UNITED STATES COURT OF APPEALS
FOR THE TENTH CIRCUIT

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No. 18-1004

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AUDUBON SOCIETY OF GREATER DENVER,
*Petitioner–Appellant*

v.

UNITED STATES ARMY CORPS OF ENGINEERS,
*Respondent–Appellee*

and

CASTLE PINES METROPOLITAN DISTRICT,
CASTLE PINES NORTH METROPOLITAN DISTRICT,
CENTENNIAL WATER AND SANITATION DISTRICT,
CENTER OF COLORADO WATER CONSERVANCY DISTRICT,
CENTRAL COLORADO WATER CONSERVANCY DISTRICT,
TOWN OF CASTLE ROCK, and
COLORADO DEPARTMENT OF NATURAL RESOURCES,
*Intervenors–Appellees*

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ON APPEAL FROM THE UNITED STATES DISTRICT COURT FOR
THE DISTRICT OF COLORADO

CIVIL ACTION NO. 1:14-cv-02749 (HON. PHILLIP A. BRIMMER)

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# INTERVENORS–APPELLEES' APPELLATE APPENDIX

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Respectfully submitted this 3rd day of May, 2018.

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Relevant Portions of the Administrative Record

COLORADO
DEPARTMENT OF NATURAL RESOURCES

SWSI
Statewide Water Supply Initiative

COLORADO WATER CONSERVATION BOARD
STATE OF COLORADO
1876
1937

# Colorado Water Conservation Board

## Statewide Water Supply Initiative

*November 2004*

*Report*

CDM

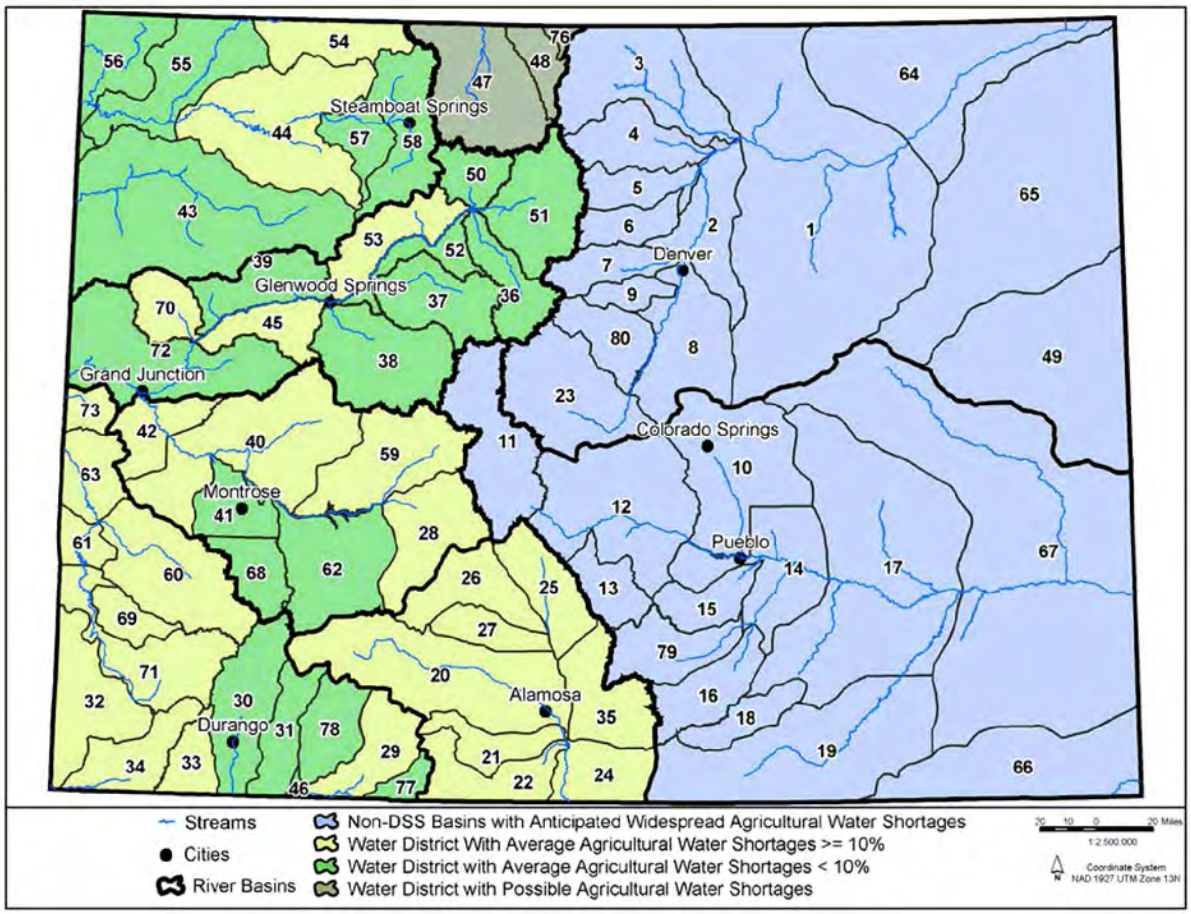


*Figure ES-7*
*Summary of Agricultural Water Shortages by Water District*

## 2. Projects and Processes that Local M&I Providers are Implementing or Planning to Implement Have the Ability to Meet About 80 Percent of Colorado's M&I Water Needs Through 2030

SWSI's unprecedented look at Colorado's future water needs found that while M&I demands will increase substantially by 2030, optimally approximately 80 percent of that increase may be met through successful implementation of projects and processes already underway or planned for implementation by M&I water providers.

All types of water use, ranging from M&I to agricultural, recreational to environmental, are expected to be significant in 2030. Among those, M&I needs in Colorado are expected to see the greatest increase. Through the Basin Roundtables, SWSI examined how the future water needs of each use and user could be met. In many cases, water management solutions were more numerous and further developed for M&I uses, while agricultural, recreational, and environmental solutions were less well defined.

The water management solutions identified by the Basin Roundtable members were compiled for each basin, and categorized as:

- Identified Projects and Processes: those solutions that are relatively well-defined and can reasonably be expected to be implemented between now and 2030
- Options for Future Alternatives to Meet the Remaining Supply versus Demand Gap: those solutions that have significant implementation issues to be resolved before they can move forward, or are

more conceptual in nature and/or are likely to be implemented in later years

In developing the catalog of options for meeting future needs, it became evident that many entities have developed specific projects or water management solutions to meet their needs ("identified projects"), while others had initiated a "process" – an ongoing study or dialog – to do so ("identified processes"). In the latter case, evaluations of different water management solutions might be ongoing, but the entities sponsoring the process have established the process with the intent of meeting the water needs of one or more users in the future. Other solutions for meeting future needs – the Options for Future Alternatives to meet the remaining gap in supply versus demand – were identified by the Roundtables as being potentially suitable for implementation, but in need of further evaluation as part of a longer-term strategy for meeting needs.

Thus, the Identified Projects and Processes are those solutions that have been identified by the project sponsors or collaborators as moving forward with implementation reasonably expected to occur between now and 2030. For many M&I water providers, part of the Identified Projects and Processes includes increased conservation measures over Level 1 conservation. Some Identified Projects and Processes involve storage, reuse, or additional diversions from existing transbasin projects. In keeping with SWSI's intent to not interfere with local planning, SWSI did not seek to judge the merits or probability of success of any individual project or group of projects. Rather, it was assumed for initial purposes that the Identified Projects and Processes will meet their water supply objectives (e.g., yield) and will be used to address the increases in demands, lowering the supply gap.

The "remaining supply versus demand gap" for M&I uses was estimated through discussions with water providers and local governmental officials and examination of demand projections. This remaining gap is the result of water providers indicating that while they might have projects or other solutions in mind for meeting future demands, they saw significant implementation challenges and were less confident of successful implementation without additional assistance. The remaining gap also consists of areas where there are known limitations on available supplies or where future growth is projected in areas where there is not currently a water provider. The estimate of gap was subtracted from the overall increase in demands for M&I, along with additional savings from Level 1 conservation anticipated by 2030, to identify the demands that will be met by the Identified Projects and Processes, including additional conservation beyond Level 1.

SWSI found that under the most optimistic scenario, if fully implemented, the Identified Projects and Processes are capable of meeting about 80 percent of the state's projected M&I water needs through 2030. That is, statewide, about 511,800 AF of the 630,000 AF gap projected in 2030 could be addressed with the Identified Projects and Processes, leaving a remaining gap in supply of about 118,200 AF statewide.

Figure ES-8 shows the total increase in M&I water demand *after* accounting for additional savings from Level 1 conservation for each basin ("supply need" on the chart), along with the relative proportion of that supply need that could be met by the Identified Projects and Processes' yields ("identified" portion of the supply need on the chart) and the remaining gap between supply and demand after those Identified Projects and Processes are implemented ("gap" on the chart). Table ES-3 provides a summary of the Identified Projects and Processes by basin and the amount of demand estimated by project sponsors and collaborators that they would satisfy, with the exception of the North Platte Basin, which has a very low projected increase in M&I demands.

## 7. Water Conservation (Beyond Level 1) Will Continue to be Relied Upon as a Major Tool for Meeting Future M&I Demands, but Conservation Alone Cannot Meet All of Colorado's Future Needs

Water conservation will continue to be relied upon as a major tool for meeting future demands for Colorado. Conservation can be a cost-effective means to manage water demands, is an option that is under the control of the individual water provider, and does not require any state or federal permits. However, water conservation can harden demand and reduce operational flexibility.

It is necessary to distinguish between water conservation and temporary demand modification measures such as drought restrictions. Temporary drought restrictions include requests for voluntary demand reductions or mandatory water use restrictions during drought conditions. This type of demand modification usually involves drastic, temporary behavioral changes such as not watering lawns, trees, plants, or not washing the car. Droughts can also result in permanent water conservation benefits, such as retrofitting indoor plumbing devices with more efficient water saving devices or reducing or eliminating high water use landscaping. During the most recent drought, many water providers contacted as part of the SWSI effort reported that mandatory restrictions resulted in short-term water demand reductions of 20 to 30 percent. Ongoing water use savings at these levels are usually not sustainable without significant impacts to quality of life.

A Level 1 conservation effect, which will occur over time, has been built into the SWSI planning assumptions. Level 1 conservation results in demand reductions from implementation of federal legislation that established maximum water use standards for certain residential and commercial indoor plumbing fixtures. This conservation requires no action on the part of water customers or water providers. It is estimated that by 2030, Level 1 conservation will result in demand reduction in Colorado of approximately 101,900 AF.

Additional water conservation savings are anticipated over time as water providers continue existing water conservation programs and implement additional water conservation measures. These efforts beyond Level 1 conservation are included as part of many water providers/ Identified Projects and Processes to meet future M&I demands. This active water conservation impact requires the active efforts of water providers and water customers to maintain and expand water conservation programs.

Water providers may begin water conservation efforts by metering all customers and implementing a program of systematic leak detection and repair of water distribution lines, meters and hydrants. Typical water conservation measures offered by water providers may include:

- Water use efficiency information and public school programs
- Rebates for low-flush toilets and high efficiency clothes washers
- Water use audits of residential, commercial, and industrial customers
- Water use audits of large landscape areas and irrigation systems
- Implementing tiered water rate structures that increase rates in proportion to usage

More advanced or aggressive conservation efforts may include:

- Rebates for landscape replacement and turf removal
- Ordinances restricting landscape areas
- Rebates for irrigation moisture sensors and evapotranspiration based controllers
- Ordinances requiring sub-metering of master-metered properties
- Ordinances requiring water fixture retrofit upon sale of properties
- Ordinances eliminating single-pass cooling systems
- Rebates for installation of non-water using urinals by non-residential customers

According to a survey (Colorado Municipal League 1994), most water providers are engaged in some level of active conservation for long-term reduction in water demands. Information from the Municipal League survey was used to approximate the current level of active conservation effort in each basin. SWSI estimates these current active conservation programs could result in additional water demand savings ranging from 3 to 14 percent by basin, or an estimated 231,000 AF statewide, by 2030 (see Figure ES-19) if the current level

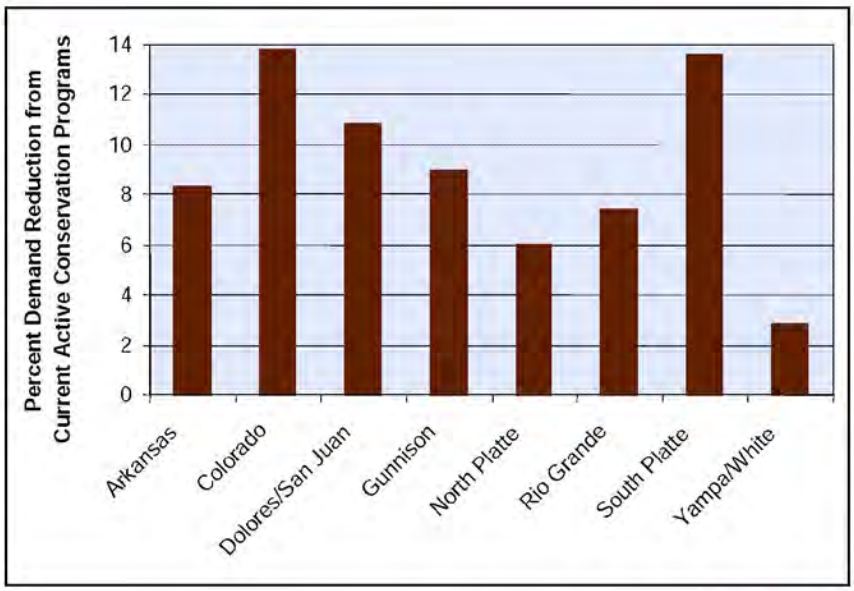


*Figure ES-19*
*Estimated Water Demand Savings by 2030*
*Associated with Current Active Water Conservation Programs*

of effort is sustained over the entire period. Additional conservation savings are factored into the Identified Projects and Processes for many water providers.

Many of the major M&I providers are already at Level 2 and 3 conservation. This makes meeting all future needs through conservation even more difficult and unlikely. Reductions in demand associated with conservation are also, in part, affected by the ratio of SSI to M&I use. For example, the potential reduction is lower in the Yampa/White/Green Basin because a significant portion of that basin's increased demand will be associated with SSI needs.

The reduction in water demand from continuation of the current level of conservation will help Colorado water providers meet future demands. Additional conservation beyond Level 1 is part of many providers' Identified Projects and Processes. However, reliance on water conservation to meet all additional water demands is not possible. While citizens will respond by temporarily reducing water use during drought conditions, and many are willing to make technological improvements in water use efficiency, there are technical and social limits to long-term water conservation. Conservation levels that would need to be imposed to meet all future demands would result in a significant change in the quality of life for most Coloradans.

Also, as Colorado water providers and water customers continue to implement long-term water conservation, it may be harder to expect the 20 to 30 percent demand reductions that were seen in the recent drought for future year droughts. This is due to the "demand hardening" effect. As water customers become more efficient in their everyday use, there is less "room" to conserve – that is, many of the measures that can be taken to reduce both indoor and outdoor water use have at that point become commonplace. Significant further reductions in water use would require more aggressive mandatory measures over time that could impact Coloradans' quality of life. Moreover, if the water that is conserved through these aggressive measures is then used to support increasing demands associated with growth, that water is no longer available to address temporary mandatory demand reductions in response to future drought conditions.

Finally, many water providers today claim credit for return flows from treated wastewater effluent and lawn watering (as prescribed in their water rights). Therefore, reducing lawn watering or indoor water use may reduce return flows and may not result in a net increase in available supply.

Figure 6-2 indicates the implications of uncertainty in the Identified Projects and Processes. To any extent that the Identified Projects and Processes fail to be fully implemented, demand and competition for Colorado's water resources will be further increased and the need to implement alternative solutions will be evident.

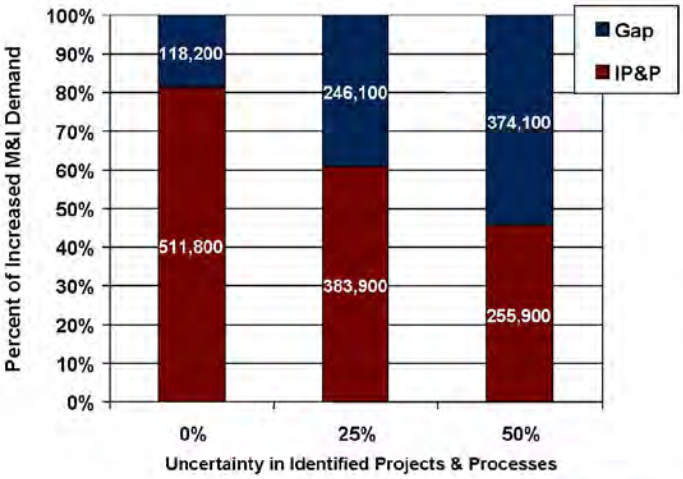


*Figure 6-2*
*Implications of Uncertainty in Identified Projects and Processes on Meeting 2030 M&I and SSI Water Needs*

Any yield that would otherwise have come from Identified Projects and Processes for M&I use might likely instead be satisfied with additional permanent agricultural transfers. History has shown that M&I providers will indeed find a way to meet their customers' needs, and agricultural water is the most readily-available source for meeting those needs. As discussed earlier, agricultural transfer will still require storage and infrastructure to move water from its source to treatment facilities and distribution systems.

Thus, it is possible that a failure to implement the Identified Projects and Processes would result in even greater impacts to irrigated agriculture and the economies dependent thereon. A range of potential changes to irrigated acres was shown in Figure 5-5. The lower end of the range reflects the assumption that all Identified Projects and Processes, including additional conservation, are successfully implemented. As noted, not all of the reduction in irrigated acreage would be available for transfer to meet M&I needs. To illustrate the possible impacts of the uncertainty of the successful implementation of Identified Projects and Processes,

Figure 6-3 shows the additional acres of irrigated farm land that might be put out of irrigated production if 25 to 50 percent of the Identified Projects and Processes were not successfully implemented. Agricultural transfers, however, are also not without risk and uncertainty due to the water court process, volume of storage required, and local and federal permits needed for construction of necessary facilities.

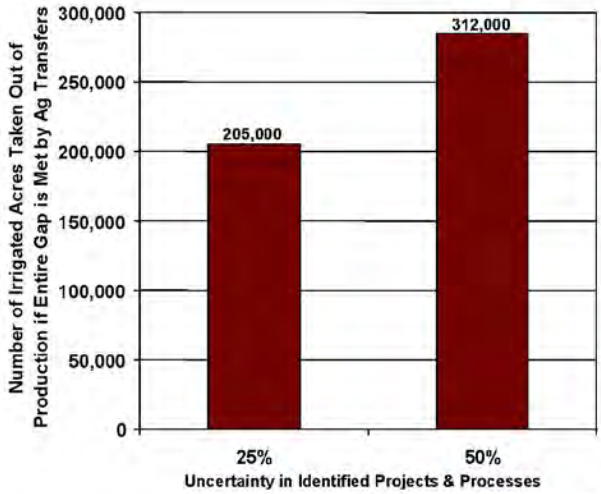


*Figure 6-3*
*Potential Impact on Irrigated Agricultural Acres if Identified Projects & Processes are Not Implemented*

Funding and permitting remain the primary challenges in implementing water management solutions in Colorado. Major implementation issues associated with water use in Colorado are discussed in Section 11 of this report.

## 6.3 Identified Projects and Processes

The catalog of Identified Projects and Processes was summarized by subbasin or county and is presented in this section. Table 6-2 provides a summary of each basin's increased M&I and SSI demands, the amount of that increase provided by the Identified Projects and Processes, and the general locations of the gap.

Table 6-2 Statewide M&I and SSI Gaps in 2030

| Basin | Increase in M&I and SSI Demand (AFY) | Estimated Yield of Identified Projects and Processes if Fully Implemented (AFY) | Estimated Remaining M&I/SSI Gap After Identified Projects and Processes (AFY) | Locations of Gap |
|---|---|---|---|---|
| Arkansas | 98,000 | 80,900 | 17,100 | Upper and Southwestern regions (augmentation credits) and Lower region and unincorporated El Paso County (firm water supply). |
| Colorado | 61,900 | 58,900 | 3,000 | Garfield, Grand and Summit Counties |
| Dolores/San Juan/San Miguel | 18,800 | 13,900 | 4,900 | San Miguel (water supply), Dolores (need for augmentation credits) and San Juan (infrastructure to deliver existing and future water supplies). |
| Gunnison | 14,900 | 12,500 | 2,400 | Crested Butte Mountain Resort, Upper Gunnison and Ouray County (need for augmentation credits) and other unincorporated areas not served by Water Districts. |
| North Platte | 100 | 100 | 0 | No gap anticipated, but storage required for drought reliability |
| Rio Grande | 4,300 | 4,200 | 100 | Physical availability of groundwater, but will need augmentation credits for well pumping. |
| South Platte | 409,700 | 319,100 | 90,600 | South and Denver Metro, Northern, Upper Mountains and Lower Platte. |
| Yampa/White/ Green | 22,300 | 22,300 | 0 | Concerns over drought reliability due to transit losses. Oil shale development in White River basin could significantly increase demands. |
| **Total** | **630,000** | **511,800** | **118,200** | |

Figure 6-4 presents this information on a map of the state. In many cases, the Identified Projects and Processes have benefits for multiple users, such as agriculture, recreation, and environmental needs.

A broad range of water management solutions with varying levels of supply are planned for each of the basins. Many water providers are pursuing multiple projects and will need all of these identified projects to meet their increased demand. This is due to the reality that each of the Identified Projects and Processes has risk associated with them and that they may not yield all of the anticipated water supply. Many of these projects and processes will benefit multiple beneficiaries and therefore address a number of objectives concurrently. However, challenges exist in determining funding sources and acquiring water rights to support the multiple uses. The following subsections provide a brief description of the major Identified Projects and Processes in each basin. Due to the number of counties and distinct areas in the Arkansas, Dolores/San Juan/ San Miguel, and South Platte Basins, those basins are summarized by subbasins, whereas each of the other basins is discussed at a county level. Because of the overall volume of demand and the size of the projected gaps in the South Platte and Arkansas Basins, those basins' Identified Projects and Processes lists are more populated than the other basins'. Details of each Identified Project and Process, as available to SWSI, are provided in the tables in the subsections below associated with each basin. Also provided is a basin-by-basin discussion of environmental and recreational flow issues.

# FINAL INTEGRATED FEASIBILITY REPORT/ENVIRONMENTAL IMPACT STATEMENT (FR/EIS) FOR THE CHATFIELD RESERVOIR STORAGE REALLOCATION STUDY

**Lead Agency**: U.S. Army Corps of Engineers, Northwestern Division, Omaha District

**Abstract:** The U.S. Army Corps of Engineers proposes to reallocate 20,600 acre-feet of storage from the exclusive flood control pool to the conservation pool at Chatfield Reservoir. Chatfield Reservoir is well placed to help meet this objective for the following reasons: the reservoir provides a relatively immediate opportunity to increase water supply storage without the development of significant amounts of new infrastructure; it lies directly on the South Platte River (efficient capture of runoff); and it provides an opportunity to gain additional use of an existing federal resource.

The additional storage would be used for municipal and industrial water supply, agriculture, recreation, and fishery habitat protection and enhancement purposes. In addition to the no action plan, Penley Reservoir combined with gravel pit storage, three other alternatives were evaluated: non-tributary ground water (NTGW) combined with gravel pit storage, reallocation of 20,600 acre-feet and 7,700 acre-feet combined with NTGW and gravel pit storage. The Selected Plan, reallocation to allow an additional 20,600 acre-feet of water supply storage; would reallocate storage from the flood control pool to the conservation pool. Under this alternative, the base elevation of the flood control pool would be raised from 5,432 to 5,444 feet above mean sea level (msl), but the reallocation of storage for this project only involves the volume between 5,432 and 5,444 feet msl. This alternative would provide storage to help meet part of the growing demand for water in the Denver Metro by using existing federal infrastructure, and lessening the dependence on NTGW.

The Selected Plan meets all federal National Economic Development (NED) goals providing $8.42 million in annual NED benefits to total annual NED project costs of $7.92 million. It provides an average year yield of 8,539 acre-feet at less cost than other alternatives for water supply. Mitigation will be required to offset impacts to terrestrial based effects (wetland and riparian habitats, including Preble's meadow jumping mouse critical habitat). Positive environmental effects to the fisheries supported by the reservoir include the inundation of terrestrial habitats which will result in increased habitat structure for use by fish and other aquatic life. Additionally, increased shoreline inundation will enhance productivity at virtually every trophic level in the aquatic food web. The Colorado Department of Natural Resources (CDNR), through its agencies and non-federal project partners, will complete 100 percent of the integral work at no cost to the federal government per the 1958 Water Supply Act and Section 103(c)(2) of the Water Resources Development Act of 1986. Cost of the project is estimated to be $179,000,000. The Omaha District Corps of Engineers may decide to perform the work related to modification or instrumentation of the dam or other Chatfield Project safety features, as well as modifications to project operating documents and processes. The district would also retain responsibility for oversight of the CDNR work and inherent government responsibilities, including agency approvals and decisions. The Corps work is estimated to cost $1,730,000 and will be funded 100 percent non-federal. The proposed CDNR work is integral to the reallocation project, because all the work and features are essential components of the Selected Plan, would otherwise have been performed by the Corps, are not inherent governmental responsibilities and are not already a task required to be performed by the non-federal sponsor (such as Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas). All the work is eligible to be performed by CDNR, because it is within the non-federal cost-share, which for water supply is 100

percent non-federal. Design and construction activities will include on-site and off-site environmental mitigation; modification/re-construction of all impacted recreation facilities; utility relocations; earthwork and shoreline contouring; road, bridge and parking lot construction; demolition, clearing, and grubbing; and vegetation management. Design and construction of environmental mitigation features and recreation modifications will follow Corps standards and regulations, as well as applicable federal laws governing non-federal construction. All plans will be approved by the Corps. The Assistant Secretary of the Army for Civil Works approval of this FR/EIS and determination of whether the proposed CDNR work items are integral will identify what CDNR work might be eligible for Section 116 credit. The acceptance of the work and the affording of credit towards the non-federal share will be determined by the Omaha District inspection and certification in accordance with the terms of the Water Storage Agreement.

The reallocation of flood storage to water supply storage would primarily result in greater and more frequent reservoir pool fluctuations at Chatfield Reservoir, but the impact on downstream flood frequency is negligible.

**Comments:** Please send comments or questions on this Final Feasibility Study/Environmental Impact Statement to: U.S. Army Corps of Engineers, CENWO-PM-AA, Attention: Gwyn Jarrett, 1616 Capitol Avenue, Omaha, NE 68102-4901, telephone (402) 995-2717, or by email: chatfieldstudy@usace.army.mil. The official closing for receipt of comments will be 30 days from the date of which the notice of Availability of the Final Feasibility Study/Environmental Impact Statement appears in the Federal Register.

# CHATFIELD RESERVOIR STORAGE REALLOCATION

## Final Integrated Feasibility Report

## and

## Environmental Impact Statement

July 2013

US Army Corps
of Engineers®

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This document is an Integrated Feasibility Report and Environmental Impact Statement. The sections required by the National Environmental Policy Act are starred "* NEPA Required."

Section 808, as amended, authorizes the Secretary of the Army to implement a reallocation of existing storage at Chatfield Reservoir to any of several named purposes upon meeting two conditions. First, CDNR must request and coordinate the reallocation. Second, the Chief of Engineers must find the reallocation to be feasible and economically justified. If these conditions are met, the Secretary can approve reallocation without obtaining additional authority from Congress. This Feasibility Report (FR)/EIS has been prepared under the Section 808 project authorization to document the study, its findings, and the recommendation of a Selected Plan and conduct the analyses required to support the Chief of Engineer's findings (ER1105-2-100, page 4-2).

Section 116 of the Omnibus Appropriations Act of 2009 (P.L. 111-8) authorizes CDNR to perform facility modifications and mitigation for the project, provided that the Secretary of the Army collaborates with CDNR and local interests to determine storage cost repayments that reflect the limited reliability of the reallocated storage space. In accordance with implementation guidance for Section 116 of the Omnibus Appropriations Act of 2009, the Secretary must make a determination whether the in-kind credits that would be afforded to CDNR are integral to the reallocation project. On January 31, 2012 the CDNR reconfirmed interest in the project and on February 10, 2012, through its office the CWCB, identified work that is important for project implementation. Specifically, CWCB identified that work integral to the project to be completed after execution of the Water Storage Agreement (WSA) at 100 percent non-federal cost includes but is not limited to: 1) on-site and off-site environmental mitigation; 2) modification/re-construction of all impacted recreation facilities; 3) utility relocations; 4) earthwork and shoreline contouring; 5) road, bridge and parking lot construction; 6) demolition, clearing, and grubbing; and 7) vegetation management. Both letters from CDNR are located in Chapter 5 and Appendix DD.

## 1.5 Project Allocation

Reservoir water levels vary with the amount and timing of inflows and of releases for flood risk management or water rights. Chatfield Reservoir currently consists of four storage layers referred to as pools (i.e., inactive, multipurpose-conservation, flood control, and maximum surcharge/spillway design flood) that are used for different purposes. These pools are discussed in detail in Chapter 2. The existing multipurpose-conservation pool, which extends from 5,385 to 5,432 feet above mean sea level (msl), contains existing water storage rights of storage space between elevation 5,432 msl and 5,423 msl held by Denver Water (USACE, 2005a). Denver Water considers its use of this pool to be a vital and permanent component of its water supply system. Denver Water uses water stored in Chatfield Reservoir primarily for exchange to its upstream reservoirs, such as Strontia Springs and Cheesman. Water is released from Chatfield Reservoir to supply a senior water right downstream of Chatfield, in exchange for allowing Denver Water to divert a like amount of water at its upstream reservoirs with more junior water rights. Filling these upstream reservoirs allows Denver Water to deliver water to treatment plants. In addition, Denver Water uses the available space in Chatfield Reservoir to provide bypass flows in the South Platte River between Strontia Springs Dam and Chatfield Reservoir that maintain the trout fishery in Waterton Canyon. Without the storage space in Chatfield Reservoir and the subsequent exchange operations, these flows would be lost from the Denver Water system. Because the 1979 Agreement granting Denver Water the exclusive right to store water in Chatfield Reservoir is only modifiable by mutual agreement, Denver Water considers any alternatives that would decrease the amount of its storage capacity in Chatfield to be unacceptable. As a result, water below 5,432 feet msl is not available for reallocation and cannot be

- East Cherry Creek Plan
- Agricultural transfers and reuse
- Additional NTGW
- Reuse for nonpotable irrigation of parks and golf courses and other landscaping
- Indirect potable reuse by the discharge of reusable effluent to a water body for later recapture
- Blending of high quality and low quality water supplies to achieve the maximum volume of potable water that is of acceptable quality
- Treating lower quality water sources

The information presented in this chapter establishes the context of the analysis within the USACE authorities and the purpose and need for the project. The focus of the Chatfield Reservoir storage reallocation study on particular aspects of physical, natural, and cultural resources in and around the Chatfield Reservoir results from the topics discussed above. The remaining chapters provide details on the proposed action and alternatives, describe existing and future conditions for the various resources, and assess the potential positive and negative effects of implementing the proposed action or alternatives.

### 1.9.1 Water Supply and Demand of the Water Providers

The water providers participating in the Chatfield Reservoir storage reallocation study provided their water demand by decade through 2050. The water demand estimates take into account the water providers' conservation programs that are described in Appendix AA. Table 1-2 shows this demand. Most of the participants were projected to meet their 2010 demand. The Central Colorado WCD and Western Mutual Ditch Company will provide augmentation and irrigation water, respectively. Augmentation is the provision of water to an affected stream to allow out-of-priority diversion from the stream, with the augmented water preventing injury to senior water rights holders on the stream. In this instance, these two agricultural water providers need to augment surface water in order to draw on tributary groundwater that is connected to and depletes surface water. Such augmentations must be approved by the water court. Currently, well pumping from approximately 225 alluvial water wells has been curtailed completely and pumping from another approximately 1,000 wells has been partially reduced by court order until necessary augmentation water is secured. The well pumping curtailment is severely impacting well users as well as adversely impacting local economies. These two water providers are not planning to issue additional shares in the future, so the demand would not change over time. Even as growing municipalities purchase participating farms, their demand is expected to change from agriculture to M&I demand such as for parks, lawns, and golf courses. The Denver Botanic Gardens at Chatfield will have an unmet need of 12 acre-feet that would allow expansion of its operation, but growth beyond 2020 is not anticipated at this time.

Most of the upstream water providers currently use groundwater and will have met their 2010 demand from that source. Center of Colorado WCD expects an increase in demand for augmentation water in Park County by 2010 and does not expect this to increase between 2010 and 2020.

For all water providers, the increase in demand between 2010 and 2050 will need to be met by developing new sources and using existing developed supplies unused in 2010.

**Table 1-2**
**Demand in Acre-Feet**

| | Water Demand | Supplies other than NTGW | NTGW Supplies | Unmet | Projected Future Demand[1] | | | |
|---|---|---|---|---|---|---|---|---|
| **Water Provider** | **2010** | **2010** | **2010** | **2010** | **2020** | **2030** | **2040** | **2050** |
| ***Downstream Providers*** | | | | | | | | |
| Central Colorado WCD | 89,000 | 18,250 | 0 | 70,750 | 89,000 | 89,000 | 89,000 | 89,000 |
| Colorado Parks and Wildlife | 3,000 | 1,200 | 0 | 1,800 | 3,000 | 5,000 | 5,000 | 5,000 |
| Denver Botanic Gardens at Chatfield | 40 | 28 | 0 | 12 | 40 | 40 | 40 | 40 |
| Western Mutual Ditch Company | 30,000 | 15,000 | 0 | 15,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| ***Upstream Providers*** | | | | | | | | |
| Castle Pines Metropolitan District | 1,467 | 1,030 | 437 | 0 | 1,620 | 1,620 | 1,620 | 1,620 |
| Castle Pines North Metropolitan District | 2,290 | 0 | 2,290 | 0 | 2,518 | 2,518 | 2,518 | 2,518 |
| Centennial WSD | 19,500 | 9,500 | 10,000 | 0 | 22,500 | 22,500 | 22,500 | 22,500 |
| Center of Colorado WCD | 267 | 70 | 0 | 197 | 267 | 325 | 375 | 425 |
| Mount Carbon Metropolitan District[2] | 15 | 15 | 0 | 0 | 815 | 1,015 | 1,036 | 1,036 |
| Other SMWSA[3] | 11,421 | 5,894 | 5,527 | 0 | 16,738 | 18,868 | 22,038 | 22,038 |
| Town of Castle Rock | 8,600 | 1,841 | 6,759 | 0 | 11,900 | 15,400 | 15,400 | 15,400 |
| ***Totals*** | 165,600 | 52,828 | 25,013 | 87,759 | 178,398 | 186,286 | 189,527 | 189,577 |

[1] No change in demand projections is predicted after 2050.
[2] Mount Carbon has not projected demand for 2040 or 2050, total demands beyond 2030 are conservative.
[3] Includes Pinery Water and Wastewater District, Arapahoe County Water and Wastewater Authority, Cottonwood WSD, and Stonegate Village Metropolitan District.

### *Weed Management*

Weed management includes frequent monitoring of the drawdown zone for the presence of weedy species. Weed control shall employ standard IPM (Integrated Pest Management) methods with the addition of inundation as a management tool. Treatment options would be based on a monitoring and management program that responds to existing conditions (Appendix GG). Although the cyclic disturbance to the drawdown zone can be anticipated, the actual weedy species that would invade in any particular year or at a particular location cannot. Introduction of aggressive native species such as foxtail barley is one option for competing against the weedy species.

The fluctuating boundary between the drawdown zone and the persistent vegetation can be a primary source for reseeding the drawdown zone each annual cycle. Weedy species established in this area as well as the immediately adjacent zone of persistent vegetation shall be closely monitored, especially during the flowering and seed stages for the weedy species.

Weed management above the drawdown zone would not be able to use inundation as a control method. Standard weed management practices apply for these areas with special focus on weedy trees and shrubs. Simultaneous removal of non-preferred species and the planting of the preferred species, as discussed in the next section, would aid in the acceleration of habitat restoration.

### *Native Species Establishment*

Natural community succession can be accelerated, and weed control can be assisted, by the establishment of native species. Due to a changed pool elevation, some areas would have improved soil moisture conditions that would allow the establishment of species that previously could not survive at these sites. Tree and shrub communities can be established at these locations, and intentionally planting these species can accelerate the successional process and the restoration of habitat. It may take several cycles of the pool elevation to establish the new soil moisture conditions and allow proper site evaluation for the installation of planted species. Tree species such as cottonwood need to be in contact with the water table when first planted and may need supplemental water for the first few years until roots can develop that would follow the water table down to its lowest level.

Herbaceous species can also be used at locations where vegetation is not currently established or has been removed by inundation. Some native species such as foxtail barley are adapted to the fluctuating conditions found on reservoir margins. Monitoring and adaptive management would be used to determine additional appropriate species to use as competitors for the weedy species.

## 4.7 Wetlands

The proposed alternatives could have potential impacts on wetlands. Specific issues include possible wetland impacts from implementing the alternatives to include inundation and transformation of specific wetland areas. These issues are evaluated by alternative in the following sections. Appendix K provides additional information on the Compensatory Mitigation Plan. This analysis of impacts on wetlands is based on the maximum level of inundation for each alternative, or the upper bound scenario. The exact new condition for each alternative is unknown due to the high fluctuation of the water levels associated with certain alternatives.

### 4.7.1 Alternative 1—No Action

Under Alternative 1, reservoir levels and operations at Chatfield Reservoir would remain unchanged (Table 4-2 and Figure 4-1). Wetlands in riverine, palustrine, and lacustrine systems around Chatfield Reservoir would be unaffected.

#### *Penley Reservoir and Downstream Gravel Pits*

The Penley Reservoir inundation area contains two small, isolated wetlands that total about 0.26 acres; therefore, impacts on wetlands would be limited. Conversely, inundation may potentially enhance wetland habitats, particularly if the resulting lake shoreline is vegetated with natural plant communities.

The Penley Reservoir project also would involve the construction of 32.05 miles of underground pipelines to deliver water to the reservoir and to water providers in the area. Pipelines would cross numerous wetlands and jurisdictional waters of the United States. Based on the estimated 100-foot buffer around pipelines, 12 acres of wetlands could be impacted. This is an approximate value based on approximate locations of pipelines.

The downstream gravel pits are currently being mined (or are already mined out) for gravel and are therefore unvegetated and inundation of these pits would not result in the loss of wetland vegetation. Inundation of the gravel pits could enhance wetland habitats, particularly if the shorelines were vegetated with natural plant communities. Seepage from earthen ditches also could create wetlands downgradient of ditches.

Based on information in Chapter 2, each of the three downstream gravel pits would include a diversion channel that is several feet wide and each would disturb about 2 acres of land area. If the disturbed area includes wetlands then there would be potential impacts on wetlands. The impact would be up to 2 acres per gravel pit, for a total of up to 6 acres. It is also assumed that each gravel pit would include outlet works (including distribution lines) and a pump station occupying 1 acre. If wetlands are present in these areas then up to 3 additional acres of wetlands would be disturbed. The maximum area of wetlands disturbed by the infrastructure for the three gravel pits is 9 acres.

The total area of wetland impacts from alternative 1 is up to 21.26 acres, based on 0.26 acres within the Penley Reservoir footprint, 12 acres of impacts from pipelines associated with Penley Reservoir, and 9 acres of impacts from the diversion channels and infrastructure at the gravel pits (see Tables 4-11 and 4-12).

### 4.7.2 Alternative 2—NTGW/Downstream Gravel Pits

Under Alternative 2, reservoir levels and operations at Chatfield Reservoir would remain unchanged. Wetlands in riverine, palustrine, and lacustrine systems around Chatfield Reservoir would be unaffected. Impacts on wetlands from the conversion of downstream gravel pits to water storage would be the same as those described under Alternative 1 (i.e., a maximum of 9 acres), (see Tables 4-11 and 4-12). However, impacts on wetlands in the Penley Reservoir area under Alternative 1 would not occur under Alternative 2 because water would be obtained from NTGW.

**Table 4-11**
**Estimate of Acres of Wetlands Impacted by Each Alternative**

| Wetland Type | Alternative 1 (a) | Alternative 2 (a) | Alternative 3 (c) | Alternative 4 (c) |
|---|---|---|---|---|
| Submergent (Palustrine Aquatic Bed) | NA | NA | 9.0 | 5.9 |
| Emergent (Palustrine Emergent) | NA | NA | 26.3 | 15.2 |
| Seasonal (Lacustrine Emergent – nonpersistent) | NA | NA | 14.7 | 14.7 |
| Scrub/Shrub (Palustrine Scrub/Shrub) | NA | NA | 73.0 | 59.2 |
| Forested (Palustrine Forested) | NA | NA | 34.2 | 24.8 |
| **Total** | **21.26** | **9.0** | **157.2 (b)** | **119.8** |

(a) "Wetland Type" is not available (NA) for Alternatives 1 and 2.
(b) Of 157.2 wetland acres for Alternative 3, 157.2 acres are also bird habitat and 137.3 acres are also habitat for Preble's meadow jumping mouse.
(c) The values in this column are based on the number of acres inundated (see text for explanation).

**Table 4-12**
**Estimate of Acres of Wetlands Impacted by Each Alternative, Total by Drainage**

| Wetland Type | South Platte River Drainage | | | | Plum Creek Drainage | | | |
|---|---|---|---|---|---|---|---|---|
| | Alternative 1(a) | Alternative 2 (a) | Alternative 3 (c) | Alternative 4 (c) | Alternative 1 (a) | Alternative 2 (a) | Alternative 3 (c) | Alternative 4 (c) |
| Submergent (Palustrine Aquatic Bed) | NA | NA | 3.8 | 1.6 | NA | NA | 5.2 | 4.3 |
| Emergent (Palustrine Emergent) | NA | NA | 11.1 | 7.8 | NA | NA | 15.2 | 7.4 |
| Seasonal (Lacustrine Emergent – nonpersistent) | NA | NA | 10.5 | 10.5 | NA | NA | 4.2 | 4.2 |
| Scrub/Shrub (Palustrine Scrub/Shrub) | NA | NA | 33.7 | 28.0 | NA | NA | 39.3 | 31.2 |
| Forested (Palustrine Forested) | NA | NA | 4.3 | 3.8 | NA | NA | 29.9 | 21.0 |
| **Total** | **15.0 (b)** | **9.0** | **63.4** | **51.7** | 6.26 (b) | **0.0** | **93.8** | **68.1** |

(a) "Wetland Type" is not available (NA) for Alternatives 1 and 2.
(b) The total acres for Alternative 1 assumes half of the Penley Reservoir pipeline impacts are in the South Platte Drainage (i.e., 6 acres) and half are in the Plum Creek Drainage (i.e., 6 acres).
(c) The values in this column are based on the number of acres inundated (see text for explanation).

### *4.7.3 Alternative 3—20,600 Acre-Foot Reallocation*

Under this alternative, the infrastructure of the pool containing conservation storage would be changed to target 20,600 acre-feet of reallocated storage by allowing the water level to rise to a target pool elevation of 5,444 feet msl. This level of inundation represents a maximum level or in terms of impacts, an upper bound scenario. Based on hydrologic modeling, this maximum pool elevation would not be reached every year (see Section 4.6). Based on elevation contours generated using field survey data of the area immediately surrounding the reservoir, when reached this maximum increase in water level would inundate additional acres of land area as shown in Table 4-2 and Figure 4-1. Under Alternative 3, approximately 587 acres of additional land area would be inundated at a water level of 5,444 feet msl. Because the maximum pool elevation would not be reached every year not all acres would be inundated all years, and some acres would be inundated for only a short period.

Inundation at a water level of 5,444 feet msl would result in an inundation of approximately 157.2 acres of vegetated wetlands based on field mapping of wetlands in potential areas of inundation (Table 4-11). The greatest loss would be of scrub/shrub type wetlands. An additional 0.8 acres of wetlands (palustrine scrub/shrub) would be permanently impacted as a result of relocation of recreational facilities above 5,444 feet msl (i.e., the recreation trail across Plum Creek).

To further understand impacts to wetland resources, it is helpful to understand that the 587 acres potentially inundated by Alternative 3 include many different land types. Some of these 587 acres are areas that are currently open water, or man-made structures such as parking lots. Other acres include wildlife habitat. It is within the wildlife habitat that wetlands also exist. Therefore, it is important to note that the 157.2 acres potentially inundated by this alternative overlap with habitat for other wildlife resources (Table 4-11). This will be explained further in Section 4.8.

The process of inundating areas works to remove vegetation in the near term and to transform vegetation in the long term. As water levels inundate new areas, the soils become saturated first, and then are completely covered in water. Once water covers the soil, oxygen cannot be exchanged for plant respiration. Plants use up the available oxygen in the soil, but if inundation persists, soil conditions become anaerobic. Only plant species that can adapt to these harsh conditions would survive. If inundation lasts for extended periods, even the adapted plants would die (see Section 4.6 for additional discussion on the effects of inundation on plants especially trees). If the plants are covered completely, all respiration shuts down and the plants die rapidly (within days). If the water levels are sustained at the maximum elevation (5,444 feet msl) for an extended period, this alternative would result in converting approximately 157.2 acres of wetland (approximately 63.4 acres in the South Platte River drainage and 93.8 acres in the Plum Creek drainage; Table 4-12) to deep water habitat.

The relocation of roads and recreation facilities would impact wetland areas as well. The total impacts on specific wetland areas would include direct loss of wetlands and possibly the indirect loss or modification of wetland areas caused by increased runoff creating erosion or changing the frequency at which an area receives water.

Under Alternative 3, pool levels could fluctuate up to a maximum of 28.2 feet during the growing season, although typically the pool fluctuations within a growing season would be much less. Based on the range of values between the 1st and 3rd quartile of data for all years combined, the fluctuation increases from approximately 4.2 feet of fluctuation under Alternative 1 (Figure 4-14), to 5.0 feet of fluctuation under Alternative 4 (Figure 4-16), and up to 7.1 feet of fluctuation for Alternative 3 (Figure 4-15). These data suggest that the shoreline water table would be available less often at the upper end of the exposed shoreline, indicating that conditions along the shoreline would tend to be drier as the target pool level increased. Therefore, conditions would favor less hydrophytic vegetation along the new shoreline due to drawdown that would be more extreme than under current conditions.

It is useful to look at fluctuations during the growing season to understand the impacts on wetlands from this alternative. The vegetation growing season corresponds roughly to beginning at week 17 and ending at week 41 (i.e., late April 25 to October 11) and corresponds to a growing season of approximately 170 days (see Section 4.6 for details). During an average year, as modeled using POR data, pool levels would begin to increase prior to the onset of the growing season until reaching the

peak between weeks 19 and 25. Then pool levels would recede modestly (2 to 3 feet) for a major portion of the growing season, then level off toward the end of the growing season and for the remainder of the year (Figure 4-17). Within the growing season, the POR data predict that the pool level during an average year would approximate 5,440 feet msl with fluctuations ± 2 feet (Figure 4-17). Pool levels during the majority of the growing season may also be influenced by reservoir management. During the recreation season (May 1 through September 30), pool level variations are currently restricted, and restrictions may continue under this alternative (see Section 4.17, Recreation, for details). This would aid in maintaining pool levels during the majority of the growing season. Outside of the growing season, pool levels would continue to decrease during average years to elevations approximating 5,436 feet msl in a typical year (Figure 4-15).

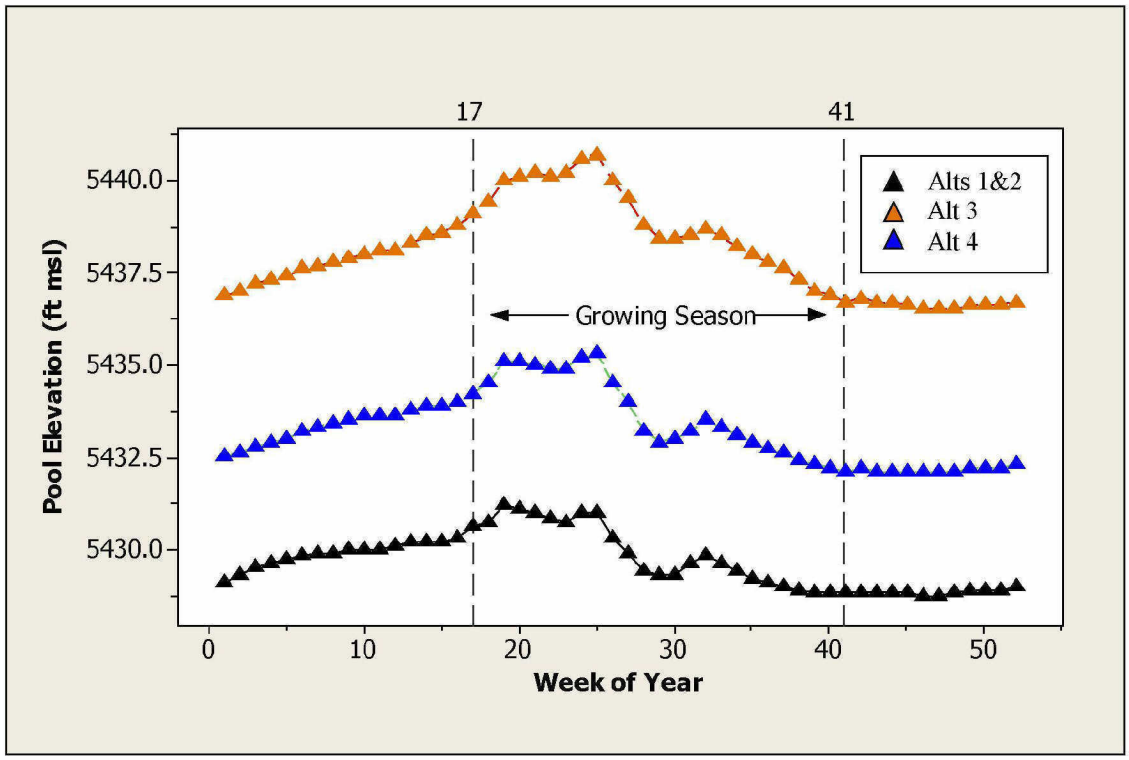


**Figure 4-17**
**Weekly Mean Pool Elevations for the Entire Year for All Alternatives**

Heavy precipitation events could raise water levels above 5,444 feet msl. Based on the POR database of pool elevations, future water levels could rise to as much as 5,465 feet msl for extended periods of time during the growing season. However, such extremes in water levels are rare from year-to-year over the POR (Figure 4-18), approximating 1 out of 10 years. Dependent on the flux of water levels, wetlands may be inundated for varying periods of time having a long-term adverse impact of changing the composition of existing wetlands (i.e., changing to more water-tolerant species such as from shrubs to cattails or from semi-aquatic habitats to aquatic) or establishing new wetlands within the new zone of fluxing inundation.

The number of wetland acres impacted in the Plum Creek drainage is over 50 percent higher than in the South Platte River drainage (Table 4-12). In both drainages the major wetland impacts are to scrub/shrub wetlands, which constitute over 50 percent of the wetland acres impacted in the South Platte River drainage. On the other hand, the percent of inundated wetland acres that are forested is nearly four times higher in the Plum Creek drainage than in the South Platte River drainage.

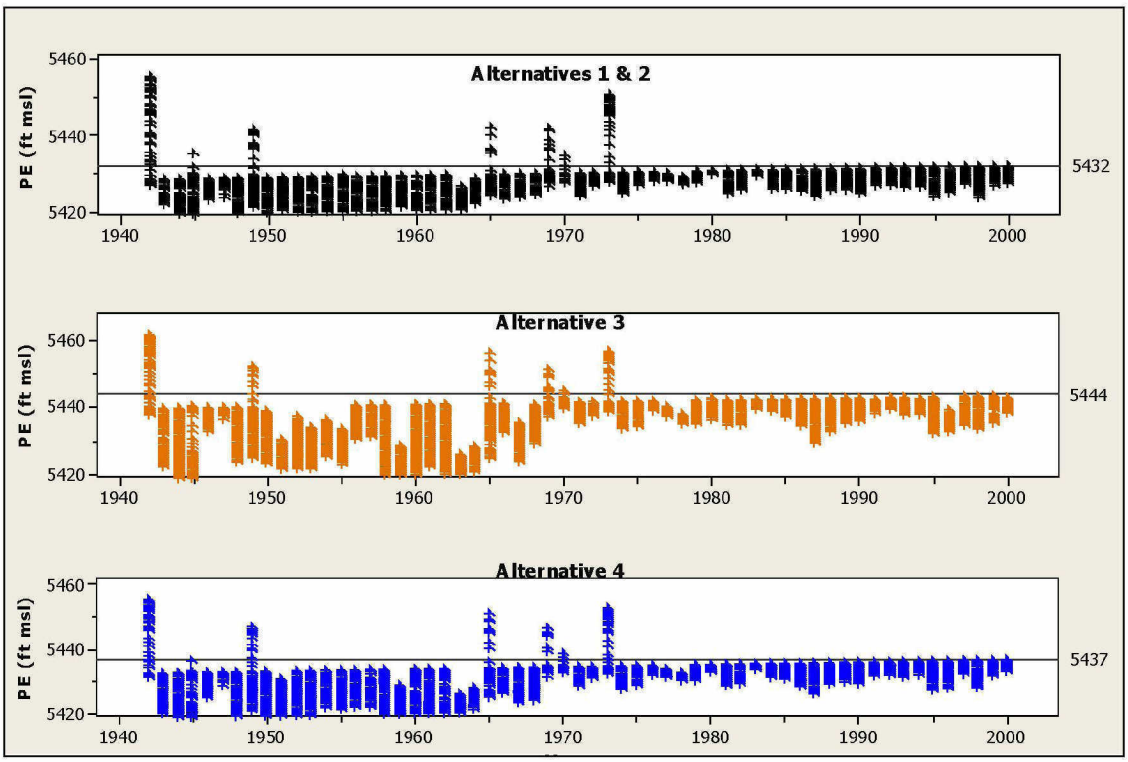


**Figure 4-18**
**Pool Elevations over the POR by Alternative**

Under Alternative 3 the Chatfield Reservoir level would fluctuate more than under the other alternatives. Over the length of an entire year, the average pool level difference would reach 6 to 7 feet; but during the growing season, it is estimated that the average pool level would peak in mid-June and would drop throughout the rest of the season, resulting in an average difference in pool elevations of only 2 to 3 feet. As a result, new wetlands could become established in areas that are inundated during a part of the growing season, including new "backwater" areas and shoreline areas on gradual slopes. However, a 2- to 3-foot drop in pool levels could also result in many areas in the flux zone being devoid of vegetation or having annual (weedy) upland communities, dependent on the slope of land at a particular site and the duration of inundation at a site. For example, areas at the peak of the elevation change would be inundated for the shortest period of time, but after the water levels drop 5 feet, are left too dry to support wetland vegetation only. Instead, these sites may be a mixture of wetland plants and upland vegetation. Wetland vegetation needs several weeks of inundation to establish itself and out-compete most terrestrial vegetation. Moreover, some sites could support upland vegetation that may be disturbed on a regular basis. In areas at the lower end of the gradient, the time of inundation would be too great for any plants (upland or wetlands) to

become established and therefore would remain as bare ground or at least poorly vegetated. In between this gradient would be areas where conditions are right for wetlands.

The mitigation of potential impacts, described in the CMP (Appendix K), is guided by the development of an Ecological Functions Approach (EFA), an accounting system used to value the overlapping ecological values that wildlife habitats provide on lands surrounding Chatfield Reservoir. Ecological Functional Units (EFUs) are calculated in the CMP to capture the ecological functions provided by the individual target environmental resources as well as their overlap. The assessment of impacts is initially estimated using a conservative approach where it is assumed that the target elevation pool would be met and maintained and therefore inundate the maximum acreage. The CMP uses these acreages to compute EFUs for the combined values of the specific resources. Based on the number of acres of wetlands impacted, the CMP estimates this equates to 123 EFUs of wetlands (see Appendix K for additional details).

### 4.7.4 Alternative 4—7,700 Acre-Foot Reallocation/NTGW/Downstream Gravel Pits

In addition to the reallocation, another 5,379 acre-feet would be obtained from NTGW and/or other storage and downstream gravel pits under Alternative 4. The potential effects on wetlands from the conversion of downstream gravel pits to water storage and the use of NTGW are disclosed under Alternatives 1 and 2, respectively. Fewer and/or smaller gravel pit reservoirs would be needed under Alternative 4 than under Alternative 1 or 2. Under Alternative 4, the maximum area of wetlands disturbed by the infrastructure for gravel pit storage is 6 acres.

Under this alternative, the infrastructure of the pool containing conservation storage would be changed to target 7,700 acre-feet of reallocated storage by allowing the water level to rise to a multipurpose pool elevation of 5,437 feet msl. Again, heavy precipitation events could raise water levels beyond 5,437 feet msl for brief periods, but this would be rare from year to year. As shown in Table 4-2, this increased water level would translate into approximately 215 acres of additional land area that would become inundated at 5,437 feet msl.

Raising water levels under this alternative would have the near-term adverse impact of eliminating approximately 119.8 acres of vegetated wetlands (approximately 51.7 acres in the South Platte River drainage and 68.1 acres in the Plum Creek drainage, Tables 4-11 and 4-12) if the water levels are sustained at 5,437 feet msl for extended periods. Plum Creek wetlands are affected more under this alternative due to the shallow nature of the Plum Creek delta at the confluence of the stream with the reservoir. More acres of land are inundated with a given rise in water level. Plum Creek impacts mainly affect scrub/shrub type wetlands. Within the South Platte River drainage, scrub/shrub type impacts are also the majority, but impacts on emergent (non-woody) wetlands are relatively large and impacts on forested wetlands are lower compared to impacts on those types in the Plum Creek drainage. An additional 0.8 acres of wetlands (palustrine scrub/shrub) would be permanently impacted as a result of relocation of recreational facilities above 5,444 feet msl (i.e., the recreation trail across Plum Creek).

As was the case under Alternative 3, the 215 acres potentially inundated under Alternative 4 are acres that are shared by multiple resources such as birds and the Preble's meadow jumping mouse as well as wetlands.

Under this alternative the Chatfield Reservoir level would fluctuate less than under Alternative 3. This may provide more areas with conditions conducive to supporting wetlands at the new water levels. However, there would likely be areas that are disturbed and weedy or lacking vegetation altogether, depending on slope and duration of inundation at specific sites.

### 4.7.5 Reduction and Mitigation of Potential Impacts

Potential impacts that would transform wetlands and/or reduce wetlands functions would be minimized as much as possible including changing the amount and timing of releases, seeding or plantings, and weed control. Adaptive management planning would involve an iterative process of cycling through several steps: problem assessment, design, implementation, monitoring, evaluation, adjustment, and continued cycling through earlier steps (Barnes, 2009). Mitigation for impacts associated with Alternatives 3 and 4 would be a combination of on-site and off-site enhancements of quality and functions of existing wetlands as well as wetland creation. Compensatory mitigation of wetlands would be maximized, to the extent practicable, at Chatfield State Park through the creation, enhancement, and restoration of wetlands within and/or adjacent to the park (see the CMP, Appendix K). The mitigation of impacts to wetlands would also occur as part of the mitigation provided for impacts to Preble's meadow jumping mouse and avifauna habitat. The mitigation for impacts to these resources would focus on riparian/wetland native forest or shrubland. Mitigation measures could include preservation and enhancement of riparian and adjoining upland habitats in nearby off-site areas, creation of habitat within Chatfield State Park, and enhancement of upland, riparian, and wetland habitat within Chatfield State Park. Of the 123 EFUs of wetlands impacted, 30 EFUs would be mitigated on-site and 93 EFUs would be mitigated off-site (Appendix K). The Corps has consulted with the EPA on how to implement an operations plan to minimize impacts of a more highly fluctuating reservoir (refer to Appendix GG for further details).

For Penley Reservoir, downstream gravel pits, pipelines, and other associated infrastructure, impacts to wetlands would be avoided and minimized to the extent possible and, if necessary, mitigated in accordance with Corps regulatory requirements so that the resulting net impacts to wetlands are insignificant.

The Corps has conducted coordination and informal consultations with the USFWS regarding potential impacts to wetlands and their recommendations for mitigation, including a Planning Aid Report (February 2006) and progress letter (July 2010) (see Appendix X).

## 4.8 Wildlife

The four proposed alternatives could have potential impacts on wildlife resources. Specific issues include possible impacts of the alternatives on habitat by inundation of wetland, riparian, and upland areas currently used by wildlife. Additionally, the relocation of recreational facilities and roads may adversely impact wildlife habitats. Potential impacts to endangered, threatened, and candidate wildlife species and wildlife species of special concern are addressed in Section 4.9. Table 4-13 presents the estimated acres of inundated wildlife habitat for all four of the alternatives, and Table 4-14 presents the estimated acres of inundated wildlife habitat for all four of the alternatives, by drainage.

Open water areas would increase by less than an acre under Alternative 4. Any increase would benefit waterfowl by increasing loafing and foraging areas. Any increase also would benefit bald eagles and osprey by expanding their hunting and foraging area.

As indicated in Table 4-13, approximately 78 acres of shoreline at Chatfield Reservoir would be inundated and transformed to aquatic habitat under Alternative 4. Shorebirds, waterfowl, reptiles, and some species of small mammals prefer shoreline habitat for nesting and foraging. High populations of invertebrates are also commonly found along shorelines and provide food for a variety of wildlife species. Inundation of 78 acres of shoreline may negatively impact wildlife species if it occurs during the nesting season, but it would produce a net benefit for wildlife species that use shoreline habitat because the present shoreline would be replaced with the same or greater amounts of new shoreline associated with reallocation, and thus it is not considered a loss of habitat. Under Alternative 4 the total acres of wildlife habitat inundated, not including shoreline, is 328 acres.

In addition, approximately 30 acres of grasslands would be permanently impacted by the footprints of relocated recreational facilities.

An additional 2.54 acres of wildlife habitat would be impacted by the relocation of the recreation trail at the Plum Creek day use area. This includes the following habitat types: 0.19 acres of mature cottonwood, 0.20 acres of shrub, 1.97 acres of upland, and 0.18 acres of wetland/non-woody habitat.

Significant adverse impacts on migratory birds downstream from Chatfield Reservoir would be unlikely under Alternative 4. Under Alternative 4, the South Platte River below the Chatfield Reservoir would have minimal changes during base flow conditions and a small increase in flow during the late summer months, and both these changes in flow are smaller than those under Alternative 3 (Figure 4-13). Alternative 4 could potentially have a slightly positive effect on waterbirds along this reach of the South Platte River.

Overall, Alternative 4 would adversely impact a variety of wildlife species by inundating a variety of wildlife habitats. Compared to Alternative 3, the area inundated would be less (Table 4-13). However, as is true with Alternative 3, these acres of inundation include habitats shared by multiple resources. Some habitats may experience gains at new elevations as is explained in the discussion of Alternative 3 above. Compared to Alternative 1, the effects on wildlife within the study area would be greater under Alternative 4.

### 4.8.5 Reduction and Mitigation of Potential Impacts

Prior to the implementation of an alternative, actions to reduce the level of impacts will be considered. These may include changes to the operations of the reservoir (e.g., holding water at a certain elevation at a specific time of year), or by actively managing the drawdown zone created by fluctuating water levels. For example, habitat losses along the shoreline near the new target pool elevation could be reduced by changing amounts and timing of storage and release of flows, plantings, seeding, and weed control (Appendix GG).

The mitigation of potential impacts, as described in the CMP (Appendix K), is guided by the development of an Ecological Functions Approach, an accounting system used to assign and track ecological value of overlapping terrestrial wildlife habitats provided on lands surrounding Chatfield

Reservoir. This assigning was done by a committee of local experts familiar with Chatfield Reservoir. Habitat attributes were derived and given values for specific resources: the Preble's meadow jumping mouse, overall wildlife habitat represented by a diverse avian community (birds), and wetlands. Mapped habitats for each of the three specific resources were incorporated to total across the functional values in order to provide an index of specific resource habitats. These indexes were then combined to represent the ecological function values for every acre of land that could be potentially lost to inundation. This approach provides a means to assess the value of what habitat values were lost and of potential mitigation areas. Finally, by tracking the functional values lost due to inundation, whether from Alternative 3 or 4, mitigation will be sure to account not only for the acres of habitat lost but their associated ecological function. Adaptive management by an established group would facilitate discussion of minimizing impacts by operation strategies once reallocation begins (Appendix GG). Mitigation is considered in detail in the CMP (Appendix K).

Habitat lost due to the rise in the target pool elevation would be mitigated in a combination of on-site and off-site mitigation activities. The CMP did not include open water bird habitat and shoreline bird habitat because these habitats are not considered lost as they will occur in similar or greater amounts with reallocation. Of the 377 EFUs of bird habitat impacted, 9 EFUs would be mitigated on-site and 368 EFUs would be mitigated off-site (Appendix K). Riparian habitats would be expanded on site as much as possible, and riparian habitats along Plum Creek and along the South Platte River would be preserved, enhanced, or both. In addition, in selecting mitigation sites, the CMP (Appendix K) places an emphasis on the added ecological value of the connectivity of parcels along riparian corridors. An acre of land for off-site mitigation would be credited with more EFUs if it provides a connection to other protected lands and occurs within specified areas near Chatfield State Park, thus there is an incentive to select mitigation sites with higher connectivity. All of these efforts would benefit wildlife species. Refer to the CMP (Appendix K) for further details. The Corps has conducted coordination and informal consultations with the USFWS regarding potential impacts to wildlife and their recommendations for mitigation, including a Planning Aid Report (February 2006) and progress letter (July 2010) (see Appendix X).

## 4.9 Endangered, Threatened, and Candidate Species, Species of Special Concern, and Sensitive Communities

The four proposed alternatives could have potential impacts on federally-threatened and endangered (T&E) species or to state-listed (threatened or endangered) species and species of special concern. Species of special concern include species tracked by the CDOW or the CNHP due to declining populations or observed risks to habitats. Collectively, these species, including federally-protected, state-protected, and species of concern, are referred to in this document as Threatened, Endangered, and Sensitive Species (TES). Specific issues include possible impacts of the alternatives on habitat by inundation of wetland, riparian, and upland areas currently used by TES species. Additionally, the relocation of recreational facilities and roads and construction of new surface storage facilities and associated infrastructure may impact TES species and their habitats. Table 4-15 lists federal and state threatened, endangered, and candidate species and species of special concern with potential to occur or be affected by the Chatfield Reservoir storage reallocation project. Consultation with USFWS on the recommended alternative is required under Section 7 of the ESA. In compliance with the ESA, a Biological Assessment (BA) was prepared, for submittal to USFWS, to address potential effects to T&E species, and their designated critical habitat, from construction, operation, and maintenance of the recommended alternative. The BA is found in Appendix V.

## CERTIFICATE OF SERVICE AND COMPLIANCE

I certify that on May 3, 2018, I electronically filed the foregoing Intervenors–Appellees' Appellate Appendix with the Clerk of the Court using the appellate CM/ECF system, which will send notification of such filing to all Counsel of Record. A hard copy will be delivered to the Clerk's office pursuant to 10th Cir. R. 30.1(A)(2). I certify that the digital submission has been scanned for, and found free from, viruses by the latest version of SentinelOne.

s/ William Davis Wert
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