	0.00	60	30	0	0	4,287	2	5	5	645	0.0	149.8
01/19/85	29,200	829	28.00	2.20	0.00	51	26	0	0	4,338	2.2	5	5	655	0.0	149.8
01/20/85	29,235	830	20.00	2.70	0.00	34	17	0	0	4,372	2.7	5	5	664	0.0	149.8
01/21/85	29,261	831	16.00	2.90	0.00	26	13	0	0	4,398	2.9	5	5	674	0.0	149.8
01/22/85	29,295	831	20.00	2.50	0.00	35	18	0	0	4,433	2.5	5	5	684	0.0	149.8
01/23/85	29,340	831	25.00	2.70	0.00	44	22	0	0	4,477	2.7	5	5	694	0.0	149.8
01/24/85	29,382	833	24.00	2.70	0.00	42	21	0	0	4,519	2.7	5	5	704	0.0	149.8
01/25/85	29,440	833	32.00	2.50	0.00	59	30	0	0	4,578	2.5	5	5	714	0.0	149.8
01/26/85	29,482	834	24.00	2.90	0.00	42	21	0	0	4,620	2.9	5	5	724	0.0	149.8

Table 4
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases of Inflow to Make 5 cfs Available

Date (Source/Note ->) /1	Reservoir Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release (cfs) /4, /5, /8	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /5, /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ 5 cfs SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ 5 cfs SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs)	Cummulative Flow Avail For Stock water at Trinidad gage (acre-feet)	Flow Avail. Below Stock wate Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												120		32	
	Totals (acre-feet)				574.57				0	7,708				1,190		261
	Max Rates (cfs)												5		22	
	Mean Rate when Diverting (cfs)												5		4	
01/27/85	29,532	834	28.00	2.70	0.00	50	25	0	0	4,670	2.7	5	5	734	0.0	149.8
01/28/85	29,576	835	25.00	3.10	0.00	43	22	0	0	4,713	3.1	5	5	744	0.0	149.8
01/29/85	29,601	836	16.00	3.10	0.00	26	13	0	0	4,739	3.1	5	5	754	0.0	149.8
01/30/85	29,610	837	8.00	3.50	0.00	9	5	0	0	4,748	3.5	5	5	764	0.0	149.8
01/31/85	29,621	837	8.00	2.70	0.00	11	5	0	0	4,759	2.7	5	5	774	0.0	149.8
02/01/85	29,627	837	4.00	1.00	0.00	6	3	0	0	4,765	1	5	5	783	0.0	149.8
02/02/85	29,640	837	8.00	1.20	0.00	13	7	0	0	4,778	1.2	5	5	793	0.0	149.8
02/03/85	29,696	837	29.00	1.00	0.00	56	28	0	0	4,834	1	5	5	803	0.0	149.8
02/04/85	29,731	838	20.00	2.20	0.00	35	18	0	0	4,869	2.2	5	5	813	0.0	149.8
02/05/85	29,759	838	16.00	2.00	0.00	28	14	0	0	4,897	2	5	5	823	0.0	149.8
02/06/85	29,786	839	16.00	2.50	0.00	27	14	0	0	4,924	2.5	5	5	833	0.0	149.8
02/07/85	29,812	839	16.00	2.70	0.00	26	13	0	0	4,950	2.7	5	5	843	0.0	149.8
02/08/85	29,858	839	25.00	2.70	0.00	44	22	0	0	4,994	2.7	5	5	853	0.0	149.8
02/09/85	29,888	840	21.00	5.00	0.00	32	16	0	0	5,026	5	5	5	863	0.0	149.8
02/10/85	29,936	840	29.00	5.00	0.00	48	24	0	0	5,074	5	5	5	873	0.0	149.8
02/11/85	29,970	841	20.00	2.70	0.00	34	17	0	0	5,108	2.7	5	5	883	0.0	149.8
02/12/85	30,015	841	25.00	2.50	0.00	45	23	0	0	5,153	2.5	5	5	893	0.0	149.8
02/13/85	30,083	842	37.00	2.50	0.00	68	35	0	0	5,221	2.5	5	5	902	0.0	149.8
02/14/85	30,142	843	33.00	3.10	0.00	59	30	0	0	5,280	3.1	5	5	912	0.0	149.8
02/15/85	30,209	843	37.00	3.30	0.00	67	34	0	0	5,347	3.3	5	5	922	0.0	149.8
02/16/85	30,276	844	37.00	3.30	0.00	67	34	0	0	5,414	3.3	5	5	932	0.0	149.8
02/17/85	30,326	845	29.00	3.70	0.00	50	25	0	0	5,464	3.7	5	5	942	0.0	149.8
02/18/85	30,377	846	29.00	3.50	0.00	51	26	0	0	5,515	3.5	5	5	952	0.0	149.8
02/19/85	30,427	846	29.00	3.70	0.00	50	25	0	0	5,565	3.7	5	5	962	0.0	149.8
02/20/85	30,469	847	25.00	3.70	0.00	42	21	0	0	5,607	3.7	5	5	972	0.0	149.8
02/21/85	30,520	847	29.00	3.50	0.00	51	26	0	0	5,658	3.5	5	5	982	0.0	149.8
02/22/85	30,562	848	25.00	3.50	0.00	43	22	0	0	5,701	3.5	5	5	992	0.0	149.8
02/23/85	30,630	848	37.00	3.10	0.00	67	34	0	0	5,768	3.1	5	5	1,002	0.0	149.8
02/24/85	30,673	849	25.00	2.90	0.00	44	22	0	0	5,812	2.9	5	5	1,012	0.0	149.8
02/25/85	30,733	850	33.00	3.10	0.00	59	30	0	0	5,871	3.1	5	5	1,022	0.0	149.8
02/26/85	30,762	850	20.00	5.00	0.00	30	15	0	0	5,901	5	5	5	1,031	0.0	149.8
02/27/85	30,800	851	24.00	5.00	0.00	38	19	0	0	5,939	6	5	5	1,041	0.0	149.8
02/28/85	30,840	851	25.00	5.00	0.00	40	20	0	0	5,979	5	5	5	1,051	0.0	149.8
03/01/85	30,885	851	25.00	2.00	0.00	46	23	0	0	6,025	2.1	5	5	1,061	0.0	149.8
03/02/85	30,924	851	21.00	1.50	0.00	39	20	0	0	6,064	1.5	5	5	1,071	0.0	149.8
03/03/85	30,954	852	17.00	1.80	0.00	30	15	0	0	6,094	1.8	5	5	1,081	0.0	149.8
03/04/85	30,992	852	22.00	2.20	1.98	37	20	0	0	6,133	2.3	5	5	1,091	0.0	149.8
03/05/85	31,020	852	18.00	2.50	1.98	29	16	0	0	6,164	2.6	5	5	1,101	0.0	149.8
03/06/85	31,066	853	26.00	2.20	1.98	45	24	0	0	6,211	2.2	5	5	1,111	0.0	149.8
03/07/85	31,077	853	10.00	2.20	3.96	12	8	0	0	6,226	2.2	5	5	1,121	0.0	149.8
03/08/85	31,106	853	20.00	2.50	5.94	29	18	0	0	6,261	2.5	5	5	1,131	0.0	149.8
03/09/85	31,153	854	29.00	2.20	5.93	47	27	0	0	6,314	2.2	5	5	1,141	0.0	149.8
03/10/85	31,191	854	25.00	1.80	7.91	38	23	0	0	6,360	1.8	5	5	1,150	0.0	149.8
03/11/85	31,259	855	38.00	0.00	7.91	67	38	0	0	6,435	0	5.7	5	1,160	0.7	151.1

Table 4
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases of Inflow to Make 5 cfs Available

Date (Source/Note -> /1	Reservoir Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release (cfs) /4, /5, /8	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /5, /8	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ 5 cfs SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ 5 cfs SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs)	Cummulative Flow Avail For Stock water at Trinidad gage (acre-feet)	Flow Avail. Below Stock wate Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
Total Days of Diversion/availability													120		32	
Totals (acre-feet)					574.57				0	7,708				1,190		261
Max Rates (cfs)													5		22	
Mean Rate when Diverting (cfs)													5		4	
03/12/85	31,334	855	42.00	0.00	7.91	75	42	0	0	6,518	0.1	6	5	1,170	1.0	153.1
03/13/85	31,383	856	29.00	0.20	7.91	49	29	0	0	6,575	0.4	5	5	1,180	0.0	153.1
03/14/85	31,439	857	33.00	0.80	7.91	56	32	0	0	6,639	1	5	5	1,190	0.0	153.1
03/15/85	31,495	858	33.00	1.00	7.91	56	32	0	0	6,702	1.2	5	0	1,190	5.0	163.0
03/16/85	31,570	858	42.00	0.00	7.90	75	42	0	0	6,785	0.2	4.2	0	1,190	4.2	171.4
03/17/85	31,620	859	29.00	0.00	7.90	50	29	0	0	6,843	0.2	3.8	0	1,190	3.8	178.9
03/18/85	31,679	860	34.00	0.00	7.90	60	34	0	0	6,910	0.2	4	0	1,190	4.0	186.8
03/19/85	31,721	860	25.00	0.00	7.90	42	25	0	0	6,960	0.2	4.2	0	1,190	4.2	195.2
03/20/85	31,804	861	46.00	0.00	7.89	83	46	0	0	7,051	0.2	4	0	1,190	4.0	203.1
03/21/85	31,856	863	30.00	0.00	7.91	52	30	0	0	7,111	0.2	3.5	0	1,190	3.5	210.1
03/22/85	31,898	863	25.00	0.00	7.91	42	25	0	0	7,161	0.2	3.8	0	1,190	3.8	217.6
03/23/85	31,939	864	25.00	0.00	7.91	42	25	0	0	7,211	0.2	3.5	0	1,190	3.5	224.5
03/24/85	31,999	864	35.00	0.00	9.89	60	35	0	0	7,280	0.2	3.2	0	1,190	3.2	230.9
03/25/85	32,051	865	34.00	0.00	15.82	52	34	0	0	7,347	0.2	3.2	0	1,190	3.2	237.2
03/26/85	32,076	866	25.00	0.00	23.74	26	25	0	0	7,397	0.2	4	0	1,190	4.0	245.2
03/27/85	32,128	866	38.00	0.00	23.73	52	38	0	0	7,472	0.2	4	0	1,190	4.0	253.1
03/28/85	32,180	867	31.00	0.00	9.89	52	31	0	0	7,533	0.2	4	0	1,190	4.0	261.0
03/29/85	32,235	867	30.00	0.00	3.96	56	30	0	0	7,593	0	0	0	1,190	0.0	261.0
03/30/85	32,299	868	37.00	0.00	9.92	63	37	0	0	7,666	0	0	0	1,190	0.0	261.0
03/31/85	32,334	869	21.00	0.00	5.97	36	21	0	0	7,708	0	0	0	1,190	0.0	261.0

See list of footnotes after Table 5.

Table 5
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases Made at Alternative Rates

Date (Source/Note ->) /1	Alternate Stockwater Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release Rate 64.9 (cfs) /4, /8, /9	Evap. (acre-feet)	Change In Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /8, /9	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ Alternate SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ Alternate SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs) /10	Cummulative Flow Avail For Stockwater at Trinidad gage (acre-feet)	Flow Avail. Below Stockwater Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												9		130	
	Totals (acre-feet)				571.83				704	7,886				1,199		791
	Max Rates (cfs)												68		27	
	Mean Rate when Diverting (cfs)												67		3	
10/31/84	25,201									0						
11/01/84	25,266	781	36.00	0.00	5.94	65	36	0	0	71	0.1	3.2	0	0	3.2	6.3
11/02/84	25,346	782	47.00	0.00	13.88	79	47	0	0	164	0.1	3.0	0	0	3.0	12.3
11/03/84	25,395	783	32.00	0.00	13.87	50	32	0	0	227	0.1	3.0	0	0	3.0	18.2
11/04/84	25,475	783	42.00	0.00	3.96	79	42	0	0	310	0.1	2.5	0	0	2.5	23.2
11/05/84	25,548	785	40.00	0.00	5.94	73	40	0	0	389	0.1	2.8	0	0	2.8	28.8
11/06/84	25,630	786	46.00	0.00	9.91	81	46	0	0	480	0.1	2.8	0	0	2.8	34.3
11/07/84	25,687	787	35.00	0.00	11.89	58	35	0	0	549	0.1	2.8	0	0	2.8	39.9
11/08/84	25,753	788	39.00	0.00	11.89	65	39	0	0	626	0.1	2.8	0	0	2.8	45.4
11/09/84	25,790	789	22.00	0.00	5.95	38	22	0	0	670	0.1	2.8	0	0	2.8	51.0
11/10/84	25,842	789	30.00	0.00	7.92	52	30	0	0	730	0.1	2.8	0	0	2.8	56.5
11/11/84	25,923	790	44.00	0.00	5.93	81	44	0	0	817	0.1	3.2	0	0	3.2	62.9
11/12/84	25,989	792	37.00	0.00	7.92	65	37	0	0	890	0.1	3.2	0	0	3.2	69.2
11/13/84	26,062	793	43.00	0.00	11.89	73	43	0	0	975	0.1	2.8	0	0	2.8	74.8
11/14/84	26,100	794	23.00	0.00	7.93	38	23	0	0	1,021	0.0	2.8	0	0	2.8	80.3
11/15/84	26,159	794	32.00	0.00	3.97	60	32	0	0	1,084	0.0	3.2	0	0	3.2	86.7
11/16/84	26,227	795	38.00	0.00	3.96	67	36	0	0	1,155	0.0	3.2	0	0	3.2	93.0
11/17/84	26,272	797	25.00	0.00	3.97	46	25	0	0	1,205	0.0	3.5	0	0	3.5	100.0
11/18/84	26,332	798	33.00	0.00	5.94	60	33	0	0	1,270	0.0	3.5	0	0	3.5	106.9
11/19/84	26,371	798	23.00	0.00	5.95	40	23	0	0	1,318	0.0	0.0	0	0	0.0	106.9
11/20/84	26,292	799	28.00	64.90	5.95	-79	0	37	73	1,316	64.9	64.9	64.9	129	0.0	106.9
11/21/84	26,223	798	33.00	64.90	5.93	-69	0	32	136	1,316	64.9	64.9	64.9	257	0.0	106.9
11/22/84	26,146	797	29.00	64.90	5.92	-77	0	36	208	1,316	65.0	67.0	67	390	0.0	106.9
11/23/84	26,219	795	40.00	0.00	5.90	73	40	0	208	1,395	0.1	2.3	0	390	2.3	111.5
11/24/84	26,271	797	29.00	0.00	5.91	52	29	0	208	1,453	0.1	2.5	0	390	2.5	116.4
11/25/84	26,323	798	29.00	0.00	5.91	52	29	0	208	1,511	0.0	2.3	0	390	2.3	121.0
11/26/84	26,374	798	29.00	0.00	5.91	52	29	0	208	1,569	0.0	2.3	0	390	2.3	125.6
11/27/84	26,396	799	14.00	0.00	5.91	22	14	0	208	1,597	0.0	2.5	0	390	2.5	130.5
11/28/84	26,440	799	25.00	0.00	5.91	44	25	0	208	1,647	0.1	2.3	0	390	2.3	135.1
11/29/84	26,476	800	21.00	0.00	5.91	36	21	0	208	1,689	0.0	2.1	0	390	2.1	139.2
11/30/84	26,519	800	25.00	0.00	5.90	44	25	0	208	1,739	0.1	1.9	0	390	1.9	143.0
12/01/84	26,571	801	28.00	0.00	3.94	52	28	0	208	1,795	0.1	2.1	0	390	2.1	147.2
12/02/84	26,614	801	24.00	0.00	3.94	44	24	0	208	1,843	0.1	2.3	0	390	2.3	151.7
12/03/84	26,666	802	28.00	0.00	3.94	52	28	0	208	1,899	0.0	2.1	0	390	2.1	155.9
12/04/84	26,710	803	24.00	0.00	3.94	44	24	0	208	1,947	0.0	0.0	0	390	0.0	155.9
12/05/84	26,722	803	8.00	0.00	3.95	12	8	0	208	1,963	1.0	18.0	0	390	18.0	191.6
12/06/84	26,763	803	23.00	0.00	3.95	42	23	0	208	2,009	1.0	27.0	0	390	27.0	245.2
12/07/84	26,819	804	30.00	0.00	3.95	56	30	0	208	2,069	0.0	5.0	0	390	5.0	255.1
12/08/84	26,932	805	59.00	0.00	3.95	113	59	0	208	2,186	0.0	5.0	0	390	6.0	265.0
12/09/84	26,999	807	36.00	0.00	3.96	67	36	0	208	2,257	0.1	3.8	0	390	3.8	272.5
12/10/84	27,051	808	28.00	0.00	3.95	52	28	0	208	2,313	0.1	3.0	0	390	3.0	278.5
12/11/84	27,107	809	30.00	0.00	3.96	56	30	0	208	2,373	2.0	0.0	0	390	0.0	278.5
12/12/84	27,166	809	42.00	0.00	3.96	79	42	0	208	2,456	3.0	0.0	0	390	0.0	278.5
12/13/84	27,259	791	39.00	0.00	3.96	73	39	0	208	2,533	0.0	3.0	0	390	3.0	284.4

Table 5
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases Made at Alternative Rates

Date (Source/Note ->) /1	Alternate Stockwater Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release Rate 64.9 (cfs) /4, /8, /9	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /8, /9	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ Alternate SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ Alternate SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs) /10	Cummulative Flow Avail For Stockwater at Trinidad gage (acre-feet)	Flow Avail. Below Stockwater Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												9		130	
	Totals (acre-feet)				571.83				704	7,886				1,199		791
	Max Rates (cfs)												68		27	
	Mean Rate when Diverting (cfs)												67		3	
12/14/84	27,313	792	29.00	0.00	3.96	54	29	0	208	2,591	0.1	2.3	0	390	2.3	289.0
12/15/84	27,372	794	32.00	0.00	3.96	60	32	0	208	2,654	0.1	2.5	0	390	2.5	294.0
12/16/84	27,418	795	25.00	0.00	3.96	46	25	0	208	2,704	0.1	2.5	0	390	2.5	298.9
12/17/84	27,432	795	9.00	0.00	3.97	14	9	0	208	2,722	0.1	2.3	0	390	2.3	303.5
12/18/84	27,485	796	29.00	0.00	3.96	54	29	0	208	2,780	0.1	2.8	0	390	2.8	309.0
12/19/84	27,545	797	32.00	0.00	3.96	60	32	0	208	2,843	0.1	2.5	0	390	2.5	314.0
12/20/84	27,614	799	37.00	0.00	3.96	69	37	0	208	2,916	0.1	2.5	0	390	2.5	318.9
12/21/84	27,644	800	17.00	0.00	3.97	30	17	0	208	2,950	0.1	2.3	0	390	2.3	323.5
12/22/84	27,666	800	13.00	0.00	3.96	22	13	0	208	2,976	0.1	1.9	0	390	1.9	327.3
12/23/84	27,727	801	33.00	0.00	3.96	61	33	0	208	3,041	0.1	2.3	0	390	2.3	331.8
12/24/84	27,765	802	21.00	0.00	3.96	38	21	0	208	3,083	0.1	1.9	0	390	1.9	335.6
12/25/84	27,827	803	33.00	0.00	3.96	61	33	0	208	3,148	0.1	2.5	0	390	2.5	340.6
12/26/84	27,902	805	40.00	0.00	3.96	75	40	0	208	3,227	0.1	3.0	0	390	3.0	346.5
12/27/84	27,987	806	45.00	0.00	3.96	85	45	0	208	3,316	0.1	2.5	0	390	2.5	351.5
12/28/84	28,073	808	45.00	0.00	3.96	85	45	0	208	3,405	0.1	2.5	0	390	2.5	356.4
12/29/84	28,134	810	33.00	0.00	3.96	61	33	0	208	3,470	0.0	2.5	0	390	2.5	361.4
12/30/84	28,180	811	25.00	0.00	3.97	46	25	0	208	3,520	0.0	2.3	0	390	2.3	366.0
12/31/84	28,241	812	33.00	0.00	3.96	61	33	0	208	3,585	0.0	2.8	0	390	2.8	371.5
01/01/85	28,281	813	21.00	0.00	1.98	40	21	0	208	3,627	0.0	1.9	0	390	1.9	375.3
01/02/85	28,297	814	8.00	0.00	0.00	16	8	0	208	3,643	0.0	2.5	0	390	2.5	380.2
01/03/85	28,313	814	8.00	0.00	0.00	16	8	0	208	3,659	0.0	3.0	0	390	3.0	386.2
01/04/85	28,360	814	24.00	0.00	0.00	48	24	0	208	3,707	0.0	3.0	0	390	3.0	392.1
01/05/85	28,424	815	32.00	0.00	0.00	63	32	0	208	3,770	0.0	2.5	0	390	2.5	397.1
01/06/85	28,479	816	28.00	0.00	0.00	56	28	0	208	3,826	0.0	2.3	0	390	2.3	401.7
01/07/85	28,543	817	32.00	0.00	0.00	63	32	0	208	3,889	0.0	2.5	0	390	2.5	406.6
01/08/85	28,622	818	40.00	0.00	0.00	79	40	0	208	3,968	0.0	2.5	0	390	2.5	411.6
01/09/85	28,678	820	28.00	0.00	0.00	56	28	0	208	4,024	0.0	1.9	0	390	1.9	415.3
01/10/85	28,709	821	16.00	0.00	0.00	32	16	0	208	4,056	0.0	2.3	0	390	2.3	419.9
01/11/85	28,749	821	20.00	0.00	0.00	40	20	0	208	4,096	0.0	2.3	0	390	2.3	424.5
01/12/85	28,773	822	12.00	0.00	0.00	24	12	0	208	4,120	0.0	2.8	0	390	2.8	430.0
01/13/85	28,828	823	28.00	0.00	0.00	56	28	0	208	4,176	0.0	2.8	0	390	2.8	435.6
01/14/85	28,876	824	24.00	0.00	0.00	48	24	0	208	4,224	0.0	2.5	0	390	2.5	440.5
01/15/85	28,795	824	24.00	64.90	0.00	-81	0	41	289	4,224	64.9	67.9	67.9	525	0.0	440.5
01/16/85	28,722	823	28.00	64.90	0.00	-73	0	37	362	4,224	64.9	67.9	67.9	660	0.0	440.5
01/17/85	28,641	822	24.00	64.90	0.00	-81	0	41	443	4,224	64.9	67.7	67.7	794	0.0	440.5
01/18/85	28,704	820	32.00	0.00	0.00	63	32	0	443	4,287	0.0	3.0	0	794	3.0	446.5
01/19/85	28,760	821	28.00	0.00	0.00	56	28	0	443	4,343	0.0	2.8	0	794	2.8	452.0
01/20/85	28,799	823	20.00	0.00	0.00	40	20	0	443	4,383	0.0	2.3	0	794	2.3	456.6
01/21/85	28,831	823	16.00	0.00	0.00	32	16	0	443	4,415	0.0	2.1	0	794	2.1	460.8
01/22/85	28,871	824	20.00	0.00	0.00	40	20	0	443	4,455	0.0	2.5	0	794	2.5	465.7
01/23/85	28,920	824	25.00	0.00	0.00	50	25	0	443	4,505	0.0	2.3	0	794	2.3	470.3
01/24/85	28,968	825	24.00	0.00	0.00	48	24	0	443	4,553	0.0	2.3	0	794	2.3	474.8
01/25/85	29,031	826	32.00	0.00	0.00	63	32	0	443	4,616	0.0	2.5	0	794	2.5	479.8
01/26/85	29,079	827	24.00	0.00	0.00	48	24	0	443	4,664	0.0	2.1	0	794	2.1	484.0

Table 5
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases Made at Alternative Rates

Date (Source/Note -> /1	Alternate Stockwater Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release Rate 64.9 (cfs) /4, /8, /9	Evap. (acre-feet)	Change in Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /8, /9	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ Alternate SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ Alternate SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs) /10	Cummulative Flow Avail For Stockwater at Trinidad gage (acre-feet)	Flow Avail. Below Stockwater Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												9		130	
	Totals (acre-feet)				571.83				704	7,886				1,199		791
	Max Rates (cfs)												68		27	
	Mean Rate when Diverting (cfs)												67		3	
01/27/85	29,134	828	28.00	0.00	0.00	56	28	0	443	4,720	0.0	2.3	0	794	2.3	488.5
01/28/85	29,184	829	25.00	0.00	0.00	50	25	0	443	4,770	0.0	1.9	0	794	1.9	492.3
01/29/85	29,216	830	16.00	0.00	0.00	32	16	0	443	4,802	0.0	1.9	0	794	1.9	496.1
01/30/85	29,232	830	8.00	0.00	0.00	16	8	0	443	4,818	0.0	1.5	0	794	1.5	499.0
01/31/85	29,247	830	8.00	0.00	0.00	16	8	0	443	4,834	0.0	2.3	0	794	2.3	503.6
02/01/85	29,255	831	4.00	0.00	0.00	8	4	0	443	4,842	0.0	4.0	0	794	4.0	511.5
02/02/85	29,271	831	8.00	0.00	0.00	16	8	0	443	4,858	0.0	3.8	0	794	3.8	519.1
02/03/85	29,329	831	29.00	0.00	0.00	58	29	0	443	4,916	0.0	4.0	0	794	4.0	527.0
02/04/85	29,368	832	20.00	0.00	0.00	40	20	0	443	4,956	0.0	2.8	0	794	2.8	532.6
02/05/85	29,400	833	16.00	0.00	0.00	32	16	0	443	4,988	0.0	3.0	0	794	3.0	538.5
02/06/85	29,432	833	16.00	0.00	0.00	32	16	0	443	5,020	0.0	2.5	0	794	2.5	543.5
02/07/85	29,464	834	16.00	0.00	0.00	32	16	0	443	5,052	0.0	2.3	0	794	2.3	548.0
02/08/85	29,513	834	25.00	0.00	0.00	50	25	0	443	5,102	0.0	2.3	0	794	2.3	552.6
02/09/85	29,555	835	21.00	0.00	0.00	42	21	0	443	5,144	0.0	0.0	0	794	0.0	552.6
02/10/85	29,612	836	29.00	0.00	0.00	58	29	0	443	5,202	0.0	0.0	0	794	0.0	552.6
02/11/85	29,652	837	20.00	0.00	0.00	40	20	0	443	5,242	0.0	2.3	0	794	2.3	557.2
02/12/85	29,702	838	25.00	0.00	0.00	50	25	0	443	5,292	0.0	2.5	0	794	2.5	562.1
02/13/85	29,775	838	37.00	0.00	0.00	73	37	0	443	5,365	0.0	2.5	0	794	2.5	567.1
02/14/85	29,841	839	33.00	0.00	0.00	65	33	0	443	5,430	0.0	1.9	0	794	1.9	570.9
02/15/85	29,914	840	37.00	0.00	0.00	73	37	0	443	5,503	0.0	1.7	0	794	1.7	574.2
02/16/85	29,987	841	37.00	0.00	0.00	73	37	0	443	5,576	0.0	1.7	0	794	1.7	577.6
02/17/85	30,045	842	29.00	0.00	0.00	58	29	0	443	5,634	0.0	1.3	0	794	1.3	580.2
02/18/85	30,102	842	29.00	0.00	0.00	58	29	0	443	5,692	0.0	1.5	0	794	1.5	583.1
02/19/85	30,160	843	29.00	0.00	0.00	58	29	0	443	5,750	0.0	1.3	0	794	1.3	585.7
02/20/85	30,209	844	25.00	0.00	0.00	50	25	0	443	5,800	0.0	1.3	0	794	1.3	588.3
02/21/85	30,267	844	29.00	0.00	0.00	58	29	0	443	5,858	0.0	1.5	0	794	1.5	591.3
02/22/85	30,317	845	25.00	0.00	0.00	50	25	0	443	5,908	0.0	1.5	0	794	1.5	594.3
02/23/85	30,390	845	37.00	0.00	0.00	73	37	0	443	5,981	0.0	1.9	0	794	1.9	598.0
02/24/85	30,440	846	25.00	0.00	0.00	50	25	0	443	6,031	0.0	2.1	0	794	2.1	602.2
02/25/85	30,505	847	33.00	0.00	0.00	65	33	0	443	6,096	0.0	1.9	0	794	1.9	606.0
02/26/85	30,545	848	20.00	0.00	0.00	40	20	0	443	6,136	0.0	0.0	0	794	0.0	606.0
02/27/85	30,592	848	24.00	0.00	0.00	48	24	0	443	6,184	1.0	0.0	0	794	0.0	606.0
02/28/85	30,642	849	25.00	0.00	0.00	50	25	0	443	6,234	0.0	0.0	0	794	0.0	606.0
03/01/85	30,563	849	25.00	64.90	0.00	-79	0	40	522	6,234	65.0	67.9	67.9	929	0.0	606.0
03/02/85	30,476	848	21.00	64.90	0.00	-87	0	44	609	6,234	65.0	68.4	68.4	1,064	0.0	606.0
03/03/85	30,381	847	17.00	64.90	0.00	-95	0	48	704	6,234	64.9	68.1	68.1	1,199	0.0	606.0
03/04/85	30,422	846	22.00	0.00	1.96	42	22	0	704	6,278	0.1	2.8	0	1,199	2.8	611.5
03/05/85	30,456	847	18.00	0.00	1.96	34	18	0	704	6,314	0.1	2.5	0	1,199	2.5	616.5
03/06/85	30,506	847	26.00	0.00	1.96	50	26	0	704	6,366	0.0	2.8	0	1,199	2.8	622.0
03/07/85	30,522	848	10.00	0.00	3.94	16	10	0	704	6,386	0.0	2.8	0	1,199	2.8	627.6
03/08/85	30,555	848	20.00	0.00	5.90	34	20	0	704	6,426	0.0	2.5	0	1,199	2.5	632.5
03/09/85	30,607	848	29.00	0.00	5.90	52	29	0	704	6,484	0.0	2.8	0	1,199	2.8	638.1
03/10/85	30,649	849	25.00	0.00	7.86	42	25	0	704	6,534	0.0	3.2	0	1,199	3.2	644.4
03/11/85	30,716	849	38.00	0.00	7.86	68	38	0	704	6,609	0.0	5.7	0	1,199	5.7	655.7

Table 5
Trinidad Reservoir - Stock Water Modeling During Non-Irrigation Season
Water Year 1985
Reservoir Operations and River Gage Flows with Stock Water Releases Made at Alternative Rates

Date (Source/Note ->) /1	Alternate Stockwater Content (acre-feet)	Surface Acres at Content (acres)	Inflow (cfs) (COE)	Release Rate 64.9 (cfs) /4, /8, /9	Evap. (acre-feet)	Change In Content (acre-feet)	Inflow Stored (cfs) /6	Stock Water Released From Storage (cfs) /8, /9	Cummulative Stock Water From Storage (acre-feet)	Cummulative Total Inflow Stored (acre-feet) /6	Gage Flows Blw Trinidad Dam w/ Alternate SW (PURBTRCO) (cfs)	Gage Flows at Trinidad w/ Alternate SW (PURTRICO) (cfs)	Flow Avail For Stockwater at Trinidad gage (cfs) /10	Cummulative Flow Avail For Stockwater at Trinidad gage (acre-feet)	Flow Avail. Below Stockwater Diversions (cfs) /7	Cummulative Flow Avail. Below Stockwater Diversions (acre-feet) /7
	Total Days of Diversion/availability												9		130	
	Totals (acre-feet)				571.83				704	7,886				1,199		791
	Max Rates (cfs)												68		27	
	Mean Rate when Diverting (cfs)												67		3	
03/12/85	30,792	850	42.00	0.00	7.86	75	42	0	704	6,692	0.1	6.0	0	1,199	6.0	667.6
03/13/85	30,841	851	29.00	0.00	7.86	50	29	0	704	6,750	0.2	4.8	0	1,199	4.8	677.2
03/14/85	30,899	851	33.00	0.00	7.85	58	33	0	704	6,815	0.2	4.2	0	1,199	4.2	685.5
03/15/85	30,957	851	33.00	0.00	7.85	58	33	0	704	6,880	0.2	4.0	0	1,199	4.0	693.4
03/16/85	31,032	852	42.00	0.00	7.85	75	42	0	704	6,963	0.2	4.2	0	1,199	4.2	701.8
03/17/85	31,082	853	29.00	0.00	7.84	50	29	0	704	7,021	0.2	3.8	0	1,199	3.8	709.3
03/18/85	31,141	853	34.00	0.00	7.84	60	34	0	704	7,088	0.2	4.0	0	1,199	4.0	717.2
03/19/85	31,183	854	25.00	0.00	7.84	42	25	0	704	7,138	0.2	4.2	0	1,199	4.2	725.6
03/20/85	31,266	855	46.00	0.00	7.84	83	46	0	704	7,229	0.2	4.0	0	1,199	4.0	733.5
03/21/85	31,318	856	30.00	0.00	7.84	52	30	0	704	7,289	0.2	3.5	0	1,199	3.5	740.4
03/22/85	31,360	856	25.00	0.00	7.84	42	25	0	704	7,339	0.2	3.8	0	1,199	3.8	748.0
03/23/85	31,402	857	25.00	0.00	7.84	42	25	0	704	7,389	0.2	3.5	0	1,199	3.5	754.9
03/24/85	31,461	857	35.00	0.00	9.81	60	35	0	704	7,458	0.2	3.2	0	1,199	3.2	761.3
03/25/85	31,513	858	34.00	0.00	15.69	52	34	0	704	7,525	0.2	3.2	0	1,199	3.2	767.6
03/26/85	31,539	858	25.00	0.00	23.54	26	25	0	704	7,575	0.2	4.0	0	1,199	4.0	775.5
03/27/85	31,591	859	38.00	0.00	23.53	52	38	0	704	7,650	0.2	4.0	0	1,199	4.0	783.5
03/28/85	31,642	859	31.00	0.00	9.81	52	31	0	704	7,711	0.2	4.0	0	1,199	4.0	791.4
03/29/85	31,698	860	30.00	0.00	3.93	56	30	0	704	7,771	0.0	0.0	0	1,199	0.0	791.4
03/30/85	31,762	861	37.00	0.00	9.84	64	37	0	704	7,844	0.0	0.0	0	1,199	0.0	791.4
03/31/85	31,797	862	21.00	0.00	5.92	36	21	0	704	7,886	0.0	0.0	0	1,199	0.0	791.4

See list of footnotes on following page.

Trinidad Project
Modeling of Stock Water Alternatives
Eastern Colorado Area Office
Bureau of Reclamation
Nov-03

Footnotes to Tables 3, 4, 5

/1	Columns not attributed are calculated.
/2	Stockwater releases are assumed to have been available at the gages below the dam and at Trinidad
/3	Stockwater was stored and then released at greater than 5 cfs rates until the 1993 season.
/4	Consistent with historical practice, stockwatering assumed to be conducted between mid November (11/15) and mid March (3/15).
/5	Stockwater releases made at a rate sufficient with stream gains to make 5 cfs available at the Trinidad gage but not to exceed the previous days inflow.
/6	Stored inflow is not reduced for evaporation losses.
/7	Flow not diverted for stockwater assumed available below diversions. Does not include gains.
/8	Any releases made during the non irrigation season are considered releases for stockwatering.
/9	Total releases from the reservoir for stockwater, when added to gains at the Trinidad gage, not to exceed 1200 acre-feet.
/10	Flow considered available for stockwatering only when releases are being made from reservoir.

Table 6
Trinidad Project
Summary of Stock Water Alternatives Modeling Results
Modeled Stock Water Diversions

	Total Stock Water Diverted*		Total Days of Diversion		Maximum Rate of Diversion		Mean Rate when Diverting		Cummulative Stockwater Released from Storage	
Water Year	Current Stock Water (acre-feet)	Alternative Stock Water (acre-feet)	Current Stock Water (days)	Alternative Stock Water (days)	Current Stock Water (cfs)	Alternative Stock Water (cfs)	Current Stock Water (cfs)	Alternative Stock Water (cfs)	Current Stock Water (acre-feet)	Alternative Stock Water (acre-feet)
1985	1,190	1,199	120	9	5	68	5	67	0	704
1986	1,190	1,199	120	9	5	68	5	67	0	729
1994	1,190	1,199	120	9	5	68	5	67	0	673
1995	1,199	1,200	121	9	5	73	5	67	0	711
1996	1,200	1,199	121	9	5	68	5	67	0	702
1997	1,179	1,199	121	9	5	68	5	67	0	749
1998	1,200	1,200	121	9	5	68	5	67	0	561
1999	1,200	1,197	121	9	5	78	5	67	0	621
2000	1,200	1,197	121	9	5	68	5	67	0	543

* Values less than 1,200 acre-feet are due to rounding error except for 1997 Current Stock Water amount which was limited by the 120 day period of modeling assumed for stock water deliveries.

Table 7
Trinidad Project
Summary of Stock Water Alternatives Modeling Results
Total Non-Irrigation Season Reservoir Evaporation

Water Year	Current Stock Water (acre-feet)	Alternative Stock Water (acre-feet)	Diff btw Current & Alt. (acre-feet)
1985	575	572	3
1986	487	484	3
1994	382	379	3
1995	431	426	5
1996	511	508	3
1997	315	313	2
1998	395	390	5
1999	537	532	5
2000	1,384	1,380	4

Table 8
Trinidad Project
Summary of Stock Water Alternatives Modeling Results
Gains from the Reservoir to the Trinidad Gage Available Below Stock Water Diversions*

	Total Days Available		Maximum Rate Available		Mean Rate when Available **		Total Gains Available Below Stock Water Diversions		
Water Year	Current Stock Water (days)	Alternative Stock Water (days)	Current Stock Water (cfs)	Alternative Stock Water (cfs)	Current Stock Water (cfs)	Alternative Stock Water (cfs)	Current Stock Water (acre-feet)	Alternative Stock Water (acre-feet)	Diff btw Current & Alt. (acre-feet)
1985	32	130	22	27	4	3	261	791	530
1986	26	130	5	10	2	2	149	487	338
1994	31	142	6	6	4	3	248	887	639
1995	33	137	8	13	3	2	186	555	369
1996	33	142	32	32	3	2	221	688	467
1997	33	138	4	9	2	1	153	399	246
1998	50	142	27	27	8	6	757	1,644	887
1999	61	136	21	22	9	6	1,085	1,600	515
2000	34	143	17	20	5	3	340	925	585

* Results presented here are based upon assumed rates and timing of stock watering for the modeling. (See discussion at IV Results in Report)

** While the Mean Rate of available gains under that Alternative Stock Water practice is less, it is available over more days under the Alternative practice and thus results i greater total gains available as indicated in the next set of columns.

APPENDIX B

Scoping Letter and Mailing List

21

United States Department of the Interior

BUREAU OF RECLAMATION
Eastern Colorado Area Office
11056 West County RD 18E
Loveland, Colorado 80537-9711

IN REPLY REFER TO:
EC-1340
PRJ-13.00

JUL 21 2003

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JUL 24 '03

REPLY DATE		
INFO. COPY TO:		
DATE	INITIAL	TO
7/24		
CLASSIFICATION		
PROJECT		
CONTROL NO.		
FOLDER I.D		

To: Interested Agencies and Members of the Public

Subject: Trinidad Dam and Reservoir Project

The Bureau of Reclamation (Reclamation) requests your input regarding a proposal to amend the existing Operating Principles and Operating Criteria for the Trinidad Dam and Reservoir Project (See enclosed map). The proposed changes would:

- Provide for the City of Trinidad's (City) use of a portion of the irrigation capacity for municipal and industrial (M&I) purposes
- Allow the Colorado State Parks to utilize 700 acre-feet (af) of the irrigation capacity to replace evaporation and seepage losses to the recreation pool
- Allow more effective delivery of stock watering during the non-irrigation season by allowing the stock water to be stored temporarily and then released at higher rates than the 5 cubic feet/second (cfs) rate presently allowed

Public input will assist Reclamation in determining environmental issues and a range of alternatives related to the proposed action. This information will be incorporated into an environmental assessment (EA), which will be prepared in accordance with the National Environmental Policy Act of 1969 (NEPA).

Purpose & Need:

The purpose and need for each element of the proposed action is presented below:

- The City has insufficient water to meet their current and future water needs. In an effort to meet their needs, the City has purchased water rights from irrigators that store water in the irrigation capacity at Trinidad Reservoir. However, the current Operating Criteria only allow water stored in the irrigation capacity to be delivered to the irrigable lands in the Purgatoire River Water Conservancy District (District), and not for M&I purposes. Implementing the 1997 Operating Principles through amendment of the Operating Criteria will allow water in the irrigation capacity to be used for M&I purposes would allow the City to address their water supply needs.

- Trinidad Reservoir is subject to a great deal of fluctuation of both the water storage and water surface elevation. This is undesirable for management of the recreation facilities, recreation experience, and for optimizing the health and success of the fishery. Stabilizing water levels and keeping them higher during the recreation season by offsetting losses to the recreation pool would improve recreation experience, recreation access, and the fishery. The current Operating Principles and Operating Criteria do not provide this.

- Currently, the Operating Principles allow daily releases for non-irrigation season stock watering within the District, however the rate of releases cannot exceed 5 cfs. This release rate has proven to be an impractical method for delivering the stock water to stock ponds along the ditches. At the rate of 5 cfs, transit and evaporative losses along the ditches often do not allow water to reach the stock ponds. Allowing stock water to be stored for short periods during the non-irrigation season, and then releasing the water at a higher rate will allow water to reach stock water ponds that under the current rate do not receive water.

Reclamation's execution of the Operating Principles and Operating Criteria is a Federal action that requires compliance with NEPA. Reclamation will be the lead Federal agency. The U.S. Army Corps of Engineers, Albuquerque District, owner and operator of Trinidad Dam and Reservoir Project, will be acting as a cooperating agency. Reclamation anticipates the preparation of an EA to evaluate the environmental consequences of the proposed action and determine whether there is a need to prepare an Environmental Impact Statement. The appropriate environmental documents will support Reclamation's final decision.

Potential Environmental Issues and Concerns:

Reclamation has tentatively identified the following issues or potential resource impacts that could result from the proposed action.

1. Impacts from changes in the hydrology of the Purgatoire River and its tributaries downstream of Trinidad Reservoir, and the Arkansas River between its confluence with the Purgatoire River and John Martin Reservoir.

2. Impacts on federally-listed threatened, endangered, and candidate species.

3. Impacts from the retirement of irrigated farmland from production.

4. Impacts from changes in Trinidad Reservoir storage.

Alternatives:

Reclamation will consider environmental issues identified to develop appropriate mitigation measures and alternatives. Preliminary alternatives that have been developed for initial consideration include:

1. *No Action Alternative*: Reclamation would not execute the proposed amended Operating Principles and Operating Criteria, and would continue to operate under the existing Operating Principles and Operating Criteria.

2. *Proposed Action Alternative*: Reclamation would execute the amended Operating Principles and Operating Criteria to:

   - Allow the City of Trinidad (City) to use of a portion of the irrigation capacity for municipal and industrial (M&I) purposes

   - Allow the Colorado State Parks to utilize 700 acre-feet (af) of the irrigation capacity for the recreation pool, primarily to replace evaporation and seepage losses

   - Allow more effective delivery of stock watering during the non-irrigation season by allowing the stock water to be stored and released at higher rates than the 5 cubic feet/second (cfs) rate presently allowed

Timeframe for Receiving Comments

Again, the purpose of this document is to solicit initial public and agency comments on environmental issues and potential effects that should be considered by Reclamation. If upon review of this information you desire to provide written comments or have any questions, please send your comments by August 11, 2003, to: Bureau of Reclamation, Great Plains Regional Office, Attn: D. Epperly (GP-4200), P.O. Box 36900, Billings, MT 59104 or Fax 406-247-7680.

Sincerely,

Brian Person
Brian Person
Area Manager

Enclosure

NOTICE:
IF YOU DETACH ENCLOSURES, PLEASE INSERT YOUR CODE NUMBER _____

bc: GP-4200 (Doug Epperly)
EC-1003 (Vehmas), EC-1300 (Johns), EC-1340 (Wilson, Sunde)

Appendix B

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Eugene Aiello President **Purgatoire River Water Conservancy District** 314 West Main Street Trinidad	CO	81082	**Work Phone:** **Fax Number:** **Email address:**	719-846-7285 719-846-6941 prwcd@yahoo.com
Ms. Jan Anderson Recording Secretary **Arkansas River Compact Administration** 112 W. Elm Street P.O. Box 1600 Lamar	CO	81052	**Work Phone:** **Fax Number:** **Email address:**	719-336-2732 719-336-3835 seced@seced.net
Ms. Carol Angel Esq. First Ass't. Attorney General Attorney General's Office 1525 Sherman St., 5th Floor Denver	CO	80203	**Work Phone:** **Fax Number:** **Email address:**	303-866-5016 303-866-3558 carol.angel@state.co.us
Mr. Dale Book **Spronk Water Engineers Inc.** 1000 Logan Street Denver	CO	80203-3011	**Work Phone:** **Fax Number:** **Email address:**	303-861-9700 303-861-9799 dbook@spronkwater.com
Mr. David Brenn 1710 Pheasant Court Garden City	KS	67846	**Work Phone:** **Fax Number:** **Email address:**	620-275-7460 620-260-9605 dbrenn@gcnet.com

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Jeris Danielson Ph.D., P.E.
President
Danielson & Associates
517 Belleview Ave — Work Phone: 719-383-2598
Fax Number: 719-384-9528
La Junta CO 81050 — Email address: prwcd@yahoo.com

Mr. John Draper

Montgomery & Andrews
P.O. Box 2307 — Work Phone: 505-982-3873
325 Paseo De Peralta — Fax Number: 505-982-4289
Santa Fe NM 87504-2307 — Email address: jdraper@montand.com

Mr. James Fernandez
Utilities Director
City of Trinidad
135 North Animas — Work Phone: 719-846-2266
Fax Number: 719-846-4140
Trinidad CO 81082 — Email address: linda@historictrinidad.com

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Mr. Dennis Garcia
Reservoir Control
Albuquerque Dist. U.S. Army Corps of Engineers
Albuquerque District — Work Phone: 505-342-3380
4101 Jefferson Plaza, NE — Fax Number: 505-342-3197
Albuquerque NM 87109-3435 — Email address: dennis.e.garcia@usace.army.mil

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Mr. Randy Hayzlett

Route 1, Box 44 — Work Phone: 620-355-7499
Fax Number: 620-355-7499
Lakin KS 67860 — Email address: hayzlett@pld.com

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Jeffrey Kahn Esq.				
Attorney				
Bernard, Lyons & Gaddis, PC				
515 Kimbark Street			**Work Phone:**	303-776-9900
P.O. Box 978			**Fax Number:**	303-413-1003
Longmont	CO	80502-0978	**Email address:**	jkahn@blglaw.com
Mr. Dick Kreiner				
Reservoir Control				
U.S. Army Corps of Engineers				
Albuquerque District			**Work Phone:**	505-342-3383
4101 Jefferson Plaza, NE			**Fax Number:**	505-342-3195
Albuquerque	NM	87109	**Email address:**	richard.d.kreiner@usace.army.mil
Mr Bruce Kroeker P.E.				
President				
TZA Water Engineers, Inc.				
9200 W. Cross Drive Suite 250			**Work Phone:**	303-971-0030
			Fax Number:	303-971-0077
Littleton	CO	80123	**Email address:**	bkroeker@tza4water.com
Mr. Rod Kuharich				
Director				
Colorado Water Conservation Board				
721 State Centennial Building			**Work Phone:**	303-866-3441
1313 Sherman Street			**Fax Number:**	303-866-4474
Denver	CO	80203	**Email address:**	rod.kuharich@state.co.us
Mr. John Lefferdink Esq.				
Attorney at Law				
Lefferdink Law Office, LLC				
409 South Main			**Work Phone:**	719-336-7411
P.O. Box 110			**Fax Number:**	719-336-7621
Lamar	CO	81052	**Email address:**	lefflaw@centurytel.net

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mrs. Thelma Lujan
Secretary
Purgatoire River Water Conservancy District
314 West Main Street — **Work Phone:** 719-846-7285
Fax Number: 719-846-6941
Trinidad CO 81082 **Email address:** prwcd@yahoo.com

Mr. Steve Miller

Colorado Water Conservation Board
Work Phone: 303-866-3532
1313 Sherman Street Room 721 **Fax Number:** 303-866-4474
Denver CO 80203-2239 **Email address:** steve.miller@state.co.us

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Mr. Donald Pitts
Assistant Attorney General
Office of the Attorney General
Kansas Judicial Center, 2nd Floor **Work Phone:** 785-296-2215
301 SW 10th Street **Fax Number:** 785-296-6296
Topeka KS 66612-1597 **Email address:** pittsd@01po.wpo.state.ks.us

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Mr. Thomas Pointon

34805 Road 17 **Work Phone:** 719-456-0413
Fax Number: 719-456-1609
Las Animas CO 81054 **Email address:** tomw7@centurytel.net

Mr. David Pope P.E.
Chief Engineer-Director
Kansas Department of Agriculture
Division of Water Resources **Work Phone:** 785-296-3717
109 S.W. 9th Street, 2nd Floor **Fax Number:** 785-296-1176
Topeka KS 66612-1283 **Email address:** dpope@kda.state.ks.us

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Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Kevin Pratt Attorney				
480 Holly Sugar Bldg 2 N Cascade Ave Colorado Springs	CO	80903-1623	Work Phone: Fax Number: Email address:	
Mr. James Rogers				
32259 County Road 13 (Route 2) Lamar	CO	81052	Work Phone: Fax Number: Email address:	719-336-2124 719-336-2422 rogerscountry@cmlnet.net
Mr. Lee Rolfs Attorney **Kansas Department of Agriculture** Kansas Division of Water Resources 109 SW 9th Street, 4th Floor Topeka	KS	66612	Work Phone: Fax Number: Email address:	785-296-4616 785-368-6668 lrolfs@kda.state.ks.us
Mr. Mark Rude Assistant Operations Secretary **Water Commissioner, Garden City Field Office** Division of Water Resources 2508 Johns Street Garden City	KS	67846	Work Phone: Fax Number: Email address:	620-276-2901 620-276-9315 mrude@kda.state.ks.us
Mr. Hal Simpson State Engineer **CO Division of Water Resources** 818 State Centennial Bldg 1313 Sherman Street Denver	CO	80203-2277	Work Phone: Fax Number: Email address:	303-866-3581 303-866-3589 hal.simpson@state.co.us

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Tom Simpson				
City of Aurora				
Water Resources Department			**Work Phone:**	719-254-7984
17850 Road JJ			**Fax Number:**	719-254-7986
Rocky Ford	CO	81067	**Email address:**	tsimpson@rural-com.com
Ms. Beverly Spady				
Spady Consulting				
420 Vigil St.			**Work Phone:**	719-456-1899
			Fax Number:	719-456-1899
Las Animas	CO	81054	**Email address:**	b_spady@yahoo.com
Mr. Mark Stark				
Operations Manager				
U.S. Army Corps of Engineers				
John Martin Reservoir			**Work Phone:**	719-336-3476
29955 County Road 25.75			**Fax Number:**	719-336-9711
Hasty	CO	81044	**Email address:**	mark.m.stark@usace.army.mil
Mr. Donald Steerman Esq.				
Attorney at Law				
Shinn, Steerman & Shinn				
P.O. Box 390			**Work Phone:**	719-336-4313
			Fax Number:	719-336-4315
Lamar	CO	81052	**Email address:**	shinnsteermanlaw@centurytel.net
Mr. Tom Tefertiller				
Oxley Farms				
			Work Phone:	
			Fax Number:	
Model	CO	81059	**Email address:**	

Trinidad Operating Principles Interested Parties List

Revised: 27-Sep-04

Mr. Tom Tifertill				
Model Land Irrigation Company				
P.O. Box 57			**Work Phone:**	719-846-6745
			Fax Number:	
Model	CO	81059	**Email address:**	oxleymgr@hotmail.com
Mr. Robert Trout Esq.				
Trout and Witmer and Freeman , P.C.				
1120 Lincoln Street Suite 1600			**Work Phone:**	303-861-1963
			Fax Number:	303-832-4465
Denver	CO	80203	**Email address:**	rtrout@troutlaw.com
Mr. Steven Witte				
Operations Secretary,Division 2 Engineer				
Colorado Division of Water Resources				
310 East Abriendo, Suite B			**Work Phone:**	719-542-3368
			Fax Number:	719-544-0800
Pueblo	CO	81004	**Email address:**	steve.witte@state.co.us
Ms. Julianne Woldridge Esq.				
MacDougall Law Office				
530 Communications Circle Suite 204			**Work Phone:**	719-520-9288
			Fax Number:	719-520-9447
Colorado Springs	CO	80905	**Email address:**	jwoldridge@waterlaw.tv

APPENDIX C

Comment Letters

13

KANSAS

DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

August 11, 2003
VIA FAX

Attn: D. Epperly (GP-4200)
Great Plains Regional Office
Bureau of Reclamation
PO Box 36900
Billings, MT 59104

RE: Trinidad Dam and Reservoir Project
NEPA Notice dated July 21, 2003

Dear Mr. Epperly:

The State of Kansas has been, and will continue to be, actively involved in the three issues listed in this notice. Kansas is a signatory to the Trinidad Operating Principles (referred to as *Principles*).

The Principles were amended to allow the City of Trinidad to transfer water from irrigation to municipal and industrial (M&I) use. The State of Kansas agreed to this transfer with the understanding that consumptive use would not be increased over the historical use made of this water. Kansas has expressed concerns that at least one tract of dry-up land did not appear to have been irrigated in many years. Appropriate lands should be dried up and associated return flows protected to their historic point of return on the Purgatoire River so the transfer has no significant effect on downstream water users.

The proposal to convert additional irrigation water supply to make up for evaporation and seepage from the permanent fishery pool must be done in a way which does not impact downstream water supply by limiting use under the transfer to the historic consumptive use. The State of Kansas had the opportunity to review the lands proposed for dry-up. Kansas expressed concerns to a representative of the Model Land & Irrigation Company about two of these proposed dry-up tracts. The Model Land and Irrigation Company should substitute other tracts. Return flows associated with this transfer should be protected to their historic point of return on the Purgatoire River so that downstream users are not affected.

Division of Water Resources David L. Pope, Chief Engineer
109 SW 9th ST., 2nd Floor Topeka, KS 66612-1283
Voice (785) 296-3717 Fax (785) 296-1176 http://www.accesskansas.org/kda

If an alternative is identified which provides for more efficient deliveries of stockwater, this must be done without increasing depletions. This issue was considered at the CY2002 Arkansas River Compact Administration Annual Meeting in May 2003. A proposal made during the meeting by the Purgatoire District varied significantly from previous proposals related to stockwater deliveries. At that time, there was not sufficient time for the other parties to compare the proposal to either the current or the temporary stockwater amendments. Any depletions due to an alternative stockwater release should be compared to the depletions under the stockwater release as prescribed by the Principles. Under the current Principles, inflow may be passed through for stockwatering (not to exceed a daily mean flow of 5 cfs), otherwise inflows are stored under the transferred Model storage right. If temporary stockwater storage were allowed, it should be done within the Model storage right. The combined storage for all uses of the Model storage right should be limited to 20,000 acre feet.

The transfer of water to Colorado State Parks for evaporation and seepage, and changes to stockwater operations must not be implemented until such time as the amendments to the Principles are approved by the signatory parties.

We appreciate the opportunity to be able to comment in the NEPA process. We would like to continue to be involved. Should you have any questions, please feel free to call this office.

Sincerely,

David L. Pope, P.E.
Chief Engineer

DLP/kls/dlm

c: Brian Person, USBR
Randy Hayzlett, KS ARCA Rep
David Brenn, KS ARCA Rep

14

MacDOUGALL, WOLDRIDGE & WORLEY, P.C.
530 Communication Circle, #204
Colorado Springs, CO 80905-1743

M.E. MacDougall
Julianne M. Woldridge
Henry D. Worley

jwoldridge@waterlaw.tv

August 11, 2003

Bureau of Reclamation
Great Plains Regional Office
Attn: D. Epperly (GP-4200)
P.O. Box 26900
Billings, MT 59104

Re: Trinidad Dam and Reservoir Project

To Whom It May Concern:

This office represents the Purgatoire River Water Conservancy District, a water conservancy district formed under the laws of the State of Colorado ("PRWCD"). PRWCD operates the irrigation portion of the Trinidad Dam and Reservoir Project, pursuant to a contract with the United States. On behalf of PRWCD, I am providing the following comments on the proposals to amend the existing Operating Principles and Operating Criteria for the Project:

1. The proposed amendments to the operation of the Irrigation Capacity of the Reservoir do not involve any physical change to the reservoir itself. The physical capacity of the reservoir will not be altered, and no physical work or construction on site will be necessary to implement the amendments. The amendments for the City of Trinidad and the State Parks involve changes in the types of uses for water that has always been part of the District's Water Supply, as defined by the initial Operating Principles. As such, the only operating changes will be administrative. There is no increase in the amount of water to be stored, or used, only a change in type of use. The amendment regarding stock water will involve storage of additional small amounts of water, but it is water that historically has passed through the Project anyway, and that can be stored in currently available capacity within the reservoir.

2. The amendments may cause a difference in timing as to when such water will be released for use, but releases from the reservoir for the new uses or for stock watering do not require a change in the time of year during which PRWCD is currently allowed to administer such Water Supplies, as defined by the initial Operating Principles.

3. The City of Trinidad and State Parks amendments have or will be allowed

only pursuant to a change of water rights approved by the Colorado Water Court. As part of this process, the historic consumptive use of the subject water has or will be determined and future use of the water will be limited to that historic consumptive use. Thus, to a great extent, the affect on the hydrology of these rivers has or will be determined in the Water Court process. This process is designed to prevent expanded consumptive use of the water and to prevent adverse affects on the water right administration on the Purgatoire River or the Arkansas River, or on other water rights. The Water Court process, however, does not involve issues of environmental impacts.

4. The amendment regarding stock water does not require a Water Court change of water rights. The water will continue to enter the Project at the same time and in the same amount as it has historically, and will pass through Project facilities within the same time period as it has historically. The total amount of such water passing through the Project will not change. Thus, there should be no measurable affect on the hydrology or environment of the river below the Project.

5. PRWCD does not believe there will be any adverse impacts from changes in Trinidad Reservoir storage. As noted above, there is no change in the total amount of water available to the Irrigation Capacity and managed by the District as a result of any of these amendments; the only change is in how such water is used and in the timing of the use. The additional water that may be stored as a result of the stock water amendment is minimal, can be stored within existing physical capacity, and should have no measurable affect on the operations of the Project or its effects on the environment. In fact, the amendments regarding the City of Trinidad have been implemented for several years now with no noticeable adverse impact on the environment or the Project operations.

PRWCD recommends that the Bureau adopt Proposed Action Alternative number 2, approving the changes to the Operating Principles and Operating Criteria. PRWCD is willing to provide copies of any documentation that may be helpful in this effort. Please contact the District if you desire any such documentation.

Sincerely,

Julianne M. Woldridge
for the firm

JMW
cc: PRWCD
Robert Trout
Jeff Kahn

2954-2L j:\PRWCD\8-11-03 Bureau

15

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RECEIVED

AUG 14 '03

STATE OF COLORADO

WATER DIVISION 2
OFFICE OF THE STATE ENGINEER
310 East Abriendo Ave., Suite B
Pueblo, CO 81004
Phone (719) 542-3368
FAX (719) 544-0800

DATE	INSTRUCTIONS	TO
8/14		

Bill Owens
Governor
Executive Director
Hal Simpson
State Engineer
Steven J. Witte, P.E.
Division Engineer

August 5, 2003

Bureau of Reclamation
Great Plains Regional Office
P.O. Box 36900
Billings, MT 59104

Attn: D. Epperly (GP-4200)

RE: Trinidad Dam and Reservoir Project
Environmental Assessment Comments

To Whom It May Concer:

In response to your request for initial public and agency comments on the above referenced project, the Colorado Division of Water Resources, Division 2 office offers the following:

1. City of Trinidad's use of a portion of the irrigation capacity for M&I purposes.

   The requested change in the Operating Criteria is consistent with the 1997 Amended Operating Principals – Article IV(B)(3) and the decree entered in Case No. 88CW061.

2. Colorado State Parks use of 700 acre-feet of irrigation capacity.

   As noted, the requested change requires amendment of the Operating Principles and Operating Criteria. Additionally, water court approval to change the irrigation water right to a fully consumable use without injuring Colorado water rights is required.

3. Delivery of stock water during the non-irrigation season.

   As noted, the requested change requires amendment of the Operating Principles. During the non-irrigation season, all inflows are stored in the reservoir except for M&I purposes, winter return flow requirements and stock water needs. The ability to temporarily store stock water allowances for subsequent release at a higher rate of flow (to be determined and with volumetric limits) will benefit the project with negligible effects downstream.

Thank you for the opportunity to provide initial comments. Please keep us advised as the process develops.

Sincerely,

Steven J. Witte
Division Engineer

APPENDIX D

Endangered Species Act Consultation

United States Department of the Interior

BUREAU OF RECLAMATION
Eastern Colorado Area Office
11056 West County RD 18E
Loveland, Colorado 80537-9711

IN REPLY
REFER TO:
GP-4200
ENV-7.00

JUN 19 2003

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JUN 23 03

REPLY DATE		
INFO. COPY TO:		
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7/24		
CLASSIFICATION		
CONTROL NO.		
FOLDER I.D.		

MEMORANDUM

To: Supervisor, U.S. Fish and Wildlife Service, Ecological Services, Colorado Field Office, Lakewood, Colorado

Brian Person

From: Brian Person,
Area Manager

Subject: Federally-Listed Threatened and Endangered Species Associated with Trinidad Reservoir and Purgatoire River, Colorado

The Bureau of Reclamation is evaluating the environmental consequences of proposed changes to the Operating Principles and Operating Criteria for the Trinidad Dam and Reservoir Project. The changes would allow the City of Trinidad to use a portion of the irrigation pool for municipal and industrial purposes; allow the State of Colorado to use a portion of the irrigation pool for the reservoir recreation/fishery pool; and allow for more efficient stock watering downstream of the reservoir.

Trinidad Reservoir was constructed in 1976 by the Corps of Engineers as a joint water resource project with Reclamation and is authorized for flood control, irrigation, sediment retention, and recreation. Reclamation administers a water supply contract with the Purgatoire River Water Conservancy District.

The action area associated with the proposed action includes Trinidad Reservoir, surrounding Project lands, the Purgatoire River downstream of the reservoir to its confluence with the Arkansas River, and the Arkansas River from its confluence with the Purgatoire River to John Martin Reservoir. In addition, the action area includes that area of Las Animas County below elevation 6,000 feet mean sea level bounded by U.S. Highway 160 on the south, the Purgatoire River on the east, the drainage divide between the Purgatoire River and the Apishapa River on the north, and Interstate 25 on the west. A map is attached that highlights these boundaries.

Reclamation has determined that the following listed, proposed, and candidate species may be present in the action area and, following your written concurrence, intend to consider and evaluate potential effects on these species in a biological assessment.

Threatened or Endangered Species

Bald eagle (*Haliaeetus luecocephalus*)
Piping plover (*Charadrius melodis*)
Interior least tern (*Sterna antillarum*)
Eskimo curlew (*Numenius borealis*)
Black-footed ferret (*Mustela nigripes*)

Proposed Species

Mountain plover (*Charadrius montanus*)

Candidate Species

Arkansas darter (*Etheostoma cragini*)
Black-tailed prairie dog (*Cynomys ludovicianus*)
Lesser prairie-chicken (*Tympanuchus pallidicinctus*)

In addition to requesting written concurrence with this list of species, Reclamation is requesting all information available to the U.S. Fish and Wildlife Service, or references thereto, that would facilitate our evaluation of the potential effects the proposed action may have on these species. We would especially appreciate all available information concerning habitat requirements, current distribution, status of the species, and recent sightings.

We appreciate your cooperation. Should you have questions concerning this request, you may contact Gary Davis at 406-247-7717.

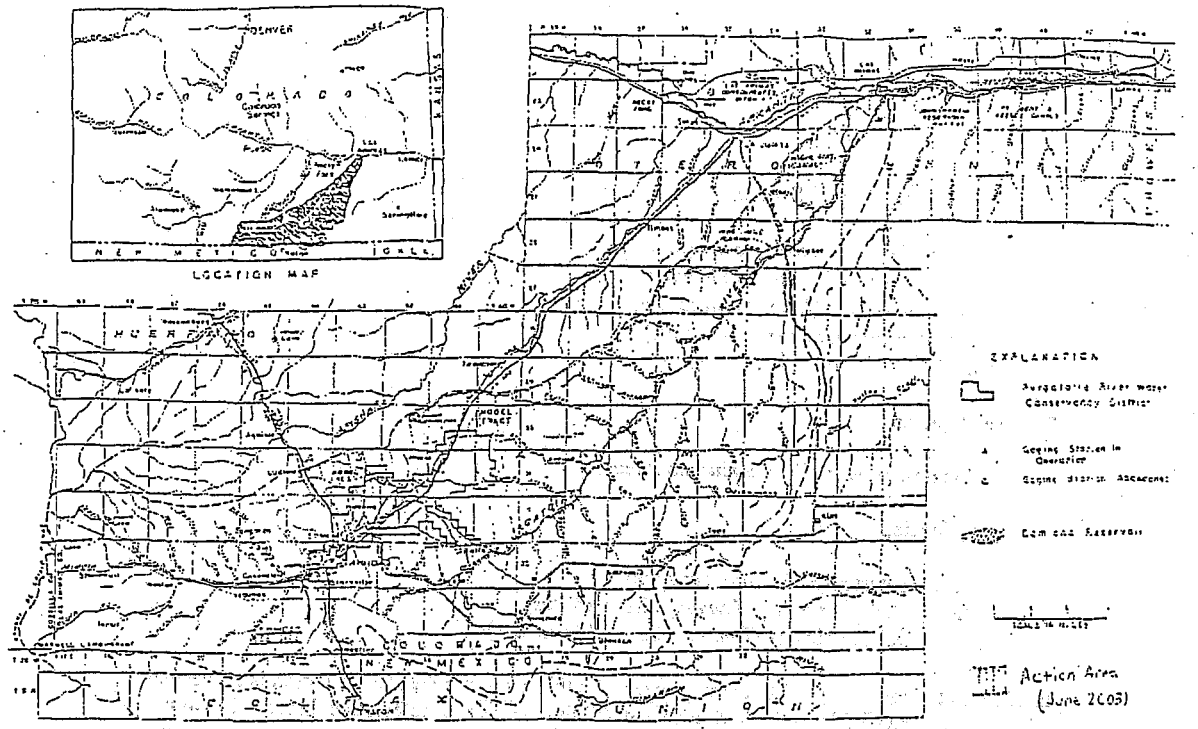
Attachment -1

bc: GP-4200 (Epperly, Davis) (w/attachment)

EC-1003 (Vehmas), EC-1300 (Johns), EC-1340 (Wilson, Sunde) w/attachment

NOTICE:
IF YOU DETACH ENCLOSURES, PLEASE
INSERT YOUR CODE NUMBER _____

Attachment


DENVER
COLORADO
KANSAS
NEW MEXICO
LOCATION MAP
HUERFANO
COLORADO
NEW MEXICO
EXPLANATION
Action Area
(June 2003)

12

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
755 Parfet Street, Suite 361
Lakewood, Colorado 80215

OFFICIAL FILE COPY
AUG 0-1 2003
(+ULY) 1340
Sym: 1000, 1003, 1005, 1340 (000)
1300 (SUNDE, WILSON)

IN REPLY REFER TO:
ES/CO/LK: T&E/SP List
Mail Stop 65412

JUL 3 1 2003

MEMORANDUM

To: Brian Person
Area Manager, Bureau of Reclamation, Eastern Colorado Area Office
Loveland, Colorado

From: Susan C. Linner
Colorado Field Supervisor, U.S. Fish and Wildlife Service
Lakewood, Colorado

Subject: Federally Listed Threatened and Endangered Species Associated with Trinidad Reservoir and Purgatoire River, Colorado

The U.S. Fish and Wildlife Service (Service) received your June 19, 2003 memorandum on June 23, 2003 regarding the proposed changes to the Operating Principles and Operating Criteria for the Trinidad Dam and Reservoir Project. These comments have been prepared under the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

The Service concurs with the list of species you have prepared. Please note, however, that the Eskimo curlew (*Numenius borealis*) has been removed from the list of special status species in Colorado, and will therefore not need to be addressed. For your convenience, I am enclosing a copy of the most recent species list, by county, for Colorado.

The Service would be concerned if the proposed action results is a depletion in the amount of water that is currently permitted to flow through the Purgatoire River Basin and/or affects John Martin Reservoir where nesting bald eagles (*Haliaeetus leucocephalus*), least terns (*Sterna antillarum*) and piping plover (*Charadrius melodus*) are known to be. Many of the species on your list depend directly on the river for their migration, breeding and feeding behavior. A disruption of these activities may adversely affect the species as defined in the Endangered Species Act.

Below is a very brief description of the habitat types of the species of concern. It is highly recommended that a more in-depth habitat analysis be accomplished before any conclusions are drawn. Among other places, this information can be found on various web sites (i.e. www.natureserveexplorer.org), the Colorado Breeding Bird Atlas (Published by the Colorado Division of Wildlife), and speaking with species experts from the Colorado Division of Wildlife.

Bald Eagle - Those pairs of bald eagles that breed in Colorado use large, mature cottonwoods or pines to hold their heavy nests (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.). Most of the time, they are found on or near large bodies of water that will provide foraging opportunities. Bald eagles feed on fish, waterfowl and carrion and prefer areas that are not heavily impacted by human disturbance.

Official File Copy
Subject ENV.400
Project TRINIDAD
Folder I.D. 196458
Contrs No. 3-FTH-252

8/1/03 ok

Piping plover- Piping plovers nest on sandy beaches, preferably on islands, but water level fluctuations from year to year force movement between sites. In wet years, when water covers island beaches, they have nested on gravel bars or sandstone benches between bands of cliffs (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.).

Interior least tern- The least tern nest in locations similar to the piping plover, but has shown a very high affinity to sites on islands.

Mountain plover - Mountain plovers are found primarily in the arid grasslands of the Great Plains, where grass grows no taller that 3 inches tall (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.). Nesting plovers choose shortgrass prairie grazed by prairie dogs, bison or cattle, overgrazed tallgrass of fallow fields (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.).

L. Prairie Chicken - Optimal habitat consists of midgrass to tallgrass prairies for nest and winter cover. The forb and shrub component of this rangelands provide foraging substrate (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.). Grasshoppers and insects provide the primary food source during the summer, whereas winter food consists largely of plant materials such as seeds and grain (Colorado Breeding Bird Atlas. 1998. H.E. Kinglery, Ed.).

Arkansas Darter - Preferred habitat: spring-fed creeks with cool, clear water and herbaceous aquatic vegetation. growths of watercress or other aquatic plants. Often in pools with sand, fine gravel, or organic detritus substrate. Eggs are laid in gravel bottoms (www.natureserveexplorer.org).

Black-tailed pr. dog - Black-tailed prairie dogs typically inhabit short-grass prairies; they usually avoid areas of heavy brush and tall grass, possibly because visibility is considerably reduced. Their food is chiefly plant materials, particularly low-growing weeds and grasses (The Mammals of Texas - Online, www.nsrl.ttu.edu).

Black-footed ferret - Ferrets utilize the same short-grass prairie habitats that the prairie dogs do. The prairie dogs are their primary food source.

Thank you the opportunity to comment on your project. If the Service can be of further assistance, please contact Jeff Peterson at (303) 275-2370.

Encl: Species List

Susan C. Linn

U. S. Fish and Wildlife Service
Ecological Services
Colorado Field Office

(Effective July 10, 2003)

FEDERALLY LISTED AND CANDIDATE SPECIES & THEIR STATUS IN COLORADO
1

COUNTIES	ADAMS	ALAMOSA	ARAPAHOE	ARCHULETA	BACA	BENT	BOULDER	BROOMFIELD	CHAFFEE	CHEYENNE	CLEAR CREEK	CONEJOS	COSTILLA	CROWLEY	CUSTER	DELTA	DENVER
Bald eagle, *Haliaeetus leucocephalus*, Listed Threatened	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gunnison sage-grouse, *Centrocercus minimus*, Candidate for Listing		✓		✓					✓			✓	✓			✓	
Least tern (interior population), *Sterna antillarum*, Listed Endangered	•		•			✓	•	•			•			✓			•
Lesser prairie chicken, *Tympanuchus pallidicinctus*, Candidate for Listing					✓	✓				✓				✓			
Mexican spotted owl, *Strix occidentalis lucida*, Listed Threatened	✓	✓	✓	✓			✓		✓		✓	✓	✓		✓		
Mountain plover, *Charadrius montanus*, Proposed Threatened	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓	✓			
Piping plover, *Charadrius melodus*, Listed Threatened					✓	✓											
Southwestern willow flycatcher, *Empidonax traillii extimus*, Listed Endangered		✓		✓								✓	✓				
Whooping crane, *Grus americana*, Listed Endangered	•		•				•	•			•						•
Yellow-billed cuckoo, *Coccyzus americanus*, Candidate for Listing		✓		✓								✓	✓			✓	
Black-footed ferret, *Mustela nigripes*, Listed Endangered	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓		✓	
Black-tailed prairie dog, *Cynomys ludovicianus*, Candidate for Listing	✓		✓		✓	✓	✓	✓		✓				✓			✓
Canada lynx, *Lynx canadensis*, Listed Threatened		✓		✓			✓		✓		✓	✓	✓		✓	✓	
Preble's meadow jumping mouse, *Zapus hudsonius preblei*, Listed Threatened	✓		✓				✓	✓									✓
Boreal toad, *Bufo boreas boreas*, Candidate for Listing				✓			✓		✓		✓	✓				✓	

U. S. Fish and Wildlife Service
Ecological Services
Colorado Field Office

(Effective July 10, 2003)

FEDERALLY LISTED AND CANDIDATE SPECIES & THEIR STATUS IN COLORADO

COUNTIES →	DOLORES	DOUGLAS	EAGLE	ELBERT	EL PASO	FREMONT	GARFIELD	GILPIN	GRAND	GUNNISON	HINSDALE	HUERFANO	JACKSON	JEFFERSON	KIOWA	KIT CARSON
ald eagle, *Haliaeetus leucocephalus*, Listed Threatened	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
unnison sage-grouse, *Centrocercus minimus*, Candidate for Listing	✓		✓				✓			✓						
east tern (interior population), *Sterna antillarum*, Listed Endangered		•		•	•			•					•	•	✓	
esser prairie chicken, *Tympanuchus pallidicinctus*, Candidate for List															✓	
lexican spotted owl, *Strix occidentalis lucida*, Listed Threatened	✓	✓			✓	✓	✓	✓				✓		✓		
lountain plover, *Charadrius montanus*, Proposed Threatened		✓		✓	✓	✓						✓	✓		✓	✓
iping plover, *Charadrius melodus*, Listed Threatened															✓	✓
outhwestern willow flycatcher, *Empidonax traillii extimus*, Listed Endangered	✓										✓					
Whooping crane, *Grus americana*, Listed Endangered		•		•	•			•					•	•		
'ellow-billed cuckoo, *Coccyzus americanus*, Candidate for Listing	✓		✓				✓		✓	✓	✓					
Black-footed ferret, *Mustela nigripes*, Listed Endangered	✓	✓	✓	✓	✓	✓									✓	✓
Black-tailed prairie dog, *Cynomys ludovicianus*, Candidate for Listing	✓	✓		✓	✓	✓						✓		✓	✓	✓
Canada lynx, *Lynx canadensis*, Threatened	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		
Preble's meadow jumping mouse, *Zapus hudsonius preblei*, Listed Threatened		✓		✓	✓									✓		
Arkansas darter, *Etheostoma cragini*, Candidate for Listing				✓	✓	✓						✓			✓	
Bonytail, *Gila elegans*, (presumed-historical) Listed Endangered	•		•				✓		•	•	•					
Colorado pikeminnow, *Ptychocheilus lucius*, Listed Endangered	•		•				•		•	•	•					
Greenback cutthroat trout, *Oncorhynchus clarki stomias*, Listed Threatened		✓			✓							✓				
Humpback Chub, *Gila cypha*, Listed Endangered	•		•				✓		•	•	•					

U. S. Fish and Wildlife Service
Ecological Services
Colorado Field Office

(Effective July 10, 2003)

FEDERALLY LISTED AND CANDIDATE SPECIES & THEIR STATUS IN COLORADO

COUNTIES →	LAKE	LA PLATA	LARIMER	LAS ANIMAS	LINCOLN	LOGAN	MESA	MINERAL	MOFFAT	MONTEZUMA	MONTROSE	MORGAN	OTERO	OURAY	PARK	PHILLIPS
ld eagle, *Haliaeetus leucocephalus*, Listed Threatened	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
innison sage-grouse, *Centrocercus minimus*, Candidate for Listing		✓					✓			✓	✓			✓		
ast tern (interior population), *Sterna antillarum*, Listed Endangered			•		•	•						✓	✓		•	
sser prairie chicken, *Tympanuchus pallidicinctus*, Candidate for Listing					✓											
lexican spotted owl, *Strix occidentalis lucida*, Listed Threatened		✓	✓	✓					✓	✓	✓				✓	
lountain plover, *Charadrius montanus*, Proposed Threatened			✓	✓	✓	✓			✓			✓	✓		✓	
ipping plover, *Charadrius melodus*, Listed Threatened				✓								✓				
outhwestern willow flycatcher, *Empidonax traillii extimus*, Listed Endangered		✓						✓		✓						
ellow-billed cuckoo, *Coccyzus americanus*, Candidate for Listing		✓					✓	✓	✓	✓	✓			✓		
Whooping crane, *Grus americana*, Listed Endangered			•		•	•						•			•	
lack-footed ferret, *Mustela nigripes*, Listed Endangered		✓	✓	✓	✓				✓	✓	✓	✓	✓			
lack-tailed prairie dog, *Cynomys ludovicianus*, Candidate for Listing			✓	✓	✓	✓						✓	✓			✓
anada lynx, *Lynx canadensis*, Listed Threatened	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓	✓	
reble's meadow jumping mouse, *Zapus hudsonius preblei*, Listed Threatened			✓									✓				
rkansas darter, *Etheostoma cragini*, Candidate for Listing				✓	✓								✓			
onytail, *Gila elegans*, (presumed historical) Listed Endangered							●		●		•			•		
olorado pikeminnow, *Ptychocheilus lucius*, Listed Endangered		•					●	•	●	•	•			•		
Greenback cutthroat trout, *Oncorhynchus clarki stomias*, Listed Threatened	✓		✓												✓	
Humpback chub, *Gila cypha*, Listed Endangered							●		●		•			•		

U. S. Fish and Wildlife Service
Ecological Services
Colorado Field Office

(Effective July 10, 2003)

FEDERALLY LISTED AND CANDIDATE SPECIES & THEIR STATUS IN COLORADO

COUNTIES -	PITKIN	PROWERS	PUEBLO	RIO BLANCO	RIO GRANDE	ROUTT	SAOUACHE	SAN JUAN	SAN MIGUEL	SEDGWICK	SUMMIT	TELLER	WASHINGTON	WELD	YUMA
ald eagle, *Haliaeetus leucocephalus*, Listed Threatened	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
unnison sage-grouse, *Centrocercus minimus*, Candidate for Listing	✓				✓		✓		✓						
east tern (interior population), *Sterna antillarum*, Listed Endangered		✓								✓		•	✓	✓	
esser prairie chicken, *Tympanuchus pallidicinctus*, Candidate for Listing		✓													
lexican spotted owl, *Strix occidentalis lucida*, Listed Threatened	✓		✓		✓		✓		✓		✓	✓		✓	
ountain plover, *Charadrius montanus*, Proposed Threatened		✓	✓	✓	✓		✓						✓	✓	✓
piping plover, *Charadrius melodus*, Listed Threatened		✓								✓			✓	✓	
outhwestern willow flycatcher, *Empidonax traillii extimus*, Listed Endangered					✓		✓	✓	✓						
Whooping crane, *Grus americana*, Listed Endangered										•		•	•	•	
ellow-billed cuckoo, *Coccyzus americanus*, Candidate for Listing	✓			✓	✓	✓	✓	✓	✓		✓				
Black-footed ferret, *Mustela nigripes*, Listed Endangered		✓	✓	✓			✓		✓				✓	✓	
Black-tailed prairie dog, *Cynomys ludovicianus*, Candidate for Listing		✓	✓							✓		✓	✓	✓	✓
Canada lynx, *Lynx canadensis*, Listed Threatened	✓		✓	✓	✓	✓	✓	✓	✓		✓				
Preble's meadow jumping mouse, *Zapus hudsonius preblei*, Listed Threatened														✓	
Pawnee montane skipper, *Hesperia leonardus montana*, Listed Threatened												✓			
Uncompahgre fritillary butterfly, *Boloria acrocnema*, Listed Endangered	✓				✓		✓	✓	✓		✓				
Arkansas darter, *Etheostoma cragini*, Candidate for Listing		✓	✓												
Bonytail, *Gila elegans*, (presumed-historical) Listed Endangered	•			•		•	•		•		•				
Colorado pikeminnow, *Ptychocheilus lucius*, Listed Endangered	•			•	•	•	•	•	•		•				

TABLE TERMINOLOGY

✓	The check mark indicates that the species is present in that county or that the county is within the historical range of the species
*	Water depletions in these counties may affect these species
●	This sign means that the species is present in the county and there is designated critical habitat for the species within the county
Candidate	Means there is sufficient information indicating that formal listing under the ESA may be appropriate
Proposed	Means the species is proposed for possible addition to the Lists of Endangered and Threatened Wildlife and Plants under the ESA
Endangered	Means the species could become extinct
Threatened	Means the species could become endangered

United States Department of the Interior

BUREAU OF RECLAMATION
Eastern Colorado Area Office
11056 West County RD 18E
Loveland, Colorado 80537-9711

JAN 23 2004

IN REPLY
REFER TO:

EC-1340
ENV-4.00

EXTRA COPY

To	Initial	Date
4200	DE	2/2

MEMORANDUM

To: Supervisor, U.S. Fish and Wildlife Service
Ecological Services, Colorado Field Office
Attn: Ms. Susan Linner

From: Brian Person **Brian Person**
Area Manager

Subject: Biological Assessment (BA) for Amending the Existing Operating Principles and/or Operating Criteria at Trinidad Dam and Reservoir, Colorado

The Bureau of Reclamation is proposing to amend the existing Operating Principles and/or Operating Criteria at Trinidad Dam and Reservoir in Las Animas County, Colorado. The proposed amendments would (1) allow the City of Trinidad to use a portion of the irrigation capacity for municipal and industrial purposes; (2) allow the Colorado Division of Parks and Outdoor Recreation to permanently commit 700 acre-feet of the irrigation capacity to the recreation pool to replace evaporation and seepage losses; and (3) allow for more efficient delivery of stock water within the Purgatoire River Water Conservancy District during the non-irrigation season by permitting stock water to be released at rates greater than the five cubic feet per second that is currently permitted.

A more detailed description of the proposed amendments and their effect on listed species is included in the attached BA. Based on our evaluation, we have determined that the proposed federal action is likely to have beneficial effects on the bald eagle. Accordingly, we are requesting written concurrence that the proposed federal action is not likely to adversely affect the bald eagle.

We would appreciate your expeditious response to this request. Should you have questions or wish to discuss the BA in more detail, you can contact Gary Davis at 406-247-7717 or Paula Sunde at 970-962-4367.

Attachment

cc: Dennis Garcia
Army Corps of Engineers
41010Jefferson Plaza, NE
Albuquerque, New Mexico 87109-3435
(w/att)

bc: GP-4200 (Davis, Epperly)(w/att)
EC-1003 (Vehmas), EC-1300 (Johns) (w/att)

NOTICE:
IF YOU DETACH ENCLOSURES, PLEASE
INSERT YOUR CODE NUMBER _____

BIOLOGICAL ASSESSMENT

AMENDMENT OF OPERATING PRINCIPLES AND/OR OPERATING CRITERIA AT TRINIDAD RESERVOIR

PURGATOIRE RIVER
LAS ANIMAS COUNTY
COLORADO

DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GREAT PLAINS REGION
Eastern Colorado Area Office

January 21, 2004

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PROPOSED ACTION

The Bureau of Reclamation (Reclamation) is proposing to approve amendments to the existing Operating Principles and/or Operating Criteria at Trinidad Dam and Reservoir. The proposed amendments would (1) allow the City of Trinidad (Trinidad) to use a portion of the irrigation capacity for municipal and industrial (M&I) purposes; (2) allow the Colorado Division of Parks and Outdoor Recreation (State) to permanently commit 700 acre-feet (af) of the irrigation capacity to the recreation pool to replace evaporation and seepage losses; and (3) more efficiently deliver stock water within the Purgatoire River Water Conservancy District (District) during the non-irrigation season by allowing stock water to be released at rates greater than the five cubic feet per second (cfs) that is currently allowed.

Trinidad Dam and Reservoir was authorized by Congress in 1958 in Public Law 85-500, as amended by Public Law 89-298, and was constructed in 1976 by the U.S. Army Corps of Engineers (Corps) as a joint water resource project with Reclamation. The project is authorized to impound water for flood control, irrigation, sediment retention, and recreation. The Corps owns and operates the reservoir; their major responsibility is for flood control. The State manages recreation activities at the Reservoir through an agreement with the Corps. Reclamation administers a repayment contract with the District which manages the irrigation capacity at the reservoir. Trinidad has acquired rights to 2,800 af of water in the irrigation capacity. The State is in the process of acquiring 700 af of water in the irrigation capacity.

ACTION AREA

The action area associated with the proposed action includes Trinidad Reservoir and adjacent Corps' lands, the Purgatoire River downstream of the reservoir to its confluence with the Arkansas River, and the Arkansas River from its confluence with the Purgatoire River to John Martin Reservoir. In addition, the action area includes Las Animas County below elevation 6,000 feet mean sea level (msl) that is bounded by U.S. Highway 160 on the south; the Purgatoire River on the east; the Las Animas County line and the drainage divide between the Purgatoire River and the Apishapa River on the north; and Interstate 25 on the west.

Trinidad Dam and Reservoir is located on the upper Purgatoire River approximately 2.75 miles upstream and southwest of Trinidad in Las Animas County, Colorado. The watershed contributing to the reservoir covers 671 square miles. The reservoir covers 2,553 surface acres at the maximum pool elevation of 6,279.3 feet msl and zero surface acres (reservoir can be fully drained) at the minimum elevation of 6,115 feet.

The Purgatoire River flows for 167 miles from the reservoir to the Arkansas River. Flows below the dam depend on releases from the reservoir and on tributary contributions, particularly Raton Creek. Releases from the reservoir range from 100 - 300 cfs during the irrigation season (approximately 1 April - 15 October) to minimal or no releases during the rest of the year.

Contributions from Raton Creek maintain some flow in the reach below the dam almost year round.

The reservoir is located in a narrow river valley where geology and vegetation transition from the Rocky Mountains to the Great Plains. Vegetation at the reservoir includes grasses, pinon pine, junipers, cottonwoods, and willows. A sediment delta has formed at the head of the reservoir that supports immature cottonwoods and willows. A small cattail wetland is located near Long's Canyon on the south side of the reservoir. Foothills adjacent to the reservoir are forested with pinon pine, juniper, and gambel oak. Riparian vegetation along the river and tributaries include cottonwood, willow, Siberian elm, box elder, locust, wild plum, and chokecherry. Grasslands in the vicinity of the District support blue grama, western wheatgrass, buffalograss, sagebrush and sand dropseed. Scattered junipers, four-wing saltbrush, soapweed, yucca, rabbitbrush, and prickly pear and cholla cacti are also found in the grasslands.

The Model Land & Irrigation District (ML&ID) is located generally east of the Town of Model and contains irrigated and dryland agricultural land and grasslands. The principal irrigated crop is alfalfa.

FEDERALLY-LISTED THREATENED OR ENDANGERED SPECIES AND CANDIDATE SPECIES

Four species have been listed as threatened or endangered under the ESA that may be present in the action area. Three species have been identified as candidates for listing. No critical habitat has been designated nor proposed in the action area.

Threatened or Endangered Species

Bald eagle (*Haliaeetus luecocephalus*)	Threatened
Piping plover (*Charadrius melodis*)	Threatened
Interior least tern (*Sterna antillarum*)	Endangered
Black-footed ferret (*Mustela nigripes*)	Endangered

Candidate Species

Arkansas darter (*Etheostoma cragini*)
Black-tailed prairie dog (*Cynomys ludovicianus*)
Lesser prairie-chicken (*Tympanuchus pallidicinctus*)

HABITAT REQUIREMENTS, DISTRIBUTION, AND STATUS OF SPECIES

Threatened or Endangered Species

Bald eagle - Bald eagles are large, opportunistic birds of prey that feed largely upon fish and waterfowl. Eagles are associated with rivers, lakes, and reservoirs where large trees provide perch sites for roosting and for locating and securing prey. Fish are the primary source of food. Under adverse conditions, eagles will search for prey in upland areas and will also feed on carrion. If severe winter conditions persist, eagles will concentrate in areas with open water or migrate further south.

Nesting and wintering eagles are found in close association with water that provides a reliable food source and isolation from human disturbance. Eagles wintering in Colorado are thought to originate in the central provinces of Canada and the Great Lakes states. Migrant and wintering bald eagles begin to arrive in the Arkansas River basin in mid- to late-October and begin to leave the area for breeding areas in the north by early March. Adult migrants tend to winter repeatedly in the same area but remain mobile when seeking food during changing winter weather conditions. The Colorado Division of Wildlife (CDOW) (2003) estimates that approximately 800 eagles winter in Colorado. Wintering and migrating eagles can be expected to occur throughout the lower Arkansas River basin.

Bald eagles nest near rivers, lakes, and reservoirs where they select nesting sites free from disturbance. Cottonwood trees are preferred nesting trees in the lower Arkansas River basin. Nests are large and re-used annually. Nesting activities begin in early to mid-March, eggs are laid in late March to early April, and both adults incubate the eggs. Eggs hatch in mid-May and fledging takes place after ten to eleven weeks with immature birds remaining near the nest for another six weeks. The number of active bald eagle nests is increasing in Colorado. In 2001, there were about 51 nesting pairs (CDOW 2003). There are no known active nests in Las Animas County (Gallegos, pers. comm. 2003). The bald eagle has been downlisted to threatened and has been proposed for de-listing.

Piping plover - The piping plover is a migratory shorebird that breeds along prairie rivers, alkali lakes and ponds of the northern Great Plains, on sandy beaches along the Great Lakes, and on the beaches of the Atlantic coast. Its primary food is aquatic invertebrates. Plover populations have fluctuated drastically since 1900 primarily as the result of market hunting. Populations rebounded by the 1920s; however, human encroachment, an increase in the recreational use of sandbars and beaches, channelization and impoundment of rivers, and the resultant modification and destruction of habitat have caused numbers to decline again.

The piping plover is one of three small plovers that can be found in Colorado. In eastern Colorado, plovers occur primarily as migrants and arrive in early April. Most non-breeding plovers leave Colorado by the end of May.

The plover's historic breeding habitat in eastern Colorado included the South Platte and

Arkansas rivers. Plovers can also be found breeding on sandy lake and reservoir shorelines, river sandbars, and sandy wetland pastures. Breeding plovers arrive in eastern Colorado in late April. Plovers are known to nest with interior least terns at John Martin Reservoir on the lower Arkansas River (Kaczmarek, pers. comm. 2003). The piping plover is listed as threatened.

Interior least tern - The interior least tern is the smallest member of the tern family and breeds in southeastern Colorado in the La Junta-Lamar area and in colonies of piping plovers at John Martin Reservoir (Kaczmarek, pers. comm. 2003). Breeding terns are normally associated with unvegetated shorelines, sandbars, and mudflats of rivers and reservoirs. The occurrence of breeding terns is localized and is highly dependent upon the presence of dry, exposed sand and gravel bars and favorable river flows that support a forage base and isolate the bars from the banks. Characteristic riverine nesting sites are dry, flat, sparsely vegetated sand and gravel bars within a wide, unobstructed, water-filled river channel. This swallow-like aquatic bird feeds primarily on small fish, such as shiners (*Notropis* spp.) and plains killifish (*Fundulus kansae*), from shallow water in rivers and lakes.

Terns arrive on breeding sites in mid-May. Both sexes share egg incubation that takes 19 to 25 days. Winter habitat for the interior least tern is currently unknown. The interior least tern is listed as endangered.

Black-footed ferret - The black-footed ferret is a small carnivore about the size of a mink and is considered to be the most endangered mammal in North America. The historic range of the ferret coincides with that of the three species of prairie dogs upon which it depends for food and shelter and includes the short and mid-grass prairies of the Great Plains (Schroeder, 1987). Ferrets inhabit prairie dog towns utilizing abandoned burrows with approximately 90% of their diet consisting of prairie dogs. The remainder of their diet is composed of mice, ground squirrels, rabbits, rats, birds, reptiles, and insects. The demise of the ferret in the mid-1900s coincided with attempts to rid the Great Plains of prairie dogs. What was believed to be the last known ferret died in 1979 in captivity in South Dakota and the species was presumed extinct until it was rediscovered in Wyoming in 1981(NGPC 1997). The last record of a ferret in Colorado was from 1946 (CDOW 2003).

Historically, ferrets were never abundant (because few people saw or recorded them) in Colorado, but they likely ranged statewide. Prairie dog towns/complexes consisting of more than 80 acres within four miles of one another should be surveyed for the presence of black-footed ferrets (FWS 1993). Small isolated prairie dog colonies are located north and east of Trinidad Reservoir (Kaczmarek, pers.comm. 2003). The black-footed ferret is listed as endangered.

Candidate Species

Arkansas darter – The following information was taken from the Colorado Division of Wildlife webpage (http://wildlife.state.co.us/species_cons/index.asp). The Arkansas darter is a three-inch member of the walleye and perch family. Its body displays 12 to 14 dusky stripes along the sides

with fine black specks on the back and a dark, vertical wedge-shaped spot beneath the eye. During the April-May breeding season, males display bright orange underneath.

Darters feed on a variety of aquatic invertebrates and plant material including small seeds. They prefer shallow, clear streams with sandy substrates, spring-fed pools, and abundant rooted aquatic vegetation.

Darters may spawn throughout spring and summer. Spawning takes place in shallow water over a bottom of coarse gravels. Eggs are usually deposited in open areas on organic material covering sandy substrates. Darters become sexually mature in a year or less.

The Arkansas darter has a very restricted natural range and is the only darter native to the Arkansas River drainage. It is found only in tributaries to the Arkansas River in Colorado, Kansas, Missouri, and Oklahoma. The species is found in the upper Arkansas River, Fountain Creek, Horse Creek, upper Arkansas River at John Martin Reservoir, Big Sandy Creek, Rush Creek, Black Squirrel Creek, and Chico Creek drainages. The darter has never been recorded from the Purgatoire River drainage and appears to be restricted to Arkansas River tributaries that enter the river from the north (Melby, pers. comm. 2003).

Darters are susceptible to predation by introduced fish and degradation of water quality. The Arkansas darter is a candidate species.

Black-tailed prairie dog - The Lewis and Clark expedition of 1804-6 was the first to collect a specimen of the black-tailed prairie dog. It was first described by Ord in 1815 from a specimen taken from the upper Missouri River basin (Hall and Kelson 1959). The black-tailed prairie dog is found in eastern Montana, eastern Wyoming, eastern Colorado, eastern New Mexico, southwestern North Dakota, western and central South Dakota, western and central Nebraska, western and central Kansas, western and central Oklahoma, northwestern Texas, and south-central Canada.

The black-tailed prairie dog is a small, stout rodent having an overall length of 14-17 inches with weights ranging from one to three pounds. The black-tipped tail is characteristic of the species with mixed body colors varying from brown, black, gray, and white (Hoogland 1995). Black-tailed prairie dogs are diurnal, burrowing animals with individuals spending most of their day above ground. They do not hibernate as do other North American prairie dog species (Hoogland 1995). The species is very social living in population aggregations that can contain thousands of individuals and extend for miles (Bailey 1905, King 1955). Within these colonies, prairie dogs live in territorial, harem-polygamous family groups called coteries (Hoogland 1995).

The colonial nature of the black-tailed prairie dog is a significant characteristic of the species. Colonality offers an effective defense mechanism by aiding in the detection of predators and by deterring predators through mobbing behavior (Hoogland 1995). It increases reproductive success through cooperative rearing of juveniles, and it aids parasite removal through shared grooming. Hoogland (1995) notes that colonality promotes transmission of disease that can

suppress populations and may be a major factor in population dynamics.

Many authors have recognized the biological importance of the black-tailed prairie dog as a keystone species. Keystone species influence ecosystem function through their activities in unique and significant ways. Prairie dogs act in several roles inasmuch as they are prey, provide shelter, modify vegetation, and influence ecological processes in a manner not entirely duplicated by other prairie herbivores (Wuerthner 1997). Although the black-tailed prairie dog creates habitat for itself and other species, it is also affected by other species. Prairie dogs can create preferential grazing opportunities for herbivores that in turn create opportunities for expansion of prairie dog colonies along their perimeters. Habitat modified by black-tailed prairie dogs is especially important to the black-footed ferret (*Mustela nigripes*), swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), and burrowing owl (*Athene cunicularia*).

The historic range of the black-tailed prairie dog included portions of eleven states, Canada, and Mexico. Its current range occurs from extreme south-central Canada to northeastern Mexico from approximately the 98th meridian west to the Rocky Mountains (FWS 2000). The species is found in scattered populations throughout eastern Colorado below 6,000 feet msl. The largest areas of active prairie dog colonies are located along the Front Range and in southcentral and southeastern portions of the state. A large colony of approximately 100 acres is located south and east of the Purgatoire River outside of the action area (T33S, R60W) (Gallegos, pers. comm. 2003). Small isolated prairie dog colonies are located north and east of Trinidad Reservoir within the action area (Kaczmarek, pers. comm. 2003; Gallegos, pers. comm. 2003); however, these colonies are believed to support primarily white-tailed prairie dogs (Holder, pers. comm. 2003). The species continues to decline due to conversion of grasslands to cropland, urban areas, and other vegetative communities; from structural deterioration of burrows; and from habitat fragmentation (FWS 2000). The black-tailed prairie dog is a candidate species.

Lesser prairie-chicken – The following information was taken from the Colorado Division of Wildlife webpage (http://wildlife.state.co.us/species_cons/index.asp). The lesser prairie chicken is mostly brown in color with horizontal barring, short rounded tails and about the size of a small chicken. Males have reddish air sacs on their necks that are inflated during mating courtship displays. Lesser prairie chickens historically occupied the grasslands of Texas, Oklahoma, New Mexico, Kansas, and southeastern Colorado. They prefer sandy grasslands having an abundance of mid-height grasses, sandsage, and yucca. During summer, they feed on grasshoppers and other insects. During winter, their food source consists of seeds, leaves, grain, and milo from agricultural areas.

Lesser prairie chickens are polygamous with males attracting females to leks with elaborate dancing displays. Males also inflate their red air sacs and display their yellow combs. Hens typically lay 12 eggs.

Populations have declined as a result of conversion of grasslands and overgrazing. In Colorado, most of the birds are found in the Comanche National Grassland near the Town of Campo in the

southeastern corner of the state. Smaller groups of birds are found south of the Town of Holly, east of the Town of Eads, and south of the Cimarron River. One group of birds was released in sandsage-yucca habitat east of the City of Pueblo in an effort to establish another population. The lesser prairie chicken is not found in Las Animas County (Kaczmarek, pers. comm. 2003). The lesser prairie chicken is a candidate species.

METHODS

Information about these species was collected through a review of existing literature and internet sources and through contact with knowledgeable individuals from the FWS, Colorado Division of Wildlife (CDOW), and Reclamation. The species addressed in this BA were identified by the Fish and Wildlife Service on July 31, 2003, as possibly being present in the action area.

There was little published technical or general literature available that pertained specifically to the Purgatoire River basin. Where available, information was cited for areas thought to contain analogous habitat types or conditions. Much of the distribution and habitat information was taken from the CDOW website (http://wildlife.state.co.us).

Hydrologic data for the stock watering analysis were provided by Reclamation model.

DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION

Environmental Baseline

The proposed action contains three components that have potential to affect flows in the Purgatoire River and elevation levels in Trinidad Reservoir. These components include conversion of irrigation water to M&I uses, use of irrigation water to offset the loss of recreation pool water in the reservoir, and modifications to releases for stock water purposes. Each of these components is evaluated against their relative environmental baseline.

The environmental baseline for the conversion of irrigation water to M&I uses is the continued leasing of water from Trinidad back to irrigators in the District until there are M&I needs for the water. The District irrigators currently lease approximately 2,800 af from Trinidad. This water would continue to either be passed through the reservoir for irrigation use or stored in the irrigation capacity of the reservoir and released later for irrigation use. This water is conveyed down the Purgatoire River and diverted approximately 8 miles downstream at the Model headgate. Approximately 35% of this irrigation water returns to the Purgatoire River at various locations downstream of the Hoehne Headgate, which is approximately 13 miles downstream of Trinidad Dam and 5 miles downstream of the Model headgate.

The environmental baseline for conversion of 700 af of the irrigation capacity water to the recreation pool for replacement of evaporation and seepage losses in the reservoir involves continued use of this water by ML&ID for irrigation purposes. This water would continue to

either be passed through the reservoir for irrigation use or stored in the irrigation capacity of the reservoir and released later for irrigation use. This water is conveyed down the Purgatoire River and diverted at the Model headgate. Approximately 35% of this irrigation water returns to the Purgatoire River at various locations downstream of the Hoehne Headgate. Recreation pool evaporation and seepage losses would continue to average approximately 1,060 af annually and may only be replaced occasionally when favorable hydrologic conditions exist for the State to make a one-time purchase of water to replace recreation pool losses. Consequently, the recreation pool will drop several thousand acre-feet before being refilled.

The environmental baseline for modification of reservoir releases for stock water purposes includes continued release and diversion of a portion of the water available for stockwatering. The gains typically range from approximately 0.5 to 3 cfs. The District is permitted to release 1,200 af for stock water purposes from January through March, but currently releases much less than this because of the inefficiency of delivering water at 5 cfs or less. These 5 cfs diversions include gains to the river between Trinidad Dam and the Trinidad gage (PURTRICO), an approximate 3 mile reach of the river, and sufficient releases from the reservoir, that when combined with the gains do not exceed 5 cfs at the Trinidad gage. Diversion of this water can vary from year-to-year, but is generally expected to occur for several days each non-irrigation season. On days when no stockwater diversions are made, gains to the river flow downstream of the District and are available for appropriation by other water users. Unused portions of the 1,200 af allowance for stockwatering remain in the reservoir for use during the irrigation season.

Effects of the Proposed Action

Once the proposed action goes into effect, leasing water back to irrigators until M&I uses are developed will continue and therefore does not alter environmental baseline conditions for that component. When irrigation water begins to be used for M&I purposes, irrigation return flows that normally return to the river below the Hoehne Headgate would then be released directly from the reservoir to compensate for the loss of irrigation return flows. This practice is identified in Trinidad's water decrees, which specify that historic irrigation return flows of 35% of the water right must be released from the reservoir in a pattern similar to historic return flows when irrigation water is converted to M&I uses. To mimic historic irrigation return flows, 25% is released during the irrigation season and the remaining 10% released during the non-irrigation season. These non-irrigation season releases, which historically returned to the river below Hoehne headgate during the non-irrigation season, result in additional flow in the Purgatoire River between Trinidad Dam and the Hoehne headgate, a 13-mile reach of the river.

There would be no return flows from developed M&I uses because Trinidad is permitted to use the consumptive portion of their water right, once developed, to extinction, and M&I return flows are expected to be re-used.

When irrigation water begins to be used for M&I purposes, previously irrigated land will no longer be cultivated and will be converted to grassland and pasture. Based on the analysis for the change in use of these water rights, approximately 2,000 acres could eventually be affected by

this action (Wheeler 1992).

Water used to replace recreation pool seepage and evaporation would now be stored in the reservoir and no longer released to the river for irrigation use. However, that portion of the irrigation water that would have returned to the river as irrigation return flows (approximately 35% or a maximum of approximately 377 af) would be released directly from the reservoir in a pattern similar to historic irrigation return flows. To mimic historic irrigation return flows, once the water right change is decreed, 25% would be released during the irrigation season and the remaining 10% would be released during the non-irrigation season. These non-irrigation season releases, which historically returned to the river below Hoehne headgate during the non-irrigation season, result in additional flow in the Purgatoire River between Trinidad Dam and the Hoehne headgate, a 13-mile reach of the river (Wheeler 2002).

When irrigation water begins to be used to replace recreation pool losses, previously irrigated land will no longer be cultivated and will be converted to grassland and pasture. Based on the analysis for the change in use of these water rights, an estimated 805 acres would be affected by this action (Wheeler 2002).

Water released from the reservoir for stock water is expected to be at rates of 100 cfs or less. These releases are expected to generally occur over a period of about nine days - three releases three days long each from January through March. When releases are made for stock water, the gains would be diverted and lost from the stream. When these releases are not made, there would be no diversion at District headgates and gains would flow past the headgates and be available for appropriation by water users downstream of the District. This pattern of diversion of the gains is not expected to alter environmental baseline conditions.

Under the proposed action, the full 1,200 af of stored water available for stock watering is expected to be released.

Threatened or endangered species

Bald eagle – The eagle may occasionally visit the Purgatoire River valley and Trinidad Reservoir during winter. Once water is used for M&I and recreation pool purposes and non-irrigation season historic return flow releases are being made from the reservoir, there will be higher flows in the river (a maximum of 3.2 cfs in winter) between the dam and the Hoehne Headgate (13 river miles below the dam and where return flows to the river are assumed to begin) during the non-irrigation season, enhancing aquatic, wetland, and riparian habitat necessary to support prey species utilized by eagles.

The proposed recreation pool and stock watering changes have the potential individually to affect the recreation pool and irrigation capacity, but cumulatively the proposed changes result in no adverse effect to the elevation level of Trinidad Reservoir. Recreation pool use of water from the irrigation capacity to replace evaporation and seepage will maintain higher winter storage levels in Trinidad Reservoir. Stock water releases are currently only partially used, but under the

proposed action full use of the 1,200 af allowance is expected. This would result in an annual reduction in reservoir volume of several hundred acre-feet during the winter months. Therefore, when considered together, these actions will very nearly or fully offset each other. Consequently, they are expected to result in either no effects or possibly a minor increase in storage.

Interior least tern/piping plover - These two species are addressed in common because of their similarity in habits and habitat requirements. Terns and plovers nest at John Martin Reservoir on the Arkansas River downstream of its confluence with the Purgatoire River. Neither species is known to nest along the Purgatoire River (Kaczmarek, pers. comm. 2003). There would be no change in flows in the Purgatoire River below the District during the months when terns and plovers would be nesting at John Martin Reservoir.

Black-footed ferret – Ferrets cohabitate with prairie dogs in large colonies. Only small, isolated prairie dog colonies are located within the action area and those occur outside of the District. The proposed action does include activities that would encourage changes in land use from cultivated use to grassland or pasture use within the District. This change in land use could create potential habitat for prairie dogs, that might result in potential black-footed ferret habitat. However, since there have been no confirmed sightings of ferrets in the state since 1946, it is unlikely that ferrets would inhabit the restored grasslands.

Candidate species

Arkansas darter – The Arkansas darter is not found in the Purgatoire River basin (Melby, pers. comm. 2003). The proposed action is not expected to alter Arkansas River flows.

Black-tailed prairie dog – A large prairie dog colony of approximately 100 acres is located south and east of the Purgatoire River outside of the action area. Small isolated prairie dog colonies are located north and east of Trinidad Reservoir within the action area but outside of the District; however, these colonies are believed to support primarily white-tailed prairie dogs (Holder, pers. comm. 2003). The proposed action does include activities that would encourage changes in land use from cultivated use to grassland or pasture use within the District. This change in land use would create potential habitat for black-tailed prairie dogs.

Lesser prairie-chicken – The lesser prairie-chicken is not found in Las Animas County. The closest known populations are found in Baca County.

INTERRELATED AND INTERDEPENDENT ACTIONS AND CUMULATIVE EFFECTS ASSOCIATED WITH THE PROPOSED ACTION

Threatened or endangered species

Bald eagle
There are no known interrelated or interdependent actions nor cumulative effects relative to non-federal actions associated with the proposed action.

Interior least tern and piping plover
There are no known interrelated or interdependent actions nor cumulative effects relative to non-federal actions associated with the proposed action.

Black-footed ferret
There are no known interrelated or interdependent actions nor cumulative effects relative to non-federal actions associated with the proposed action.

CONSERVATION MEASURES

No conservation measures are being proposed.

DETERMINATIONS OF EFFECT

Threatened or endangered species

Bald eagle
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action may affect but not adversely affect (beneficially affect) the bald eagle.

Piping plover
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the piping plover.

Interior least tern
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the interior least tern.

Black-footed ferret
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the black-footed ferret.

Candidate species

Arkansas darter
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the Arkansas darter.

Black-tailed prairie dog
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action has the potential to beneficially affect the black-tailed prairie dog.

Lesser prairie-chicken
Based upon our analysis of the effects of the proposed action, the current and potential status of this species in the Purgatoire River basin, and other land use activities in the area, we conclude the proposed action will have no effect on the lesser prairie-chicken.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
755 Parfet Street, Suite 361
Lakewood, Colorado 80215-5599

IN REPLY REFER TO:
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FEB 20 2004

Memorandum

To: Area Manager, Eastern Colorado Area Office, Bureau of Reclamation, Loveland, Colorado

From: Field Supervisor, Ecological Services, Lakewood, Colorado

Subject: Biological Assessment for Amending the Existing Operating Principles and/or Operating Criteria at Trinidad Dam and Reservoir, Colorado

The U.S. Fish and Wildlife Service received your memorandum of January 26, 2004, regarding the Bureau of Reclamation's proposal to amend the existing operating principles and/or operating criteria at Trinidad Dam and Reservoir in Las Animas County, Colorado. You requested concurrence with your determination that the bald eagle is likely to be beneficially affected by the proposed action and would not be adversely affected by the proposed action.

Based on the information you have provided, the Service concurs that the proposed action is likely to beneficially affect the bald eagle and is not likely to adversely affect the bald eagle. Further, we concur that the proposed action will have no effect on other federally-listed threatened or endangered species. These comments have been prepared under the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

If the Service can be of further assistance, contact Peter Plage of this office at (303)275-2370.

cc: Plage

PPlage:T&E2004.02:021104

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