

RECLAMATION

Managing Water in the West

EA No. EC-1300-07-06

2008 Upper Arkansas Water Conservancy District Temporary Excess Capacity Contract, Fryingpan-Arkansas Project

Environmental Assessment



U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region
Eastern Colorado Area Office

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CHAPTER ONE – PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

The Bureau of Reclamation (Reclamation) is proposing to enter into a one year excess storage capacity contract with Upper Arkansas Water Conservancy District (Upper Arkansas) for contract year 2008. The contract would allow storage of non-project water in Pueblo Reservoir if and when space is available.

This Environmental Assessment (EA) was prepared by Reclamation in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508), and Reclamation's NEPA Handbook (USDI 2000). It is not a decision document, but rather it is a disclosure of the environmental consequences of the No Action and Proposed Action Alternatives.

PURPOSE AND NEED

In general, the purpose of the issuance of excess storage capacity contracts is to maximize the use of existing infrastructure to support entities with temporary municipal, industrial, irrigation, fishery, and recreation needs in their response to increasing water demands, and annual variability of climate and resultant hydrologic conditions. These contracts enable contractors to more efficiently use their non-project water, by providing temporary storage for that water for use at a later date. Consequently, temporary excess capacity contracts meet contractor needs by providing valuable water storage and increased water management flexibility.

Upper Arkansas has a need to store up to 1,000 ac-ft of their non-project water in Pueblo Reservoir to provide more reliable timing for domestic and irrigation augmentation (Upper Arkansas 2007a).

BACKGROUND

Reclamation completed Environmental Assessment and Finding of No Significant Impact No. EC-1300-06-02 in April 2006 (2006-2010 EA). The EA analyzed the effects of making up to 80,000 ac-ft of Fryingpan-Arkansas Project excess capacity storage and 10,000 ac-ft of excess exchange capacity available from 2006-2010.

As a basis for the analysis the EA included hydrologic modeling, which included and in most cases doubled the amounts requested from contracts requested from 2000-2005. The 2006-2010 EA did not prevent any contractor that was not included in the analysis from receiving a contract; however, it did stipulate that additional NEPA would be required for any potential effects of future requests that were not evaluated.

SCOPE OF ANALYSIS

During the consideration of the proposed contract, Reclamation revisited the 2006-2010 EA to determine whether the expected impacts were within the scope of analysis previously conducted. Further, an evaluation of whether or not the environmental commitments were being met was completed. Table 1.1 summarizes the result of this effort.

TABLE 1.1 – COMPLIANCE WITH ENVIRONMENTAL COMMITMENTS IN 2006-2010 EA

Environmental Commitment	2008 Compliance Determination
All water must be transported, stored, and released in accordance with the laws of the State of Colorado.	To be included in contract.
By entering into a temporary excess capacity contract with Reclamation, for the use and distribution of United States waters, the Contractor shall comply with all sections of the Clean Water Act.	To be included in contract. Confirmed requests include no construction to transport and/or deliver the water.
If Reclamation enters into any long-term contracts during the term of the proposed action, the amount of storage and exchange covered by this EA will be reduced by the amount of the long-term contract.	The City of Aurora long-term excess capacity contract was signed on September 12, 2007. The 53,075 ac-ft total being requested for 2008 is still well under the now 70,000 ac-ft available for temporary contracts.
Reclamation will monitor temporary excess capacity operations including daily storage and release data for Contractors' accounts, to better understand real-time use of contracted storage. This will aid in understanding how temporary excess capacity is used and present the opportunity to adaptively manage future temporary excess capacity contract operations.	Monitoring ongoing. Year-end analysis planned. Modifications to operations will be made accordingly, if necessary.
Reclamation will work with the State's Water Quality Control Division (WQCD) and other interested parties to compare their water quality data with Reclamation's operational data described above to determine if there is a correlation between selenium concentrations on the Arkansas River from Pueblo Reservoir to the Rocky Ford head gate, and changing hydrology as a result of temporary excess capacity contract operations for the years 2006 through 2010.	WQCD confirmed collection of selenium data is ongoing. Reclamation will initiate a study toward the end of the 2006-2010 term to determine any correlations.
Temporary excess capacity contract operations shall not cause flows on the Arkansas River as measured at the Avondale gage to fall below 86 cfs.	Ongoing communication with signatories of the IGA (Intergovernmental Agreement between the City of Aurora, Colorado Springs Utilities, City of Fountain, Pueblo Board of Water Works, the District and the City of Pueblo to maintain certain flows downstream from Pueblo Reservoir to Fountain Creek), St. Charles Mesa Water District, and State Engineer to ensure compliance.
In support of the Upper Arkansas River Flow Program (Flow Program), Contractors may not exchange water from Pueblo Reservoir to upstream locations against releases made by Reclamation in support of the Flow Program, or make any exchanges from Pueblo Reservoir which would require Reclamation to release additional water to meet the objectives of the Flow Program.	To be included in contract. If a contractor requests to exchange water from Pueblo Reservoir against releases made in support of the Flow Program, the request will be denied. This would prevent entities from exercising a physical exchange against the outflow of Twin Lakes Reservoir from Pueblo Reservoir.
Reclamation will not execute contract exchanges until the Natural Resource Conservation Service (NRCS) makes its annual May 1 st water supply forecast, and Reclamation determines whether or not contract exchanges will affect its ability to operate in accordance with the Flow Program recommendations, or impair the ability of Fremont Sanitation District Wastewater Treatment Plant or the Salida Treatment Plant to meet their CDPES permit requirements.	The Aurora long-term excess capacity contract allows up to 10,000 ac-ft of exchange. However, no temporary exchange contracts have been requested for 2008, including Upper Arkansas' request. Therefore, this commitment is not applicable.

<p>Reclamation will limit temporary excess capacity contract operations that have the potential to affect the Arkansas River below Pueblo Reservoir when flows are \leq 500 cfs and $>$ 50 cfs to a decrease of no more than 50% of the average daily flow as measured by adding the flow at the above Pueblo gage to fish hatchery return flows.</p>	<p>Reclamation will use the previous day's flows, as measured by adding flows at the Above Pueblo Gage to fish hatchery return flows, to determine whether this mitigation measure would be triggered. This commitment is included as a standard clause in all the contracts. Reclamation would not allow Upper Arkansas to exercise an exchange from a lower reservoir into Pueblo if flows fell below 50 cfs.</p>
<p>Reclamation will limit temporary excess capacity contract operations that have the potential to affect the Arkansas River below Pueblo Reservoir when flows are \leq 50 cfs, as measured by adding the flow at the above Pueblo gage to fish hatchery return flows.</p>	<p>To be included in contract. See above.</p>
<p>Contractors that propose to store water that originates in the Upper Colorado River basin must either (1) sign a Recovery Agreement with the U.S. Fish and Wildlife Service, or (2) if the water originates in the Gunnison River basin, individual consultation with the Service may be required.</p>	<p>Confirmed completed.</p>
<p>Contracts will be conditioned to limit storage of west slope water to the volume modeled for this analysis, or 14,200 ac-ft per year, as discussed in the EA, Chapter 3, Section IV. If a request is outside of this condition, additional environmental compliance will be required.</p>	<p>Confirmed to be under the 14,200 ac-ft per year analyzed in the EA.</p>
<p>If the potential effects of future requests were not evaluated in EA No. EC-1300-06-02, as discussed in Appendix C, Hydrologic Model Documentation, additional environmental compliance will be required.</p>	<p>The portion of Upper Arkansas' request that involves exchanging reservoirs was found to be outside the scope of analysis of the 2006-2010 EA. Additional analysis of impacts to the hydrology of the exchanging reservoirs and streams out of the reservoirs, and to the aquatic resources, threatened, endangered and special status species, and recreation in those waters will be completed for the contract requests with this EA. Based upon the magnitude of the changes in flows expected with the Proposed Action Alternative, the scope of analysis will include the reservoirs and streams to the mainstem of the Arkansas River as impacts beyond that point are believed to be indiscernible. See Figure 1.1 for a location map. The analysis only discusses those streams directly below the reservoirs. However, it should be assumed that the level of impacts will gradually reduce with further distance from the reservoirs. See the 2006-2010 EA for the complete analysis for all other aspects of the 2008 requests.</p>

FIGURE 1.1- LOCATION MAP



CHAPTER TWO – ALTERNATIVES

NO ACTION ALTERNATIVE

Under the No Action Alternative, Reclamation would not enter into an excess capacity storage contract with Upper Arkansas Water Conservancy District. Without this contract Upper Arkansas would be unable to make the necessary exchanges and the releases to meet needs downstream of the exchanging reservoirs would not be met.

PROPOSED ACTION ALTERNATIVE

Reclamation would enter into a one year temporary excess storage capacity contract with Upper Arkansas Water Conservancy District for storage of up to 1,000 ac-ft of non-project water in Pueblo Reservoir. See Table 2.1 for contract request details (Upper Arkansas 2007a).

TABLE 2.1 –CONTRACT REQUEST MAXIMUM EXPECTED INFLOW AND OUTFLOW FROM PUEBLO RESERVOIR (AC-FT)

Jan		Feb		Mar		Apr		May		Jun	
In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
0	8	0	8	50	8	100	20	100	55	100	80
Jul		Aug		Sept		Oct		Nov		Dec	
In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
100	80	50	50	50	25	50	20	50	8	50	8

Upper Arkansas is requesting storage of up to 1,000 ac-ft of their non-project water in Pueblo Reservoir to provide more reliable timing for domestic and irrigation augmentation. Of the expected outflow, only the 37.2 ac-ft that would be exchanged to Rainbow Lake (Rainbow), Cottonwood Lake (Cottonwood), O’Haver Lake (O’Haver), North Fork Reservoir (North Fork), Boss Lake Reservoir (Boss Lake), and DeWeese Reservoir (DeWeese) will be analyzed in this EA. The remainder of their request, which involves the Arkansas River below Pueblo Reservoir, is within the scope of the 2006-2010 EA.

Upper Arkansas would abide Colorado water law and any requirements of The Colorado Division of Water Resources - The Office of the State Engineer (State Engineer), which have jurisdiction over the administration of state waters. All of Upper Arkansas’ exchange rights are junior to CWCB ISF except for Gray’s Creek. However, for this year’s contract request Upper Arkansas has committed to not decreasing flows below the CWCB ISF for

Gray’s Creek. All the streams have CWCB ISF except for Boss Lake Creek. For exchanges involving Boss Lake Creek, Upper Arkansas has committed to not cause a decrease in the flows of the CDOW recommendation for Boss Lake Creek ISF shown in Table 3.2 as a result of the proposed exchanges at that location.

Upper Arkansas would have to comply with any agreements and/or permits that allow them to operate the reservoirs. For example, the San Isabel National Forest has issued Upper Arkansas a Special Use Permit to operate Cottonwood. Upper Arkansas and the Rainbow Lake Resort, Inc. have an agreement regarding Rainbow. Upper Arkansas and the DeWeese Dye Ditch and Reservoir Company have an agreement regarding DeWeese.

North Fork, Boss, and O’Haver are on the Pike and San Isabel National Forest (USFS). Upper Arkansas must comply with any Operating Plans and conditions of any Special Use Permits that are or may be issued from the USFS. For example, the current Temporary Special Use

Permit for North Fork Reservoir stipulates that when refilling the reservoir Upper Arkansas must pass 2.5 cfs, or native discharge, until the reservoir is full. Once full the discharge below the reservoir is to follow the natural hydrograph (Gaines 2008).

Since the USFS conditions are still being composed and are not expected to be finalized before this EA is complete or may change throughout the life of the proposed contract, for the purposes of the analysis possible scenarios are presented below with the potential to cause the most impacts.

Operational flexibility allows the South Arkansas River Basin reservoirs (North Fork, Boss Lake, and O'Haver) and Cottonwood Creek Basin reservoirs (Cottonwood and Rainbow) to share the exchange/capture of water and burden of releasing for augmentation on a sliding scale from none to all. Upper Arkansas has a policy of maintaining a 3 year supply for augmentation. Under the worst case scenario they would need to exchange 3 years worth of augmentation water to these reservoirs. Therefore, Upper Arkansas could exchange up to 15 ac-ft of contract water into North Fork, Boss Lake or O'Haver; and up to 13.2 ac-ft into Rainbow or Cottonwood.

Exchange/capture of the water would generally occur during periods of peak flows. But capture of the water in Boss Lake could occur between April and July as long as the conditions of the USFS permit and the CDOW recommendation for Boss Lake Creek ISF were met. All other reservoirs could capture water as soon as the

contract is issued (for the purposes of the analysis, January) through July as long as the conditions of the USFS permit were met and CWCB ISF (including Gray's Creek) were not injured. The maximum capture rate for all reservoirs except Boss Lake would not exceed -0.17 cfs January through April, -0.75 cfs in May, and 1.5 cfs June through July. Assuming this maximum capture flow, storage could occur throughout the entire months of January through April and over 5 days for each May through July. Because the flows in Boss Lake Creek are normally lower, capture into Boss Lake would not exceed -0.17 cfs in April, and -0.75 cfs May through July in order to minimize impacts to aquatic resources in the streams. Assuming this maximum capture flow, storage could occur throughout the month of April and over 10 days for each May through July. Releases of the exchanged water from any of the reservoirs are expected to occur from July through October and would not exceed 0.52 cfs for 3 days in each of those months.

With regard to DeWeese, Upper Arkansas would exchange up to 9 ac-ft of contract water into this reservoir in June and July or up to 2 cfs and 3 cfs in a 24 hour period, respectively. Releases from DeWeese would normally be in the order of 0.5 cfs. However, for the purposes of this EA, the possible scenario with the potential to cause the most impact would only occur at the request of the Bureau of Land Management to improve flows in Grape Creek below the reservoir. In this case the exchanged water would be released starting November 16 at a rate of 2-3 cfs until it is gone in about 2-3 days.

CHAPTER THREE – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION AND METHODOLOGY

This chapter describes the affected environment and discloses the environmental consequences associated with implementing the No Action and Proposed Action Alternatives that are beyond those analyzed in the 2006-2010 EA. This includes the utilization of exchanging reservoirs in Upper Arkansas' request. Resources evaluated in this chapter include the hydrology of the exchanging reservoirs and streams out of the reservoirs, and the aquatic resources, threatened, endangered, and special status species, and recreation in those waters.

Based upon the magnitude of the changes in flows expected with the Proposed Action Alternative, the scope of analysis will include the reservoirs and streams to the mainstem of the Arkansas River as impacts beyond that point are believed to be indiscernible. See the 2006-2010 EA for the complete analysis for all other aspects of the 2008 requests.

Impact Thresholds

Direct, indirect, and cumulative effects were analyzed for each impact topic and are described in terms of type, duration, and intensity with general definitions of each provided below.

Type - describes the classification of the impact as beneficial or adverse, and direct, indirect or cumulative.

Beneficial: positive change in the condition or appearance of the resource, or a change that moves the resource toward the desired condition.

Adverse: negative change that detracts from the resource's appearance or condition, or a change that moves the resource away from the desired condition.

Direct: effect caused by alternative and occurs in the same time and place.

Indirect: effect caused by alternative but is later in time or farther removed in distance, but is still reasonably foreseeable.

Cumulative: incremental effect caused by alternative when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over time.

Duration - describes the length of time an effect would occur as short- or long-term.

Short-term: lasting no longer than the contract year.

Long-term: lasting beyond the contract year.

Intensity - describes the degree, level, or strength of an impact as no impact, negligible, minor, moderate, or major.

No impact: no discernable effect.

Negligible: effect is at the lowest level of detection and causes very little or no disturbance.

Minor: effect that is slight, but detectable, with some perceptible effects of disturbance.

Moderate: effect is readily apparent and has measurable effects of disturbance.

Major: effect is readily apparent and has significant effects of disturbance.

HYDROLOGY

Affected Environment

See Table 3.1 for information regarding the exchanging reservoirs involved in Upper Arkansas' request (Upper Arkansas 2007b, Judge 2007). The current storage levels for all but DeWeese were from November 2007 as winter conditions have prevented more recent data collection (Upper Arkansas 2007b). Upper Arkansas tries to maintain their reservoirs at full capacity at all times; therefore, their goal is to have the reservoirs at or near capacity by July 1. See Appendix A for the capacity tables of these reservoirs.

TABLE 3.1- EXCHANGING RESERVOIRS

Reservoir / Lake	Current Storage (ac-ft)	Storage Capacity (ac-ft)	Water Depth (ft)	Surface Area (ac)
DeWeese	4,100	4,100	42	352
O'Haver	173	193	25	15
Boss	252	252	22	24
N Fork	49	595	26	32
Rainbow	0	63	4	20
Cottonwood	112	116	3	47

The USFS has begun an Environmental Impact Statement (EIS) to analyze, among other things, the impacts of the long term operations and maintenance of North Fork, Boss Lake, and O'Haver. Upper Arkansas is working with the USFS to procure Temporary Special Use Permits to allow continued operation of those reservoirs until the completion of the EIS. The USFS has jurisdiction and regulatory authority over the operation of these reservoirs as they are on USFS land.

Upper Arkansas has been issued Special Use Permit #FS-2700-4 from the Salida District of the San Isabel National Forest with an expiration of 12/31/17. This authorizes Upper Arkansas to store 50 ac-ft of water in Cottonwood and release up to 1.075 cfs from the reservoir. Upper Arkansas and the Rainbow Lake Resort, Inc. entered into an agreement that is to last as long as Upper Arkansas is in legal

existence. The agreement allows Upper Arkansas to store 106 ac-ft in Rainbow and to make releases according to its augmentation plan with the Division Water Engineer. DeWeese is owned by DeWeese Dye Ditch and Reservoir Company.

See Table 3.2 for flows downstream of the reservoirs for the period of record available (CWCB 2007, USGS 2007, Upper Arkansas 2007b). Note that the only stream flow gage in the South Arkansas River Basin is near the confluence of the South Arkansas and Arkansas Rivers. These data are affected by a significant amount of upstream diversions. Therefore, the average flow for each month shown for the streams was based on a correlation analysis with the Clear Creek stream gage # 17086500. The analysis assumes that the basin size ratio relative to the Clear Creek Basin is 4.72% for North Fork Basin, 2.3% for Boss Lake Basin, and 5.8% for O'Haver Lake Basin.

In addition, the data shown for the Cottonwood Creek Basin is from gage #07089000 below Hot Springs. Although the readings were discontinued in 1986, the data record lasted for 50 years and the only other alternative, the gage at the mouth, is downstream of active diversions. The analysis assumes 44.4% of the gage reading is attributable to Middle Cottonwood Creek and 40.9% is attributable to South Cottonwood Creek.

Note that this method of hydrologic modeling, although a common technique and accepted by the Division of Water Resources Dam Safety Branch during its consideration of work at the North Fork Reservoir, is not highly rigorous. It does not take into consideration slope, aspect, or several other geographical and physical variables that have significant effects on rainfall, snowfall, and snowpack. This method is also subject to significant error. However, given that there are no existing real data, the numbers are being used to provide the reader some context.

Table 3.2 also shows CWCB ISF and Upper Arkansas exchange rights (Exch). Notice that Upper Arkansas' exchange rights are junior to CWCB ISF except for Gray's Creek. For this year's contract request Upper Arkansas has committed to not decreasing flows below the CWCB ISF levels at Gray's Creek. All the streams have CWCB ISF except for Boss Lake Creek. For exchanges involving Boss Lake Creek, Upper Arkansas has committed to not cause a decrease in the flows of Boss Lake Creek below the CDOW recommendation for Boss Lake Creek ISF shown in Table 3.2 as a result of the proposed April through July exchanges at that location.

Note that averages are shown and dry year data are not highlighted because in dry years Upper Arkansas would not have the ability to exchange due to being called out by senior water rights holders. However, since dry years were included in the averages there is the potential that the subsequent impact analysis is somewhat overestimated.

Releases from the reservoirs are administered by the Colorado Division of Water Resources. Releases are generally made in measureable amounts at a rate of at least 0.5 cfs (Upper Arkansas 2007b, Smith 2008).

TABLE 3.2- STREAMS BELOW RESERVOIRS

Stream	ISF Jan-Dec (cfs)	Approp Date	Exch (cfs)	Approp Date	Monthly Average Flow (cfs)											
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Grape Cr	1	6/3/82	N/A	N/A	14	17	32	53	59	90	50	36	20	17	19	15
Gray's Cr	4	11/14/96	85	5/18/87	0.7	0.7	0.6	1.1	6.4	17.6	10.3	4.3	2.5	1.7	1.2	0.9
Boss Lake Cr	*	*	85	5/18/87	0.3	0.3	0.3	0.4	2.5	7.0	4.1	1.7	1.0	0.7	0.5	0.4
N Fork S Arkansas R	8	11/15/77	85	5/18/87	0.6	0.5	0.5	0.9	5.1	14.3	8.4	3.4	2.1	1.4	0.9	1.7
M Cottonwood Cr	10	11/15/77	25	6/30/01	10.4	8.3	8.9	9.7	30	80	49	29.0	19.2	16.1	13.9	11.3
S Cottonwood Cr	10	11/15/77	25	6/30/01	9.6	7.7	8.2	8.9	32	87	53	26.7	17.7	14.9	12.8	10.4

*CDOW Boss Lake Creek flow recommendation submitted to CWCB are 1.75 cfs from May 1 to July 31, 0.75 cfs from August 1 to September 30, and 0.20cfs from October 1 to April 30.

Environmental Consequences

No Action Alternative

This alternative would result in the exchanging reservoirs and downstream hydrology continuing to fluctuate as a result of any existing storage and release operations, water rights administration, and yearly precipitation variations. Therefore, there would be no impact to the exchanging reservoirs or downstream hydrology as a result of this alternative.

Proposed Alternative

It is important to remember that Upper Arkansas must comply with any North Fork, Boss and/or O'Haver Operating Plans and conditions of any Special Use Permits that are or may be issued from the USFS. Since the USFS conditions are

still being composed and are not expected to be finalized before this EA is complete or may change during the life of the proposed contract, for the purposes of the analysis the possible scenarios presented in Chapter 2 will be analyzed to show the potential worst case impacts. This simplified approach has the potential to overestimate impacts because it is likely the USFS conditions will be more stringent.

Table 3.3 shows the changes that could occur to the storage of the exchanging reservoirs as compared to the No Action Alternative. In order to illustrate the largest potential difference between the alternatives the largest exchange is shown as early as possible in the year. Remember the contract would limit the

exchanges to a total of 9 ac-ft into DeWeese, 15 ac-ft into North Fork, Boss, or O’Haver, and 13.2 ac-ft into Rainbow or Cottonwood. In other words, the largest changes possible are shown for each month, but those changes would not be possible for all months.

By the end of July DeWeese Reservoir is expected to have 9 ac-ft more water in storage than with the No Action Alternative. This amount would remain until by the end of

November the storage level would again be the same as the No Action Alternative.

For all the other reservoirs involved in Upper Arkansas’ request, the worst case scenario of 3 years worth of augmentation water exchanged and only one year worth released is shown. The reservoirs would have the potential of not returning to No Action Alternative conditions until October 2010.

TABLE 3.3- PROPOSED ACTION ALTERNATIVE MAXIMUM MONTHLY STORAGE LEVELS CHANGES FROM NO ACTION ALTERNATIVE (ac-ft)

	Annual Maximum	Jan-Apr	May	Jun	Jul	Aug	Sept	Oct	Nov-Dec
DeWeese	9	0	0	4	9 (4 + 5 captured)	9	9	9	0
North Fork, Boss Lake or O’Haver	15	10	15	15	13.46 (15 -1.54 released)	12.03 (13.46 - 1.43 released)	10.73 (12.03 -1.3 released)	10.04 (10.73 – 0.69 released)	10.04
Rainbow or Cottonwood	13.2	7	13.2	13.2	11.73 (13.2 – 1.47 released)	10.42 (11.73 – 1.31 released)	9.28 (10.42 – 1.14 released)	8.79 (9.28 – 0.49 released)	8.79

Refer to Appendix A for a listing of elevations and surface areas at certain storage capacities. Upper Arkansas is unable to estimate what the monthly average storage capacities might be for 2008 beyond that their goal is to have their reservoirs at or near capacity by July 1. However, it is possible to determine what a 9 ac-ft (DeWeese), 15 ac-ft (North Fork, Boss Lake, O’Haver), and 13.2 ac-ft (Rainbow, Cottonwood) change in storage would cause to the elevation and surface area for any storage level greater than the current level until the reservoir is full. See Table 3.4; note these numbers are relative to current elevations.

Based on the changes expected, there could be a long-term increase in storage levels and surface acres of the exchanging reservoirs ranging from up to negligible for Boss Lake, North Fork, and Cottonwood to up to minor for Rainbow and O’Haver. DeWeese is expected to experience a negligible short-term increase in storage level from June through November.

TABLE 3.4- PROPOSED ACTION ALTERNATIVE POTENTIAL RESERVOIR CHANGES COMPARED TO THE NO ACTION ALTERNATIVE

Reservoir/Lake	Elevation Change (in)	Surface Area Change (ac)
DeWeese	0**	0
O’Haver	12-13	1
Boss	0**	0
N Fork	3-9	0.3-0.5
Rainbow	9-13	0.7-3
Cottonwood	3-4	0.3-0.7

**Currently full; there may be a change in elevation if room is made in the reservoir to allow storage of the exchange water.

Table 3.5 shows the maximum changes in flows expected as a result of the implementation of this alternative. The worst case scenarios are shown, which would be that the entire exchange/storage and release would come out of one of the reservoirs within the South Arkansas River Basin and none from the other 2 reservoirs. The same assumption is true for the Cottonwood Creek Basin reservoirs. Although the largest maximum change is shown for each

month, only the annual maximum of 15 ac-ft for the South Arkansas River Basin reservoirs and 13.2 ac-ft for the Cottonwood Creek Basin reservoirs can be captured in the reservoirs. The change in flows would only occur for the number of days indicated; the other days would experience no change as compared to the No Action Alternative.

Remember that flows would be maintained at the CWCB ISF levels or the CDOW recommendation for Boss Lake Creek ISF. Because of these restrictions there is minimal exchange potential from January through April. But in order not to exclude the possibility of flows on any particular day exceeding CWCB ISF or CDOW recommendations for Boss Lake Creek ISF, this analysis assumes that the flows would be just high enough over those levels to allow the exchange (numbers bolded). Also because of the limits on exchanges, it is unlikely that exchanges during the January through April timeframe would occur every day of the month. Therefore, it is highly unlikely that the percent change to the monthly average shown would actually occur. Because there are senior water rights holders downstream of Boss Lake that call for water from January through March it

would not be possible to exchange any water during that time period.

Therefore, there would be up to a negligible short-term decrease in the flows of Grape Creek for one day each in June and July and increase for 2-3 days in the last half of November as a result of this alternative. There would be a decrease in flows on certain days in each month of the first half of the year ranging from up to negligible at Middle and South Cottonwood Creeks to up to moderate at Gray's Creek, North Fork South Arkansas River, and Boss Lake Creek. An increase in flows on certain days in each month is expected from July through October ranging from negligible at Middle and South Cottonwood Creeks to up to moderate at Gray's Creek, North Fork South Arkansas River, and Boss Lake Creek. Note that due to the uncertainty of error in the hydrologic modeling, a conservative approach (overestimation of effects) has been used here. However, it is unlikely the flow reductions would be this large because they would not be reduced below USFS permit conditions, CWCB ISF levels, and/or CDOW recommendations for Boss Lake Creek ISF.

TABLE 3.5- MODELED MAXIMUM DOWNSTREAM FLOW IMPACTS

Exchanges / Storage	January				February				March				April				May				June				July			
	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)
Grape Cr	14.00	14.00	0	0	17.00	17.00	0	0	32.00	32.00	0	0	53.00	53.00	0	0	59.00	59.00	0	0	90.00	88.00 1 day	0	-2 1 day	50.00	47.00 1 day	-3	-6 1 day
Gray's Cr	4.17	4.00	-4	-4	4.17	4.00	-4	-4	4.17	4.00	-4	-4	4.17	4.00	-4	-4	6.40	5.65 5 days	-2	-12 5 days	17.60	16.10 5 days	-1	-9 5 days	10.30	8.80 5 days	-6	-15 5 days
Boss Lake Cr	0.30	0.30	0	0	0.30	0.30	0	0	0.30	0.30	0	0	0.57	0.40	-30	-30	3.25	2.50 10days	-7	-23 10days	7.75	7.00 10days	-3	-10 10days	4.85	4.10 10days	-6	-15 10days
N Fork S Arkansas R	8.17	8.00	-2	-2	8.17	8.00	-2	-2	8.17	8.00	-2	-2	8.17	8.00	-2	-2	9.50	8.75 5 days	-1	-8 5 days	14.30	12.80 5 days	-2	-10 5 days	9.50	8.00 5 days	-6	-16 5 days
Middle Cottonwood Cr	10.40	10.29	-1	-1	10.11	10.00	-1	-1	10.11	10.00	-1	-1	10.11	10.00	-1	-1	30.00	28.67 5 days	-1	-4 5 days	80.00	78.67 5 days	0	-2 5 days	49.00	47.67 5 days	-4	-3 5 days
South Cottonwood C	10.11	10.00	-1	-1	10.11	10.00	-1	-1	10.11	10.00	-1	-1	10.11	10.00	-1	-1	32.00	30.67	-1	-4	87.00	85.67 5 days	0	-2 5 days	53.00	51.67 5 days	-4	-3 5 days

Releases	July				August				September				October				November				December							
	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)	No Act ion Flows (cfs)	Prop Action Flows (cfs)	Change to Monthly Ave (%)	Diff from Monthly Ave (%)
Grape Cr	50.00	50.00	0	0	36.00	36.00	0	0	20.00	20.00	0	0	17.00	17.00	0	0	19.00	22.00 3 days	2	14 3 days	15.00	15.00	0	0	15.00	15.00	0	0
Gray's Cr	10.30	10.82 3 days	0	5 3 days	4.30	4.78 3 days	1	11 3 days	2.50	2.94 3 days	2	18 3 days	1.70	1.93 3 days	1	14 3 days	1.20	1.20	0	0	0.90	0.90	0	0	0.90	0.90	0	0
Boss Lake Cr	4.10	4.62 3 days	1	13 3 days	1.70	2.18 3 days	3	28 3 days	1.00	1.44 3 days	4	44 3 days	0.70	0.93 3 days	3	33 3 days	0.50	0.50	0	0	0.40	0.40	0	0	0.40	0.40	0	0
N Fork S Arkansas R	8.40	8.92 3 days	1	6 3 days	3.40	3.88 3 days	1	14 3 days	2.10	2.54 3 days	2	21 3 days	1.40	1.63 3 days	2	16 3 days	0.90	0.90	0	0	1.70	1.70	0	0	1.70	1.70	0	0
Middle Cottonwood Cr	49.00	49.50 3 days	0	1 3 days	29.00	29.44 3 days	0	2 3 days	19.20	19.59 3 days	0	2 3 days	16.10	16.27 3 days	0	1 3 days	13.90	13.90	0	0	11.30	11.30	0	0	11.30	11.30	0	0
South Cottonwood C	53.00	53.50 3 days	0	1 3 days	26.70	27.14 3 days	0	2 3 days	17.70	18.09 3 days	0	2 3 days	14.90	15.07 3 days	0	1 3 days	12.80	12.80	0	0	10.40	10.40	0	0	10.40	10.40	0	0

Bold = Modeled average flows elevated just high enough over the CWCB ISF or the CDOW recommendation for Boss Lake Creek ISF levels to allow the exchange. Although unlikely, this analysis assumes that all days of the month would achieve these flow levels.

AQUATIC RESOURCES

Affected Environment

All of the exchanging reservoirs support an active fishery (Policky 2007). The primary fish in these reservoirs are brown, rainbow, and cutthroat trout (Schuckert 2008). The Colorado Division of Wildlife actively stocks these high use areas with fish such as rainbow and cutthroat trout. The streams below these reservoirs support an active fishery, with self-sustaining trout populations (Policky 2007). Along with the fish species mentioned above, fall spawning brook trout are present below O'Haver Lake and North Fork Reservoir (Schuckert 2008). Analysis relative to greenback cutthroat trout will be discussed in the Threatened, Endangered, and Special Species section of this chapter.

Macroinvertebrates represent a significant food source for trout species, and their presence is important to maintaining a productive fishery.

Environmental Consequences

No Action Alternative

This alternative would result in the exchanging reservoirs and downstream hydrology continuing to fluctuate as a result of any existing storage and release operations, water rights administration, and yearly precipitation variations. Therefore, there would be no impact to the exchanging reservoirs or downstream hydrology as a result of this alternative.

Proposed Action Alternative

See the Hydrology section of this chapter for a discussion about the expected changes in the exchange reservoir storage levels as a result of this alternative. It is possible that the increased water levels in summer could reduce stress to fish due to increased oxygen levels and cooler temperatures of the surface water. However, the amount of water involved with this alternative is small relative to the capacities of the reservoirs. Further, the trout species in the reservoirs do not spawn in the reservoir; rather they ascend

tributary creeks and streams where adequate discharge volume and substrate particle size is available (Schuckert 2008). Therefore, this alternative is not expected to cause any adverse impacts to the aquatic resources of the reservoirs.

See the Hydrology section of this chapter for a discussion about the expected changes in the flows downstream of the exchanging reservoirs as a result of this alternative. The maximum increases in flows during the late summer through early fall spawning period are expected to be up 0.48 cfs for the South Arkansas River Basin reservoirs, and 0.44 cfs for the Cottonwood Creek Basin reservoirs. These reservoirs normally release at rates of at least 0.5 cfs (Upper Arkansas 2007b, Smith 2008), making the issue one of increased frequency.

It is possible that fall spawning fish would have to put more of their energy into fighting these higher currents for 5 additional days for each late summer and early fall month over the No Action Alternative instead of preparing physiologically for spawning. Also, due to the increased frequency additional eggs already laid by fall spawning fish could be washed downstream. However, the number of eggs to be affected is expected to be low because the intensity of the flows is not expected to exceed those normally experienced. The 5 days of higher flows during spawning (assuming a 30 day spawning period) in the fall above those later in the winter could cause spawning in redds (gravel beds) that would later not be inundated. The rest of the spawning period would be unaffected. And the flows during the later winter period would not be reduced lower than USFS permit conditions, CWCB ISF levels, or the CDOW recommendation for Boss Lake Creek ISF.

Reduced flows in the spring and early summer could limit spawning habitat for spring spawning fish. The 5 or 10 days of reduced flows in summer could limit the availability of habitat and/or damage incubating eggs of spring spawning fish. This concern would only apply

to those eggs that were laid in the area of the stream to be temporarily not inundated. But again, the flows would not be reduced lower than USFS permit conditions, CWCB ISF levels, or the CDOW recommendation for Boss Lake Creek ISF.

Of the basic physical requirements necessary to sustain macroinvertebrate populations, river depth and flow velocity are the most critical (Nelson and Roline 1996). Significant fluctuations in flow velocity and depth can have negative effects on macroinvertebrates; however, since this variation is typical for high mountain environments, where summer storm events are common, these species are adapted to fluctuations of this nature (Roline 2001). Macroinvertebrates are primarily confined to the areas of the stream that remain submerged during the lowest flows. This alternative would not cause flows to be lower than CWCB ISF levels or the CDOW recommendation for Boss Lake Creek ISF. However, macroinvertebrates could be affected by the greater frequency of fluctuations that would occur as a result of this alternative (Schuckert 2008).

The CWCB ISF program was designed to provide minimum stream flows to preserve the natural environment to a reasonable degree (CWCB 2007). Based on this premise; that the proposed storage and releases would be restricted by the conditions of the USFS permit; and the expected frequency, timing and magnitude of the hydrological changes, there could be a short-term adverse impact to the aquatic resources ranging from up to negligible at Grape, Middle and South Cottonwood Creeks to up to minor at Gray’s Creek, North Fork South Arkansas River, and Boss Lake Creek.

THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

Affected Environment

DeWeese and Grape Creek are in Custer County, whereas all the other reservoirs and affected stream segments are in Chaffee County. Table 3.6 shows the Federally-listed Threatened and Endangered Species within these counties (USFWS 2007).

Table 3.6 – USFWS Federally-Listed Species and Habitat (County)

Species	Scientific Name	Status	Custer	Chaffee
Canada Lynx	<i>Lynx canadensis</i>	Threatened	Yes	Yes
Greenback Cutthroat Trout	<i>Oncorhynchus clarki stomias</i>	Threatened	Yes	No*
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Threatened	Yes	Yes
Uncompahgre Fritillary Butterfly	<i>Boloria acrocynema</i>	Endangered	No	Yes

*Error; should be listed (Ellwood, 2008).

There is no critical habitat for greenbacks (Ellwood, 2008). Within the analysis area, protected populations of greenbacks are only found in Boss Lake. Interagency recovery efforts have resulted in greenbacks in the reservoir and upstream of the reservoir in Boss Lake Creek. Downstream from the reservoir there are other trout species present. The incidental greenbacks that make their way out of the reservoir readily hybridize with the other trout; therefore, the greenbacks downstream of the reservoir are not part of a protected population.

See Appendix B for additional greenback information that was considered during this analysis.

In addition to the USFWS listed species, there is a new moonwort plant species (*Botricium bifurcatum*) that is on the Regional Forester’s Sensitive Species List. This species is not listed by the USFWS and has no special protection under the Endangered Species Act. However, the USFWS requested this species be addressed (Ellwood 2008). The Regional Forester’s

Sensitive Species listing applies to species on U.S. Forest Service lands.

The moonwort occurs within the analysis area; however, exact sensitive location data has been withheld from this report. There is no published data to date for this species. According to studies conducted by the USFS, this moonwort is an upper sub-alpine species that prefers previously disturbed areas. It occurs in meadow openings on rocky or coarse-textured soils (Olson 2008).

Environmental Consequences

No Action Alternative

This alternative would result in the exchanging reservoirs and downstream hydrology continuing to fluctuate as a result of any existing storage and release operations, water rights administration, and yearly precipitation variations. Therefore, there would be no impact to the exchanging reservoirs or downstream hydrology as a result of this alternative.

Proposed Action Alternative

There is no ground disturbances expected with the implementation of this alternative as a result of construction, operation, or maintenance activities. Further, the reservoirs would not exceed their storage capacities which are shown in Table 3.1. The 0.5 cfs that would be released from the reservoirs downstream is well within the normal release patterns for the reservoirs (Upper Arkansas 2007, Smith 2008). Therefore, the only changes expected with the implementation of this alternative are water related. As a result, there are no impacts (“no effect”) to Canada lynx, Mexican spotted owl, or Uncompahgre fritillary butterfly expected with the implementation of this alternative.

This alternative does not concern Boss Lake Creek above the reservoir since it only involves storage in the reservoir and releases downstream. Therefore, there is no potential to impact the protected population of greenbacks in Boss Lake Creek above the reservoir. The

only protected population of greenbacks in the analysis area is at Boss Lake.

See the Hydrology and Aquatic Resources sections of this chapter for a discussion of the expected impacts to the Boss Lake storage levels and aquatic resources of the reservoirs. It is possible that the increased water levels in summer could reduce stress to the greenbacks due to increased oxygen levels and cooler temperatures of the surface water. However, the amount of water involved with this alternative is small relative to the capacities of the reservoirs. Further, the greenbacks in the reservoir do not spawn in the reservoir; rather they ascend tributary creeks and streams to spawn. Therefore, the greenbacks in Boss Lake are not expected to experience any adverse impacts as a result of this alternative (“is not likely to adversely affect”).

The protection of the moonwort plants within the analysis area will be a condition of the permit Upper Arkansas receives from the USFS (Schuckert 2008). As part of this alternative, Upper Arkansas must abide by all conditions of any USFS permits. As such there is no potential to affect (“no effect”) the moonwort plants with the implementation of this alternative.

Reclamation received concurrence from the USFWS on these determinations on March 3, 2008. Further consultation would be required if at any time it is determined other species are found in the project area that are Federally-listed, proposed for Federal listing, or candidates for Federal listing; if critical habitat is designated in the project area; or if new information becomes available that reveals that the action may impact such species in a manner or to an extent not previously considered.

RECREATION

Affected Environment

Fishing is a very popular activity at all of the reservoirs and streams down from the

reservoirs. DeWeese is a State Wildlife Area and in addition to fishing is a popular area for hunting. Several of the reservoirs also have campgrounds at or nearby that provide services to the visitors of the reservoirs and streams. Rainbow is privately owned and hosts a resort for access by guests only. Non-motorized boating is allowed on Cottonwood, Rainbow (private guests only), and O'Haver.

Environmental Consequences

No Action Alternative

This alternative would result in the exchanging reservoirs and downstream hydrology continuing to fluctuate as a result of any existing storage and release operations, water rights administration, and yearly precipitation variations. Therefore, there would be no impact to the exchanging reservoirs or downstream hydrology as a result of this alternative.

Proposed Action Alternative

There is no ground disturbances expected with the implementation of this alternative as a result of construction, operation, or maintenance activities. Further, the reservoirs would not exceed their storage capacities which are shown in Table 3.1. The 0.5 cfs that would be released from the reservoirs downstream is well within the normal release patterns for the reservoirs (Upper Arkansas 2007, Smith 2008). Therefore, the only changes expected with the implementation of this alternative are water related. As a result, there are no impacts to non-water related recreation expected with the implementation of this alternative.

Refer to the Aquatic Resources section of this chapter for a discussion of the expected impacts to sport fish as a result of the implementation of the Proposed Alternative. Using a conservative approach, it is estimated that up to similar levels of impact would result to fishery recreation in those water bodies.

For the magnitudes of hydrologic changes expected with this alternative, impacts to non-

fishery water-related recreation can be directly correlated with whether there is an expected increase (beneficial impact) or decrease (adverse impact) in storage levels and flows. Refer to the Hydrology section of this chapter for a discussion on the expected changes expected with this alternative. By extension, non-fishery water-related recreation is expected to experience up to similar levels of impact during those time periods.

CUMULATIVE IMPACTS

All of the reservoirs and lakes are utilized for storage of water unrelated to the temporary excess storage capacity contracts. Only a portion of the overall operation and maintenance of these reservoirs is attributable to the temporary contract request being contemplated in this EA.

Still, despite what other reservoir operations have, are, or will occur at the exchanging reservoirs related to Upper Arkansas' contract request, the addition of the implementation of this alternative would not cause flows to be reduced lower than CWCB ISF levels or the CDOW recommendation for Boss Lake Creek ISF. Upper Arkansas must comply with any Operating Plans and all conditions of any Special Use Permits that have or will be issued from the USFS. A cumulative impact analysis will be completed by the USFS as part of their ongoing EIS process for the issuance of the Special Use Permits (Sugaski 2007).

However, it is important to consider the cumulative impact of the issuance of multiple one-year contracts in a row. Upper Arkansas received a contract in 2007 and will likely continue to request contracts in the years to follow 2008. The resultant cumulative impact of these consecutive contracts is that all the impacts discussed earlier in this chapter would be long-term.

CHAPTER FOUR – CONSULTATION AND COORDINATION

SCOPING PROCESS

Reclamation conducted extensive consultation and coordination during the 2006-2010 EA process. When 2008 contract requests were received, internal discussions between Reclamation staff established which contract requests were outside the scope of the 2006-2010 EA and defined the scope of analysis for this EA.

In November and December 2007 issues scoping was conducted with Colorado Division of Wildlife (CDOW) and USFS staff. Communications centered on concerns related to aquatic resources and recreation. Discussion with USFS also included their EIS process related to the reservoir operations at O’Haver, Boss, and North Fork and the approval of reservoir operations on their property.

As a result of subsequent conversations with the USFS the Federally-listed threatened greenback cutthroat trout was identified as being a potential concern. In January 2008 the U.S. Fish and Wildlife Service (USFWS) was contacted to discuss this and other species of concern.

As a result of comments submitted by the CDOW, the Colorado Division of Water Resources was contacted regarding administration of state water rights. Particular attention was paid to CWCB ISF.

In addition, a posting to www.fishexplorer.com, www.mountainbuzz.com, and Reclamation’s NEPA Quarterly website at <http://www.usbr.gov/gp/nepa/quarterly.cfm#eca> was posted in January 2008 to determine if there were any concerns or comments on the proposed contract. No comments from the public were received.

COMMENTS ON DRAFT EA AND BIOLOGICAL ASSESSMENT

The Draft EA was sent to the CDOW and USFS for review in January 2008. Reclamation received comment letters from both agencies. Appendix C includes a summary of the comments received along with Reclamation’s responses.

A preliminary Final EA and request for concurrence was subsequently sent to the USFWS in February 2008. That document was in replacement of a Biological Assessment. Concurrence was received on March 3, 2008.

PREPARERS

See Table 4.1 for a list of Reclamation staff involved in the preparation of the EA.

TABLE 4.1 – LIST OF RECLAMATION PREPARERS

Name	Title	Contribution
Gomoll, Terry	Repayment Specialist	Water contracting information and document review.
Musgrove, Tom	Facility Manager	Pueblo Reservoir operations information.
Lamb, Kara	Public Information Specialist	Scoping guidance and posting.
Ronca, Carlie	Natural Resource Specialist	Project management for NEPA compliance and document production.
Thomasson, Ron	Hydraulic Engineer	Hydrologic modeling guidance.
Tully, Will	Environmental Specialist	Environmental compliance guidance and document review.
Vaughan, Roy	Facility Manager	Document review.

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APPENDIX A- RESERVOIR CAPACITY TABLES

Table 1a
North Fork Reservoir - Revised Capacity Table

Elevation 2007 Datum	Water Depth (feet)	Surface Area* (sq. feet)	Surface Area (Acres)	Incremental Volume (Acre-Feet)	Capacity Active Storage (Acre-Feet)	Notes
Unknown						Unknown depth on natural lake
11399	0	516,421.00	11.9		0.0	Lip of concrete box = 11398.9'
11400		538,557.00	12.4	2.1	2.1	
1402		608,552.00	14.0	6.3	8.4	
1404		728,205.00	16.7	0.7	9.1	
1406		840,494.00	19.3	6.0	05.1	
1408		922,373.00	21.2	0.5	45.6	
1410	1	1,002,426.00	23.0	4.2	89.8	
1412	3	1,066,089.00	24.5	7.5	37.3	
1414	5	1,136,303.00	26.1	0.6	87.8	
1416	7	1,190,852.00	27.3	3.4	41.3	
1418	9	1,242,315.00	28.5	5.9	97.1	
1420	1	1,291,172.00	29.6	8.2	55.3	
1422	3	1,340,276.00	30.8	0.4	15.7	
1424	5	1,390,191.00	31.9	2.7	78.4	
1426	7	1,453,278.00	33.4	5.3	43.7	
11424.5	25.5				594.7	Capacity@ spillwayelev

Table 1b
North Fork Reservoir - Depth vs. Capacity Table
Volume in acre-feet

Depth	0.1	2	3	4	5	6	7	8	9	
0	0.0	1.2	2.4	3.6	4.8	6.1	7.3	8.5	9.7	10.9
1	12.1	13.4	14.7	16.1	17.4	18.7	20.0	21.3	22.6	24.0
	25.3	26.6	27.9	29.2	30.5	31.9	33.2	34.5	35.8	37.1
3	38.4	40.0	41.5	43.0	44.6	46.1	47.6	49.2	50.7	52.3
	53.8	55.3	56.9	58.4	59.9	61.5	63.0	64.5	66.1	67.6
5	69.1	70.9	72.7	74.5	76.3	78.1	79.9	81.7	83.5	85.3
	87.1	88.9	90.7	92.5	94.3	96.1	97.9	99.7	101.5	103.3
7	105.1	107.2	109.2	111.2	113.2	115.3	117.3	119.3	121.3	123.4
	125.4	127.4	129.4	131.4	133.5	135.5	137.5	139.5	141.6	143.6
9	145.6	147.8	150.0	152.2	154.5	156.7	158.9	161.1	163.3	165.5
0	167.7	169.9	172.1	174.3	176.5	178.8	181.0	183.2	185.4	187.6
11	189.8	192.2	194.5	196.9	199.3	201.7	204.0	206.4	208.8	211.2
2	213.5	215.9	218.3	220.7	223.0	225.4	227.8	230.2	232.5	234.9
13	237.3	239.8	242.3	244.9	247.4	249.9	252.5	255.0	257.5	260.0
4	262.6	265.1	267.6	270.2	272.7	275.2	277.7	280.3	282.8	285.3
15	287.8	290.5	293.2	295.9	298.5	301.2	303.9	306.5	309.2	311.9
6	314.6	317.2	319.9	322.6	325.2	327.9	330.6	333.3	335.9	338.6
17	341.3	344.1	346.9	349.6	352.4	355.2	358.0	360.8	363.6	366.4
8	369.2	372.0	374.8	377.6	380.4	383.2	385.9	388.7	391.5	394.3
19	397.1	400.0	402.9	405.8	408.8	411.7	414.6	417.5	420.4	423.3
0	426.2	429.1	432.0	434.9	437.8	440.7	443.6	446.6	449.5	452.4
21	455.3	458.3	461.3	464.3	467.4	470.4	473.4	476.4	479.4	482.5
2	485.5	488.5	491.5	494.5	497.6	500.6	503.6	506.6	509.6	512.7
23	515.7	518.8	522.0	525.1	528.2	531.4	534.5	537.6	540.8	543.9
4	547.0	550.2	553.3	556.4	559.6	562.7	565.8	569.0	572.1	575.2
25	578.4	581.6	584.9	588.2	591.4	594.7	598.0	601.2	604.5	607.7
6	611.0	614.3	617.5	620.8	624.1	627.3	630.6	633.9	637.1	640.4
27	643.7									

Spillway = 25.5 feet

**Boss Lake
Area Capacity
Tables**

2-Nov-99

Elevation (ft)	Survey area/ ft sq	Area (acres)	Capacity (a.f.)	Elevation Spacing (feet)
530	1759198.1051	40.388	1612.53	
528	1724941.4895	39.599	1532.55	2
526	1691675.4675	38.836	1454.11	
524	1658914.5304	38.083	1377.19	
522	1626157.1803	37.331	1301.78	
520	1594186.1873	36.597	1227.85	
518	1563491.9635	35.893	1155.36	
516	1533525.8388	35.205	1084.26	
514	1503427.8931	34.514	1014.54	
512	1473489.4364	33.828	946.20	
510	1443893.6892	33.147	879.23	
508	1411202.4577	32.397	813.68	-El for 796 af is 507.45
506	1379232.4183	31.663	749.62	
504	1346736.1605	30.917	687.04	-El. for 688 af is 504.03
502	1314746.9220	30.182	625.95	
500	1280311.8945	29.392	566.37	Existing Crest El. 500.0
498	1244121.1764	28.561	508.42	
496	1208962.4117	27.708	452.15	
494	1171977.3595	26.905	397.54	
492	1133551.6909	26.023	344.61	
490	1094131.5922	25.118	293.47	
488	1050802.3689	24.123	244.23	Spillway @ 487 +/-
486	1002854.8446	23.022	197.08	Restricted storage - 221 af
484	938922.2330	21.555	152.50	
482	876153.3918	20.114	110.84	
480	798413.1227	18.329	72.39	
478	711981.0725	16.345	37.72	
476	212409.5078	4.876	16.50	
474	169467.3698	3.651	7.86	
472	80735.6295	1.853	2.45	
470	6460.7057	0.148	0.44	
466	0.0000	0.000	0.00	* Start El.

Elevation	Area ft ²	Area Ac.		
476.10	423584.3624	9.724	south	Old Lake (dead Storage)
470.03	12622.0717	0.290	north	Normal Water Level
465.05				Invert of Outlet Intake
463.92				Invert Outfall of Outlet

Equation: Approximate USGS Elevation 10,860 feet = 476.1 ft +/- @ spillway

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OCT 24 2001

DIVISION ENGINEER
PUEBLO, COLORADO

COTTONWOOD LAKE

Chaffee County, Colorado

(W.R. Smith, P.E.)
(Revised 10/15/01)

---Storage Capacity---

---Evaporation Area Calculations---

Location	Elevation (feet)	Depth (feet)	Surface Area (acres)	Cap. of Segment (ac.ft.)	Available Storage (ac.ft.)	Surface Area (acres)	Area of Nat. Lake (acres)	Difference between nat. lake and seg. (acres)
Bottom of Channel	-4.0		31.72	0.00	0.00			
	-3.0		33.43	0.00	0.00			
Original Stream ---	-2.5	3.0	34.39	0.00	0.00	34.39	34.39	0.00
Channel Flowline	-2.4	2.9	34.58	3.45	3.45	34.58	34.39	0.19
	-2.3	2.8	34.77	3.47	6.92	34.77	34.39	0.38
	-2.2	2.7	34.96	3.49	10.41	34.96	34.39	0.57
	-2.1	2.6	35.15	3.51	13.92	35.15	34.39	0.76
Bottom of F. S. ---	-2.0	2.5	35.34	3.52	17.44	35.34	34.39	0.95
Spillway	-1.9	2.4	35.75	3.55	20.99	35.75	34.39	1.36
	-1.8	2.3	36.15	3.60	24.59	36.15	34.39	1.76
	-1.7	2.2	36.56	3.64	28.23	36.56	34.39	2.17
	-1.6	2.1	36.97	3.68	31.91	36.97	34.39	2.58
	-1.5	2.0	37.38	3.72	35.63	37.38	34.39	2.99
	-1.4	1.9	37.78	3.76	39.39	37.78	34.39	3.39
	-1.3	1.8	38.19	3.80	43.19	38.19	34.39	3.80
	-1.2	1.7	38.60	3.84	47.03	38.60	34.39	4.21
	-1.1	1.6	39.00	3.88	50.91	39.00	34.39	4.61
	-1.0	1.5	39.41	3.92	54.83	39.41	34.39	5.02
	-0.9	1.4	40.05	3.97	58.80	40.05	34.39	5.65
F.S. decrees 59.3	-0.8	1.3	40.69	4.04	62.84	40.69	34.39	6.30
acre feet	-0.7	1.2	41.34	4.10	66.94	41.34	34.39	6.95
	-0.6	1.1	41.98	4.17	71.11	41.98	34.39	7.59
	-0.5	1.0	42.62	4.23	75.34	42.62	34.39	8.23
	-0.4	0.9	43.26	4.29	79.63	43.26	34.39	8.87
	-0.3	0.8	43.90	4.36	83.99	43.90	34.39	9.51
	-0.2	0.7	44.55	4.42	88.48	44.55	34.39	10.16
	-0.1	0.6	45.19	4.49	93.03	45.19	34.39	10.80
Top of F. S. ---	0.0	0.5	45.83	4.55	97.63	45.83	34.39	11.44
Spillway	+0.1	0.4	46.09	4.60	102.25	46.09	34.39	11.70
	+0.2	0.3	46.35	4.62	106.90	46.35	34.39	11.96
	+0.3	0.2	46.61	4.65	111.57	46.61	34.39	12.22
	+0.4	0.1	46.87	4.67	116.27	46.87	34.39	12.48
Top of 6" plate	+0.5	0.0	47.13	4.70	121.00	47.13	34.39	12.74
above current	+0.6**		47.39	4.73	125.75	47.39		
storage capability	+0.7**		47.65	4.75	130.53	47.65		
"	+0.8**		47.91	4.78	135.33	47.91		
"	+0.9**		48.17	4.80	140.15	48.17		
"	+1.0**		48.43	4.82	145.00	48.43		
"	+2.0**		51.30	49.87	190.02	51.30		

Up. Ark decree of 50.00 acre feet is at total available storage of 59.3 (F.S. Decree) +50.00 = 109.3

Measured elevations are from Timberlin survey of August 29, 1995.

RAINBOW LAKE

Chaffee County, Colorado

CAPACITY TABLE

Contour (*)	Elevation (**) (feet)	Depth (feet)	Surface Area (ac. ft.)	Cap. of Segment (ac. ft.)	Available Storage (ac. ft.)					
						2.5	2.5	17,904	1,790	36,144
						2.6	2.6	18,001	1,800	36,952
						2.7	2.7	18,258	1,826	41,778
-5			10,020			2.8	2.8	18,435	1,844	43,621
			10,251			2.9	2.9	18,612	1,861	45,482
			10,482			3	3	18,789	1,879	47,361
			10,713			3.1	3.1	18,966	1,897	49,258
			10,944			3.2	3.2	19,143	1,914	51,172
			11,175			3.2	3.2	19,143	1,914	51,172
			11,406			3.3	3.3	19,320	1,932	53,104
			11,637	0.000	0.000	3.4	3.4	19,460	1,946	55,050
-4.3 (bottom of headgate)	0	0	11,637	0.000	0.000	3.5	3.5	19,600	1,960	57,010
	0.1	0.1	11,868	1,187	1,187	3.6	3.6	19,740	1,974	58,984
	0.2	0.2	12,099	1,210	2,397	3.7	3.7	19,880	1,988	60,972
-4.0	0.3	0.3	12,330	1,233	3,630	3.8	3.8	20,020	2,002	62,974
	0.4	0.4	12,572	1,267	4,897	3.9	3.9			***
	0.5	0.5	13,014	1,301	6,198	4	4			
	0.6	0.6	13,356	1,336	7,534	4.1	4.1			
	0.7	0.7	13,698	1,370	8,904	4.2	4.2			
	0.8	0.8	14,040	1,404	10,308	4.3	4.3			
	0.9	0.9	14,382	1,438	11,746					
	1	1	14,724	1,472	13,218					
	1.1	1.1	15,066	1,507	14,725					
	1.2	1.2	15,408	1,541	16,266					
-3.0	1.3	1.3	15,750	1,575	17,841					
	1.4	1.4	16,093	1,593	19,434					
	1.5	1.5	16,436	1,611	21,045					
	1.6	1.6	16,779	1,629	22,674					
	1.7	1.7	17,122	1,647	24,321					
	1.8	1.8	17,465	1,665	25,986					
	1.9	1.9	17,808	1,683	27,669					
	2	2	18,151	1,701	29,370					
	2.1	2.1	18,494	1,719	31,089					
	2.2	2.2	18,837	1,737	32,826					
-2.0	2.3	2.3	19,180	1,755	34,581					
	2.4	2.4	19,523	1,773	36,353					

* These contours are from the survey map developed by Timberline Surveying, Inc for the Upper Arkansas Water Conservancy District on September 12, 1995.

** The elevations are computed from the bottom of the spillway which is at contour -4.3.

*** Storage not available below this line with present spillway.

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 PUEBLO, COLORADO

O'HAVER RESERVOIR
 CAPACITY TABLE
 by
 William R. Smith, P.E.

Contours used in developing this capacity table are based on the original plans and specifications. Contour intervals on the plans are at five foot intervals. In order to make the table easier to administer, one foot contours were interpolated with the top 2 feet interpolated to 0.1 foot.

Information from original plans and specifications.
 Spillway elevation 118.8 feet.
 Surface Area 15.2 ac ft.
 Capacity of reservoir at spillway 193.4
 Elev approx. 9000 ft
 Sec. 12, T. 48 N., R. 7 E., NMPM

Elev.	Depth feet	Planimeter Reading	Area acres(a)	Average acres	Capacity of Interval ac.ft.	Cumulative capacity ac. ft.
108.80	0.00	608.8	15.20			
108.70	0.10		15.10	15.15	1.52	1.52 spillway
108.60	0.20		15.01	15.06	1.51	3.02
118.50	0.30		14.91	14.96	1.50	4.52
118.40	0.40		14.82	14.87	1.49	6.01
118.30	0.50		14.72	14.77	1.48	7.49
118.20	0.60		14.63	14.68	1.47	8.96
118.10	0.70		14.53	14.58	1.46	10.42
118.00	0.80		14.44	14.49	1.45	11.87
117.90	0.90		14.34	14.39	1.44	13.31
117.80	1.00		14.25	14.30	1.43	14.74
117.70	1.10		14.15	14.20	1.42	16.16
117.60	1.20		14.06	14.11	1.41	17.57
117.50	1.30		13.91	13.99	1.40	18.97
117.40	1.40		13.81	13.86	1.39	20.36
117.30	1.50		13.72	13.77	1.38	21.74
117.20	1.60		13.62	13.67	1.37	23.11
117.10	1.70		13.53	13.58	1.36	24.47
117.00	1.80		13.43	13.48	1.35	25.82
116.90	1.90		13.34	13.39	1.34	27.16
116.80	2.00		13.24	13.29	1.33	28.49
116.70	2.10		13.15	13.20	1.32	29.81
116.60	2.20		13.05	13.10	1.31	31.12
116.50	2.30		12.96	13.01	1.30	32.42
115.50	3.30		12.88	12.91	12.91	45.33
115.00	3.80	509.00	12.72	12.79	12.79	58.32
114.00	4.80		12.11	12.42	12.41	70.73
113.00	5.80		11.51	11.81	11.81	82.54
112.00	6.80		10.90	11.20	11.20	93.74
111.00	7.80		10.30	10.60	10.60	104.34
110.00	8.80	388.00	9.69	10.00	10.00	114.34
109.00	9.80		9.08	9.39	9.39	123.73
108.00	10.80		8.46	8.77	8.77	132.50
107.00	11.80		7.85	8.16	8.16	140.66
106.00	12.80		7.23	7.54	7.54	148.20
105.00	13.80	285.00	6.62	6.93	6.93	155.13
104.00	14.80		6.00	6.31	6.31	161.44
103.00	15.80		5.38	5.69	5.69	167.13
102.00	16.80		4.75	5.07	5.07	172.20
101.00	17.40		4.13	4.44	4.44	176.64
100.00	18.80	140.50	3.51	3.82	3.82	180.46 bottom of outlet
95.00	23.80	32.25	0.81	2.16	10.80	191.26 dead storage
94.00	24.80	12.00	0.30	0.56	0.55	191.81 dead storage

(a) Area in sq. ft. = 15.2acres / 608.6 units = 0.0250
 0.025 X number of planimeter units

Note:
 There is a difference in the total storage area between this calculation and the area indicated on the original plans. The only explanation for this would be the small scale from which the calculations were made.

APPENDIX B – GREENBACK CUTTHROAT SPECIES INFORMATION

The following information was considered during the analysis of effects for the greenback cutthroat trout (*Oncorhynchus clarki stomias*; greenback) in addition to that contained in Chapter 3. The information was taken from the Greenback Cutthroat Trout Recovery Plan (USFWS 1998).

The greenback is native to the headwaters of the South Platte and Arkansas River drainages within Colorado and a small segment of the South Platte drainage within Wyoming. However, the greenback declined so rapidly in the 1800's that the original distribution of the subspecies is not precisely known. At the time of the enactment of the Endangered Species Act in 1973, only 2 small historic populations of greenbacks were known to exist in Como Creek and South Fork Cache La Poudre River. By the writing of the Greenback Cutthroat Trout Recovery Plan, the greenback was in 61 sites that totaled 166 hectares of lakes and 165 kilometers of stream habitat in the upper tributaries of the South Platte and Arkansas River drainages. Also by this time it was believed that 20 populations were stable self-sustainable populations, with only 3 occurring in the Arkansas River drainage. These historic populations are located in the higher elevations of the species' historic range, probably because of less habitat disturbance and less accessibility to humans than occurred in the lower elevations.

Greenbacks are very susceptible to land and water exploitation, mining, agriculture, logging, and unregulated fishing. However, the most long-term impacts have been caused by the introduction of non-native trout species which hybridize and compete with native fishes for space and food. The mechanism by which brook trout displace greenbacks is not thoroughly understood, but probably includes an advantage gained through a one year earlier sexual maturation by brook trout. Also, brook trout spawn in the fall leading to larger young-of-the-year at any given point in the year, which allowed them to better compete for food and deal with energy expenditures. Brown trout of equal-sized greenbacks are more aggressive and able to displace greenbacks. Greenbacks are easier to catch by anglers than other trout species.

The habitat requirements of greenbacks are similar to those of other trout species. Greenbacks inhabit cold water streams and cold water lakes that have stream spawning habitat present in the springtime. However, habitat unoccupied by other trout species is optimal. Stable reproducing populations of greenbacks above timberline in Colorado are rare since there is not sufficient time for spring spawning, hatching, and establishment of fry in the ice-free period. At the time of the writing of the Greenback Cutthroat Trout Recovery Plan, the highest elevation known was 3,402m. The lower elevation limit is not known, but stocking efforts at 1,889m have been successful.

Spawning is initiated in the spring when temperatures reach 5-8C. Females in most subalpine streams of Colorado are thought to mature after their 3rd-4th summer of life. Greenback size and growth varies based upon the elevation and population size, between 356-510mm.

Greenbacks are reported to feed upon terrestrial organisms during the summer, primarily adult Hymenoptera and adult Diptera. This diet was observed to decline rapidly in October with temperature decreases. Greenbacks are not known to be cannibalistic.

Although greenbacks generally show no overt signs of whiling disease infection such as skeletal deformities and tail chasing, mortalities for infected greenbacks are higher than for infected rainbow

trout. The threshold concentration of pH in the absence of aluminum is pH 5.0, but adverse affects occur at pH 6.0. Greenback eggs are particularly sensitive to heavy metals.

“The objective of the Greenback Cutthroat Trout Recovery Plan is the removal of this subspecies from the list of Threatened and Endangered Species. This subspecies will be considered recovered when 20 stable greenback cutthroat trout populations are documented representing a minimum of 50 hectares of lakes and ponds and 50 kilometers of stream habitat within its native range. A minimum of five of these populations will exist in the Arkansas River drainage. Once recovery objectives have been met, a long range management strategy will be implemented for the continued restoration of the species.”

A stable self-sustaining greenback population is one that maintains a minimum of 22 kg of greenbacks per hectare of habitat through natural reproduction. There should be at least 500 adults greater than 120mm in length and there should be a minimum of 2 year classes within a 5 year period established through natural reproduction. The population cannot be considered stable unless it is separated by physical or biological barriers from other trout. The locations the team selected for recovery have concentrated on headwater streams and high elevation lakes for these reasons.

APPENDIX C – COMMENT RESPONSES

Two letters were received on the Draft EA. The following provides a summary of the comments received along with Reclamation's responses.

COLORADO DIVISION OF WILDLIFE submitted by Dan Prenzlow, Regional Manager

Comment: It appears that completion of this scoping/Draft EA is premature pending the completion of the USFS EIS process. CDOW would request the option to amend or modify these comments if the assumptions and data used in this EA are altered by decisions reached in the USFS EIS.

Response: The process to receive temporary contracts occurs on an annual basis for an identified need in that contract year. The USFS EIS process will not be completed in this contract request year, but Upper Arkansas and the USFS have/are working on conditions to allow Upper Arkansas to operate temporarily. Reclamation would require Upper Arkansas through its contract to abide by all the conditions and stipulations that USFS has or will place on Upper Arkansas. Reclamation does not believe that issuance of the proposed contract will limit management options available to the USFS. On an annual basis Reclamation reviews the contract requests it receives. Assuming Upper Arkansas submits another request for 2009; Reclamation will revisit the progression of the USFS EIS process, will contact the CDOW at that time, and adjust details for their new contract accordingly.

Comment: With regard to Table 1.1, DOW cannot determine whether mean flows below Pueblo Reservoir could be permitted to fall as low as 25 cfs (50% of 50cfs) or if Reclamation intends to curtail all temporary excess capacity exchanges when flows below Pueblo Reservoir are ≤ 50 cfs. There are several agreements and cooperative efforts underway to maintain a minimum flow of the Arkansas River below Pueblo dam to maintain the fishery. A cooperative target of 100cfs has been chosen for the period under the Winter Water Storage Program (November 15 - March 15).

Response: It is possible that flows could fall below 50 cfs, but it would not be a result of allowing Upper Arkansas to exchange into an excess capacity space. Clarification has been added to Table 1.1.

Comment (also submitted by U.S. Forest Service): According to Table 1.1 Upper Arkansas will not attempt to store water in the proposed reservoirs prior to a favorable water supply forecast by NRCS on May 1st. However, Table 3.3 indicates storage underway during the period January through June.

Response: This commitment specifically addresses contract exchanges which involve an exchange of water between Reclamation facilities. Upper Arkansas' request involves exchange into non-Reclamation reservoirs. Clarification has been added to Table 1.1 to specify this commitment is not applicable.

Comment: It is not clear from the report under what water right or priority date Upper Arkansas plans to exchange to the reservoirs. Based on statements and the estimated hydrology within the report, the CWCB ISF are rarely exceeded in months other than May, June, and July. The CDOW recommends limiting future excess capacity contracts and their exchanges that could injure CWCB ISF water rights to May 1st through June 30th. Limiting future exchanges to this time period would lessen the impact on the existing low wintertime flows and would ensure the CWCB ISF water rights were being met without placing an undue burden on the parties to monitor stream flow conditions in these remote areas.

Response: Clarification relative to CWCB ISF and Upper Arkansas exchange rights has been added to Chapters 2 and 3. The current oversight by the State Engineer would continue with respect to the

exchanges, which involves a request by Upper Arkansas and approval by the State Engineer when there is sufficient flows and an order to cease exchanges when there is no longer sufficient flows. The State Engineer is able to ensure CWCB ISF are uninjured by considering flows at gages further downstream and by knowing what is being used by senior water users. Administration of CWCB ISF and other water rights has not been an issue and would not be expected to be an issue with the implementation of the Proposed Action Alternative (Smith 2008).

Comment (also submitted by U.S. Forest Service): The release or storage patterns may subject stream flows to excessively high or low flows, unless those releases can be extended. The CDOW requests that releases be extended over several days or over a week long period with the goal of a daily target release of 0.5cfs for all waters, when such releases can be accommodated. Generally, aquatic stream habitats and the trout populations considered under this scoping/EA should benefit from moderating both high and lower flows projected for the preferred alternative.

Response: The EA already shows releases for all reservoirs except DeWeese would not exceed 0.52cfs (see response below for DeWeese), or essentially what you are requesting.

Upper Arkansas believes their ability to store would highly depend upon times when there are increases above CWCB ISF as a result of snowmelt or rainfall events. These events may only occur during a few days each month and they believe limiting the flow allowed for storage would severely limit their ability to fully exchange its water. Nevertheless, Upper Arkansas exchange rights are junior to CWCB ISF for all but Gray's Creek. In addition, for this year's contract request Upper Arkansas has committed to not decreasing flows below the CWCB ISF for Gray's Creek. The CWCB ISF program was designed to provide minimum stream flows to preserve the natural environment to a reasonable degree (CWCB 2007). Further, despite there being no CWCB ISF at Boss Lake Creek, Upper Arkansas has committed to not cause a decrease in the flows below the CDOW recommendation for Boss Lake Creek ISF shown in Table 3.2 as a result of the proposed April through July exchanges at that location. Assuming Upper Arkansas submits another request for 2009, Reclamation will revisit the progression of the USFS study to determine an appropriate CWCB ISF for Boss Lake Creek and will adjust accordingly. In addition, Upper Arkansas must also comply with all conditions of their permits with the USFS. Reclamation believes these restraints on the exchanges will protect against significant impacts during the capture and release of water.

Comment: The above rationale would also apply to the 2-3cfs additional flow in Grape Creek in November. Such operations will benefit the cooperative winter stream flow program between the U.S. Bureau of Land Management and the Dye-DeWeese Irrigation Company by allowing more flexibility and conservation for water releases and water quantities considered under that program.

Response: Clarification has been added to Chapter 2.

Comment: Although the hydrological data that is presented in the Draft EA is rather difficult to completely understand, it appears that incremental (percentage) changes to reservoir storage levels as a result of the proposed action should have insignificant (when comparing Tables 3.1 and 3.2) impacts to aquatic resources or fishing recreation.

Response: Comment noted. Alterations have been made to Chapter 3 to add to and clarify the analysis.

Comment: The CDOW suggests that any party seeking the benefits of an "If and When Account" should be financially responsible for the installation, maintenance and/or data collection needed to assure that no other water rights interests are injured. Real-time data tracking is important since these transfers are not part of the historic stream regime and there is no real basis for which we can be assured that documentation and accounting for transit losses are accurate.

Response: The State Engineer administers and has regulatory oversight of Colorado water law. The State Engineer would decide whether to require such an installation. This issue was discussed with the Lead Water Commissioner of District 11 and he does not believe real time monitoring is necessary at this time to prevent injury (Smith 2008). See additional information added to Chapter 2 on Upper Arkansas abiding Colorado water law and any requirements of the State Engineer.

Comment: Edit text to read “The streams below these reservoirs support an active fishery, with self-sustaining trout populations (Policky 2007).”

Response: Text has been changed in the Aquatic Resources section of Chapter 3.

Comment (also submitted by the USFS): Additional reservoir water in the fall and winter will not increase the reproductive success of fish communities within the reservoirs. The primary fish in these reservoirs is composed of brown, rainbow and cutthroat trout. These species do not spawn in the reservoir; rather they ascend tributary creeks and streams where adequate discharge volume and substrate particle size is available. The small percentage change may not cause an adverse impact but the logic leading to this conclusion is flawed.

Response: Changes have been made to the Aquatic Resources section of Chapter 3.

Comment: The CDOW questions the statement “Macroinvertebrates are primarily confined to the areas of the stream that remain submerged during the lowest flows. This alternative would not violate any of the CWCB ISF and would not cause flows to go below recent low levels.” CWCB ISF rights are junior water rights – they could violate if they wanted to.

Response: Clarification relative to CWCB ISF and Upper Arkansas exchange rights has been added to Chapters 2 and 3.

Comment: DeWeese State Wildlife Area is also a very popular area for fishing.

Response: Clarification has been made in the Recreation section of Chapter 3.

Comment: The statement that the Proposed Alternative “...would not exceed the existing high and low pool levels originally established for and recently seen at the reservoirs, and the water released would still be within the range of normal flows in the downstream rivers. Therefore, there are no impacts to non-water related recreation expected with the implementation of this alternative” cannot be validated without elevation data including the elevation of both high and low pool levels and documentation of what normal flows are downstream. The CDOW believes there potentially could be both direct and indirect impacts.

Response: Surface area and elevation information for the reservoirs has been added to the Hydrology section of Chapter 3, and clarifications have been made to the Recreation section of Chapter 3.

U.S. FOREST SERVICE submitted by William A. Schuckert, District Ranger

Comment: It does not appear that the required consultation with USFWS for Threatened and Endangered species has taken place.

Response: Informal consultation has occurred since the Draft EA. Analysis has been added in a new section of Chapter 3 called Threatened, Endangered, and Special Status Species. The outcome of informal consultation has been added to Chapter 4 – Consultation and Coordination.

Comment: There is no detailed analysis reports associated with this EA. That leads to questions about methodology of analysis, and use of best available science in arriving at the determinations described.

There appears to be obvious effects to habitat and species associated with the project area that are not discussed. This could be a fatal flaw in the analysis presented.

Response: Additional information has been added in the Hydrology section of Chapter 3 relative to changes in reservoir elevations. A new section has been added in Chapter 3 called Threatened, Endangered, and Special Status Species. With these new additions Reclamation believes that the level of detail and depth of impact analysis is sufficient to determine if significant impacts would occur (USDI 2000).

Comment: The Decision Notice needs to clearly identify what the scope of authority is for the decision maker relative to the proposed action and the operation of the dams that are addressed. It also needs to identify those agencies that have the regulatory authority to approve, adjust, or deny the operational plan for each reservoir. It needs to state that the Forest Service is conducting an EIS to determine the operational requirements and constraints for Boss, O'Haver, and North Fork reservoirs.

Response: Comment noted. This information will be carried to the decision document.

Comment: The Forest Service is concerned with the EA's lack of discussion concerning water level fluctuation with regards to the magnitude, duration and impacts.

Response: Reservoir elevation and surface area information has been added to Chapter 3.

Comment: The Forest Service is concerned with any proposal to capture water during the winter months. Native winter discharge volume is essential for self-sustaining aquatic ecosystems, and especially to fish and macroinvertebrate communities. During the winter months, streams are generally at their base or lowest discharge volumes of the year. Fish and macroinvertebrate habitat is minimized and residual pool depth is less than at higher discharge volumes. Fish need adequate pool depth to protect against over-winter mortality caused by low water temperature and ice formation. We feel that any capture of water during these months may greatly impact the sustainability of downstream fish and macroinvertebrate communities.

Response: Capture during any time of the year, including winter months, could not drop lower than CWCB ISF levels and according to any existing or future permit conditions by the USFS. Reclamation does not agree that the sustainability of the communities could be impacted since the minimum stream flows required to preserve the natural environment to a reasonable degree would be upheld. See previous responses above related to Boss Lake Creek, which does not have CWCB ISF water rights.

Comment: The Forest Service Temporary Special Use Permits do not allow hydrologic operations of Boss Lake or O'Haver Lake without an operating plan. To date, the Forest Service has not received any plans from UAWCD for operations of either reservoir. A Temporary Special Use Permit does allow for the refilling of North Fork Reservoir.

Response: Clarifications have been made in Chapter 2 and the Hydrology section of Chapter 3.

Comment: The Forest Service understands that correlation analysis is a common technique, but we question the validity of the relationship developed because no information or data was provided supporting the relationship between the Clear Creek stream gage and the study area. Hydrologic modeling from one basin to another can be highly complex. We're concerned that the analysis used was a simple linear relationship based on area, and did not take into account slope, aspect or several other geographical and physical variables that have significant effects on rainfall, snowfall and snow pack within a basin. Moreover, there was no estimation of the error rate for the model selected. Error rates for these analyses commonly exceed 100-200%. We would like a description of how the model was developed and estimates of the error associated with the model.

Response: Clarification has been added to the Hydrology section of Chapter 3.

Comment: The Forest Service strongly supports the approach of using the worst case scenario, which would be that the entire exchange/capture and release would come out of one of the reservoirs and none from the others.

Response: Comment noted.

Comment: The macroinvertebrate community within and below these reservoirs is adapted to the frequency and duration of “natural” storm events. What the BOR is proposing will increase the frequency of these events over what occurs naturally. The BOR has provided no support that the macroinvertebrate communities can adapt or tolerate a greater frequency of events. Moreover, the proposed capture of water in the winter would be outside the range of natural variability except for drought situations. We strongly believe there could be adverse effects to the macroinvertebrate community from reduced winter flows if capture occurs from November through April.

Response: Comment noted; text changed.

Comment: The trout species of the reservoirs spawn in the spring during high flows, not the fall. Fall spawning brook trout are present below O’Haver Lake and North Fork Reservoir. The proposed reduction in flows during the fall and winter could expose egg-laden brook trout redds to air, resulting in high egg mortality.

Response: Species information has been added to the Aquatic Resources section of Chapter 3. There is no proposed reduction of flows during the fall with the Proposed Action. The impacts you note from the reduction of flows in the winter are already included in the analysis.

Comment: The Forest Service disagrees with the conclusion that the impact to aquatic resources within and below O’Haver, North Fork and Boss Lakes is “minor.” We believe the effect may be “moderate” based on our comments above. Furthermore, the accuracy of the flow modeling that your projections are based on is uncertain and should lead to a more conservative conclusion.

Response: We have acknowledged the error and have incorporated a more conservative approach to evaluating the impacts. Despite this, Reclamation does not believe that the expected changes in flows will cause more than a minor effect. Additional explanation has been added to the Aquatic Resources section of Chapter 3 explaining this determination.