WHITE RIVER REGIONAL WATER SUPPLY PROJECT

PRE-PERMITTING PHASE REPORT

Prepared for:

RIO BLANCO WATER CONSERVANCY DISTRICT

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Prepared by:

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EXECUTIVE SUMMARY

The Rio Blanco Water Conservancy District (RBWCD) initiated the planning process for providing additional water supplies for existing and new water users in the lower White River basin in 2013. The planning work funded by pre-permitting grant funds was key to further refinement of the White River Regional Water Supply Project (WRRWSP). The pre-permitting funds allowed the RBWCD to file a June 2022 Right-of-Way (ROW) application with the Bureau of Land Management (BLM) for Wolf Creek Reservoir. The submittal of this ROW application initiated the National Environmental Policy Act (NEPA) review process.

Pre-permitting grant funds included a Colorado Water Plan grant from the Colorado Water Conservation Board (CWCB). This grant was instrumental in allowing the RBWCD to leverage District funds to continue:

1. Refinements to the water supply needs in Colorado's White River basin;
2. Firming up financial commitments from key project partners;
3. Preparation of a preliminary recreation plan for the preferred reservoir site on Wolf Creek;
4. Initiating a streamlined permitting dialogue with key Federal agencies and state agencies that would be expected to cooperate in the NEPA documentation process;
5. Perform preliminary design refinements for the preferred reservoir size and appurtenant facilities based on the conditional water right for Wolf Creek Reservoir;
6. Participation with the White River Management Planning Team to work towards development a Programmatic Biological Opinion for the White River;
7. Stakeholder outreach and project management; and
8. Preparation of this report that summarizes the pre-permitting work.

One of the key results of the CWCB pre-permitting grant was the development and execution of future water use agreements with:

1. Rio Blanco County,
2. the Town of Rangely, and
3. the Yellow Jacket Water Conservancy District (YJWCD).

WHITE RIVER REGIONAL WATER SUPPLY PROJECT
PRE-PERMITTING PHASE REPORT

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1.0 INTRODUCTION

1.1 Objective

The objective of the pre-permitting phase of the White River Regional Water Supply Project (WRRWSP) was to refine the proposed project features and firm-up financial commitments so that applications for Federal permits could be filed.

It should be noted that the CWCB grant was awarded under the project name "White River Storge Project." During preparation of the Purpose and Need Report, the project name was changed to "White River Regional Water Supply Project (WRRWSP)." The work performed in this phase of the project is generally referred to "Pre-Permitting Phase" in this report.

1.2 Authorization

This work was commissioned by the Rio Blanco Water Conservancy District (RBWCD). The pre-permitting work was partially funded by a Colorado Water Plan grant from the Colorado Water Conservation Board (CWCB). This grant was awarded to the RBWCD in December 2018 to promote progress on key actions identified in the Colorado Water Plan. The grant funding required that 50 percent of the project funding be provided by the applicant and the remaining 50 percent would be funded through the CWCB. The RBWCD provided the matching funds to complete this work, with some assistance from Rio Blanco County.

The RBWCD contributed additional funds, in excess of the matching funds, to complete the work included in this report. The additional funding requirements were largely due to the delays in the project from November 2019 to January 2021, when the RBWCD elected to focus efforts on finalizing the conditional water rights decree for Wolf Creek Reservoir. This focus on finalizing the water rights decree resulted from a Bureau of Land Management (BLM) requirement, stated in the initial streamlined permitting meeting described in Section 2, that the BLM would not invest additional time in the planning process for the proposed project until the RBWCD obtained a water right for the project. As a result, work from November 2019 through January 2021 was not focused on the pre-permitting tasks except for the continued coordination with the White River Management Planning Team that was working toward a Programmatic Biological Opinion for the White River. In February 2021, the RBWCD resumed work on the remaining pre-permitting tasks documented in this report.

The CWCB grant was not used to obtain the conditional water right decree.

1.3 Statement of Work

The Statement of Work prepared for the WRRWSP Pre-Permitting Phase CWCB grant is provided in Appendix A. Key work tasks funded by the grant are summarized below:

1. Design refinements for the preferred reservoir size and appurtenant facilities based on the conditional water right for Wolf Creek Reservoir.

2. Purpose and need refinements;
3. Firming up financial commitments from key project partners;
4. Preparation of a preliminary recreation plan for the preferred reservoir site on Wolf Creek;
5. Initiating an efficient permitting plan with the key Federal agencies and state agencies that would be expected to cooperate in the National Environmental Policy Act (NEPA) documentation process;
6. Continued participation on the White River Management Planning Team working toward a Programmatic Biological Opinion for the White River.
7. Continued project management, stakeholder outreach, and public meetings.
8. Preparation of this report that summarizes the pre-permitting work.

1.4 Project Team

The **RBWCD** was responsible for reviewing the work and providing thoughtful comments; participation in project meetings including stakeholder meetings and public outreach; participation on the White River Management Planning Team; and assistance in development of the financing plan.

W. W. Wheeler and Associates, Inc. (Wheeler) was responsible for the preliminary engineering for the dam and reservoir design modifications based on the preferred 66,720 acre-foot reservoir in the conditional water rights decree; documenting elements of the refined purpose and need; coordination of the initial streamlined permitting meeting; participation in the White River Management Planning Team meetings; participation in some of the stakeholder outreach meetings; and preparation of this report.

Harvey Economics was responsible for documenting elements of the refined purpose and need; participation in project meetings; and assistance with developing the financing plan.

EIS Solutions and **Vanoco PSI** organized and participated in project meetings including stakeholder meetings and public outreach; participated in the purpose and need discussions and provided assistance in development of the financing plan.

Logan Simpson developed the preliminary recreation plan for Wolf Creek Dam that is documented Section 4 and Appendix E of this report.

WestWater Engineering provided permitting support with the initial work on the permitting plan.

1.5 Project Background and History

As a result of the significant loss of storage due to sedimentation at Kenney Reservoir, the RBWCD initiated a planning process in 2013 to identify additional and replacement water storage for existing and new water users in the lower White River basin. The RBWCD has been proactive in its planning to provide drought protection for its constituents and enhance the natural

environment of the White River. The RBWCD has also been mindful in their planning approach to investigate and identify a multitude of future needs in the White River basin in Colorado. The current and future water supply needs can be met by a multi-purpose reservoir at Wolf Creek.

The RBWCD is a political subdivision of the State of Colorado and a body corporate with all the powers of a public or municipal corporation pursuant to Water Conservancy District Act C.R.S. § 37-45-118. The RBWCD was organized with the purpose of conserving and developing land and water resources for the greatest beneficial use within the District's boundaries. The RBWCD boundaries are shown on Figure 1-1.

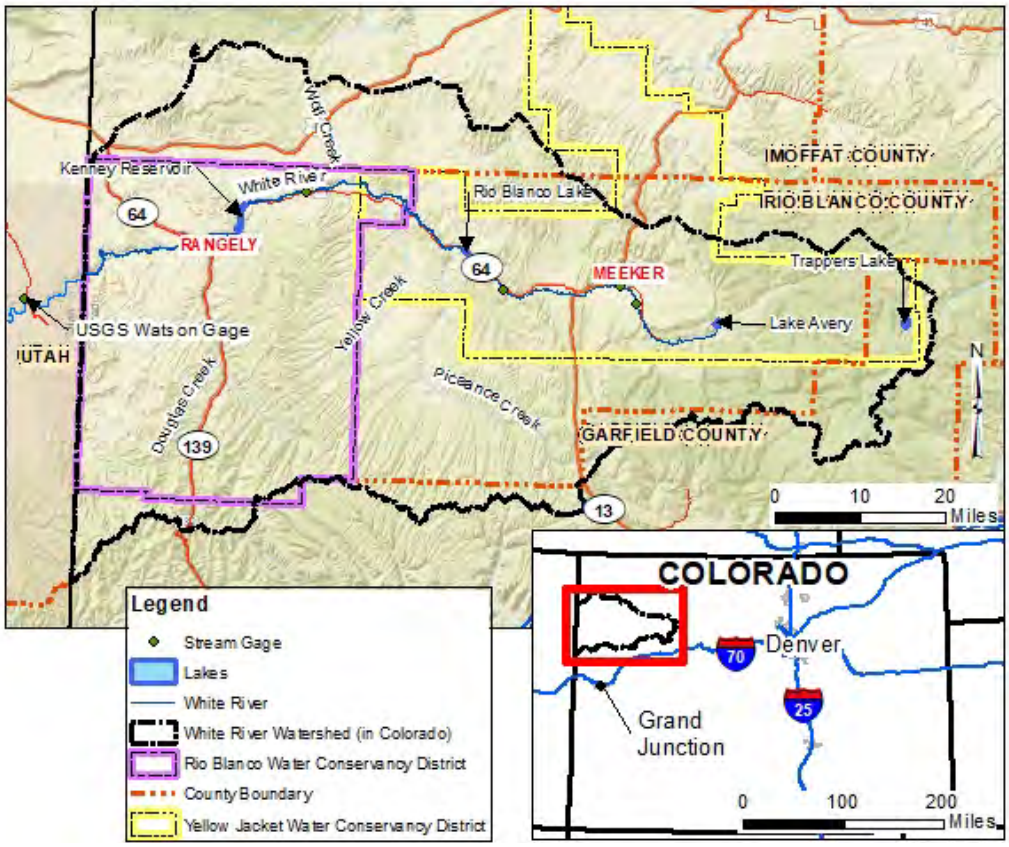


Figure 1-1: Location Map

The Wolf Creek Reservoir Project was included in the Colorado Water Plan and is an important part of the Yampa/White/Green Basin Implementation Plan (BIP). This project will also significantly address municipal and industrial storage gaps in the White River basin that were identified in the Statewide Water Supply Initiative (SWSI). A general project planning timeline is provided on Figure 1-2 below that summarizes the key project phases and milestones to date. These phases are briefly described in the subsequent sections.

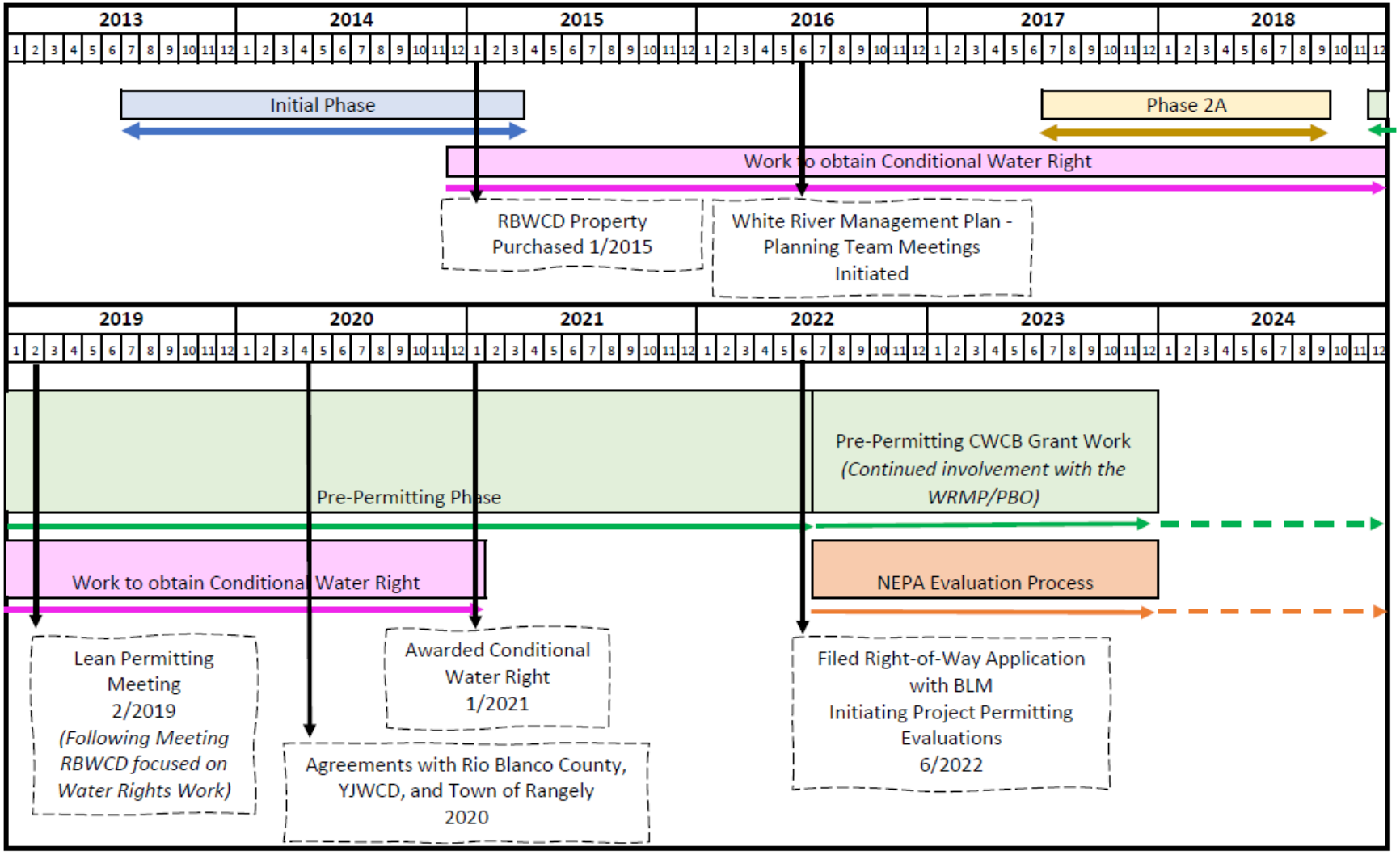


Figure 1-2: General Project Timeline

1.5.1 Initial Feasibility Study Phase

In 2013, RBWCD initiated the White River Storage Feasibility Study to identify new water storage options for the White River basin with potential to replace the storage being lost at Kenney Reservoir and meet future water supply demands. This initial planning study was designed with the understanding that a Federal NEPA documentation decision process would eventually be required. The initial planning and feasibility study phases of the project generally extended from 2013 to 2015 (Wheeler, 2015). These work tasks included:

1. The development of the potential water storage needs within the White River basin. The water volume needs were developed by updating previous state-wide water demand projection information, interviewing potential water users, and updating water demands to include potential future water needs in the White River basin. A range of future water needs was identified, which included water needs for municipal and industrial; oil and natural gas; oil shale; recreation; and endangered fish flows. The total range of projected annual water needs in the initial study ranged from about 16,600 to 90,950 acre-feet by the year 2065. *Note that refinement of the purpose and need was developed in this pre-permitting phase of the project.*

2. An alternatives map study was performed that identified locations within the White River basin that could potentially be used as new water storage sites.

3. Coarse screening of the potential reservoir site alternatives was performed to eliminate sites that were too small to meet the long-term storage demands; did not meet desired recreational criteria; or had significant preliminary identified environmental, infrastructure, or property impacts. Consistent with their bylaws, the RBWCD screened out alternatives located outside of the RBWCD boundaries (RBWCD, 1996). Based on the coarse screening of alternatives, three primary reservoir water storage sites were identified.

4. At each of the three primary reservoir sites (Gillam Draw, Spring Creek, and Wolf Creek), Wheeler developed feasibility-level designs and opinions of probable project cost for two reservoir sizes: a 20,000 acre-foot and a 90,000 acre-foot reservoir. The 20,000 acre-foot and 90,000 acre-foot reservoir sizes were approximately equivalent to the low end and high end of the projected long-term water demands in the White River basin. The feasibility designs assumed that the reservoirs would be filled with water from the White River using pump stations and pipelines.

5. Wheeler performed an alternatives evaluation considering feasibility-level cost opinions and preliminary environmental and geologic information available from GIS files or collected during site visits to the three primary reservoir sites. The Wolf Creek site, located on Wolf Creek immediately above its confluence with the White River, was found to be the preferred alternative for future planning and permitting assessments. The Wolf Creek Reservoir has the most favorable capital costs and pumping costs; no significant preliminary identified environmental or cultural resource impacts; has the flexibility to be

expanded to a larger size if future needs require additional water storage; and is located in an area that will allow recreation access from both U.S. Highway 40 in Moffat County and State Highway 64 in Rio Blanco County.

6. Harvey Economics assessed the financial element of Wolf Creek Reservoir. This work consisted of quantifying the potential financial benefits; assessing the key stakeholders' ability and willingness to pay; and developing a financial roadmap for funding the Wolf Creek Project construction.

7. In late 2014, near the conclusion of this work, the RBWCD filed for a water right at its preferred location near the confluence of Wolf Creek and the White River.

1.5.2 Phase 2A Feasibility Study

Following the initial phase of the project, the RBWCD continued to get comments from the community and Federal, state, and local government stakeholders. Several comments were received regarding the potential to construct an on-channel reservoir on the main stem of the White River to eliminate the pumping costs associated with the off-channel Wolf Creek reservoir. Other commenters indicated a preference that the reservoir should have a dedicated storage pool available for future potential reservoir sedimentation and recreation. The work in Phase 2A updated information to address these comments and questions. The Phase 2A work occurred in 2017 through 2018 (Wheeler, 2018). The primary tasks during this phase included:

1. Preliminary engineering to refine the off-channel Wolf Creek Dam design, including providing storage for long-term reservoir sedimentation, recreational use, and insurance storage. The feasibility of gravity fill facilities for the Wolf Creek Reservoir was also evaluated.

2. Preliminary engineering for the White River Dam design, which also included storage for recreation and future reservoir sedimentation. The White River Dam option would be located on the White River immediately downstream of the Wolf Creek tributary.

3. Preparing an initial estimate of the long-term sediment volumes anticipated at both the off-channel Wolf Creek Dam site and the White River Dam site and incorporating a 50-year sediment pool into the designs.

4. Participating in the review committee for the Yampa/White/Green Basin Roundtable Basin Implementation Plan Modeling of the White River, which included the Wolf Creek Dam.

5. The RBWCD Board of Directors identified Wolf Creek Dam as their preferred alternative for providing storage for future water needs. Their secondary alternative was the White River Dam.

1.5.3 Wolf Creek Reservoir Water Right

In December 2014, the RBWCD filed an application for surface water rights and storage water rights for Wolf Creek Reservoir, which included options for either an on-channel reservoir, on the White River immediately downstream of the confluence with Wolf Creek, or an off-channel option, on Wolf Creek immediately upstream of the White River confluence. Statements of opposition were filed with the water court that included private landowners and energy corporations in the White River basin; the BLM; the CWCB; and the Colorado State Engineer's Office (Colorado Division of Water Resources). The RBWCD negotiated stipulations in the water rights case with each of the opposers, or the statements of opposition were withdrawn, except with the Colorado Division of Water Resources (DWR) Division 6 Engineer. Each of the opposer's stipulations were filed and approved by July 2020, except with the Colorado DWR Division 6 Engineer.

After initiating a court case with the Colorado DWR and preparing multiple expert reports and rebuttal reports, the RBWCD negotiated a settlement with the Colorado DWR. Based on this settlement, the RBWCD was awarded a conditional water right for a 66,720 acre-foot Wolf Creek Reservoir in January of 2021. The water's beneficial uses include:

- Municipal use (including but not limited to domestic, irrigation, commercial, and industrial uses) for the Town of Rangely;
- Augmentation (to augment depletions through a future blanket augmentation plan for water users within the District boundaries and within the Yellow Jacket Water Conservancy District boundaries pursuant to leases or exchanges of water under C.R.S. § 37-83-106);
- Mitigation of environmental impacts of the Wolf Creek Reservoir project;
- Hydroelectric power generation exercised only in conjunction with releases for other decreed beneficial uses; and
- In-reservoir uses for recreation, piscatorial, and wildlife habitat.

The water right stipulation states "limits on annual releases are not intended to prevent releases in excess of those amounts to the extent any such additional releases are required or authorized by statute or rule." This stipulation provides the potential for utilizing the water stored in Wolf Creek Reservoir to be released for other future water needs such as future Colorado River Compact obligations or endangered fish needs as required by statutes or Rules. The complete water right decree and stipulation are provided in Appendix B.

Although the water rights case and settlement negotiations delayed the pre-permitting work by about two years, it did help further refine and affirm the purpose and need for Wolf Creek Reservoir. It is important to state again that no CWCB grant funds were used in the legal case to establish the Wolf Creek Reservoir water rights. The RBWCD funded this water rights case out of their own funds.

1.5.4 Previous Wolf Creek Reservoir Evaluations

During the course of the initial feasibility study, it was discovered that a reservoir near the confluence of Wolf Creek and the White River was considered as far back as the early 1960s. This Wolf Creek Reservoir had a conditional water right with a 1966 adjudication date for beneficial uses that included irrigation, municipal, industrial, fishery, domestic, stock and all other beneficial uses. The original Wolf Creek water right was owned by the Colorado River Water Conservation District (River District). The River District abandoned this water right in 2012.

In 1983, the Water Users' Association No. 1, a predecessor to the RBWCD, performed geologic and geotechnical field investigations and a construction materials investigation for a preliminary Wolf Creek Reservoir project, located on the main channel of the White River (Western Engineers, 1983; 1985). These investigations provided information about the regional geologic structure, stratigraphy and faulting, surficial deposits, and joint patterns in the bedrock; detailed geologic logs for the proposed dam axis; identification of borrow source locations, quantities, and detailed logs and laboratory tests of test pits. Even though this information was developed for a dam on the main channel of the White River, this information provided some valuable information for the RBWCD's proposed off-channel Wolf Creek Reservoir site.

1.5.5 RBWCD Land Purchase

On January 1, 2015, the RBWCD purchased the only private property that would be inundated by the Wolf Creek Reservoir. This property is located near the East Fork of Wolf Creek.

2.0 STREAMLINED PERMITTING

2.1 2019 Streamlined Permitting Planning

Consistent with the Statement of Work in the CWCB grant, the RBWCD attempted to initiate an innovative, streamlined water project planning and permitting process for the WRRWSP. This process is sometimes referred to as a LEAN permitting process, which is similar to the LEAN production process that is used by Toyota in their production systems. The three main goals of Toyota's LEAN process are to eliminate overburden, inconsistency, and wasted effort. These roadblocks to efficiency can occur during the environmental authorization of complex water supply processes that require multiple Federal, state, and local authorizations. Some of these permits require similar environmental analysis, but under different regulatory requirements. For larger or more complex water projects, the permitting processes can take several decades and tens of millions of dollars to complete. Recent examples of long permitting timelines include the Northern Colorado Water Conservancy District's Norther Integrated Supply Project (NISP) and Denver Water's Gross Reservoir Enlargement projects.

RBWCD referenced the Colorado's Water Supply Planning and Permitting Handbook (Colorado, 2017) when developing the streamlined permitting plan. This handbook was developed by the State of Colorado to provide guidance on incorporation of regulatory requirements into the initial water supply planning phases long before permitting requests are being submitted so projects are developed to meet the requirements. The handbook also provides guidance on coordination with agencies in the permitting process to gain efficiency and predictability.

To facilitate a more streamlined permitting process, Wheeler planned to develop a detailed work plan so that permitting data needs and analysis requirements from various agencies could be identified early on. This would allow data collection and analyses to occur concurrently, rather than in series, resulting in a more streamlined permitting process. Wheeler planned to have several meetings with key Federal and state agencies to identify the various data needs and agree on the analyses that would be performed to assist in evaluation of the project impacts. The goal was to develop a detailed permitting plan by the end of 2019, with plans to hire a third-party contractor to perform the permitting analysis and prepare the permitting documents shortly thereafter.

An initial meeting was held on February 6, 2019, in Glenwood Springs, Colorado with the option for individuals to attend in-person or remotely. An overview of the proposed Wolf Creek Reservoir project was presented at the meeting. The participants collaboratively identified the potential agencies that would likely participate in permit evaluations and identified resources that needed to be evaluated. Participants in the meeting included representatives from the Colorado Parks and Wildlife (CPW), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), Colorado River Water Conservation District (Colorado River District), Colorado Department of Natural Resources (DNR), CWCB, Upper Colorado River Recovery Program (Recovery Program), Bureau of Land Management (BLM), Colorado Department of Public Health and Environment (CDPHE), Environmental Protection Agency (EPA), and legislative

representatives from Congressman Scott Tipton's office and Senator Cory Gardner's office. Key members of the RBWCD project team were in attendance including EIS Solutions, Wheeler, WestWater Engineering, and Harvey Economics.

During this meeting, representatives from the BLM told the RBWCD it needed to have a water right for Wolf Creek Reservoir before the BLM would do any further pre-permitting consultation with the RBWCD or other agencies. Also, the BLM and the USACE stressed the importance of the development of the project purpose and need. The BLM indicated that a purpose and need would be required prior to the BLM publishing the Notice of Intent (NOI). The USACE indicated that they would not review data collection needs until the USACE had reviewed and generally concurred with the Purpose and Need Report. As a result of these comments, further streamlined permitting interagency workshops and meetings were canceled.

The meeting summary from the February 6, 2019, meeting is included in Appendix C. The meeting summary includes documentation of the discussions, the presentation slides, the list of needed permits, the list of identified resources to be analyzed, and an initially proposed schedule with deliverables that was suggested for a streamlined permitting process.

2.2 2021 - 2022 Pre-Application Coordination

After the RBWCD received their conditional water right in January of 2021, the RBWCD prepared a draft Purpose and Need Report. The RBWCD then reinitiated pre-permitting discussions with the BLM and USACE to reassess potential permitting requirements and efficiencies.

A pre-application meeting was held with the BLM on March 17, 2021, to review the BLM's application package requirements and timelines. During this meeting, the RBWCD's attorney provided the BLM with an overview of the key elements of the Wolf Creek Reservoir water right. The BLM indicated that they required a detailed plan of development (POD) to be submitted with the RBWCD's right-of-way application.

A pre-application meeting was held with the USACE on November 12, 2021. During this meeting, the RBWCD team provided a project update; confirmed the USACE application process; and reviewed the preliminary project purpose and need statement. The USACE provided some specific comments on necessary refinements to the purpose and need statement that would be required based on the USACE internal guidelines under Section 404(b) of the Clean Water Act. The USACE emphasized the importance of the purpose and need and suggested the RBWCD not move forward until the purpose and need was further refined. The USACE also suggested coordination and review of the purpose and need with both the BLM and USACE. The USACE also emphasized their requirement to authorize the Least Environmentally Damaging Practicable Alternative (LEDPA). Following this meeting, the USACE provided a December 17, 2021, letter to the RBWCD emphasizing the discussions in the meeting, particularly the importance of the purpose and need documentation and subsequent alternatives analysis. This letter is included in Appendix C.

The RBWCD team met with the BLM and USACE on January 6, 2022. During this meeting, it was expressed that after the RBWCD met with the USACE on November 12, 2021, it was recognized that there was a disconnect between the requirements of the BLM's Right-of-Way approval and the USACE's evaluation of the project under the Clean Water Act. It was discussed that the BLM requires a significant amount of detail in the POD; however, the USACE recommends evaluating and supporting the purpose and need prior to moving forward with project-specific details. The BLM agreed that the POD required by BLM requires a significant amount of detail per the BLM's regulations; however, for this project they requested a high-level POD be filed with a Purpose and Need Report. At this meeting, the USACE indicated that they would like to develop a joint purpose and need statement with the BLM. Also, the USACE indicated that they will need to review the needs, purposes, and alternatives prior to visiting any potential project sites.

On January 19, 2022, the RBWCD team met with the BLM, USACE, and EPA. This meeting mainly involved discussing the process once the Right-of-Way application was filed with the BLM. Additional meetings were held with the following agencies to explain the project's progress and status of filing the BLM ROW application.

- March 3, 2022 – Meeting with Colorado Parks and Wildlife
- March 24, 2022 – Meeting with the Colorado Department of Natural Resources
- March 29, 2022 – Meeting with Colorado Department of Public Heath and Environment.

RBWCD completed the Right-of-Way application, the initial POD, and a Purpose and Need Report and filed these documents with the BLM in June 2022. This filing triggered the NEPA project evaluations.

2.3 Streamlined Permitting Results

Although the BLM was not interested in investing significant resources in streamlined pre-permitting discussions before the RBWCD filed a ROW application, the pre-permitting meetings that the RBWCD was able to hold with key Federal and State agencies were considered to be beneficial. The CWCB grant-funded pre-permitting meetings helped the key agencies become familiar with the proposed project, key issues, and key evaluations for which each agency needed to prepare. A summary of the key approvals required is presented in Table 2-1.

Table 2-1: Identified Permits or Approvals Required

Permit or Approval	Lead Agency [A]
BLM ROW	BLM
BLM Resource Management Plan Amendment	BLM
NEPA documentation	BLM
BLM Section 7 Endangered Species Act Consultation	US Fish and Wildlife
BLM Section 106 National Historic Preservation Act Consultation	Colorado State Historic Preservation Office (SHPO)
Clean Water Act, 404 Permit	USACE
401 Water Quality Certification	CDPHE
Fish and Wildlife Mitigation Plan	Colorado Parks and Wildlife
Flood easement on State Land Board land	Colorado Land Board
1041 Permits [B]	Not applicable

[A] Cooperating Agency will participate in permits or approvals as necessary.

[B] Moffat County does not have a 1041 requirement, Rio Blanco County waived the requirement for this project.

After the Federal permitting was initiated, the BLM reached out to numerous Federal, state, and local agencies and developed Memorandums of Understanding (MOUs) with the Cooperating Agencies. These Cooperating Agencies provided initial review comments on the BLM's project management plan and the RBWCD's initial POD. These comments are expected to help streamline the overall project permitting process. A list of the BLM's Cooperating Agencies is provided below.

1. U.S. Army Corps of Engineers
2. U.S. Environmental Protection Agency
3. U.S. Fish and Wildlife Service
4. U.S. Bureau of Reclamation
5. Colorado Department of Agriculture
6. Colorado Department of Natural Resources
7. Colorado Division of Water Resources
8. Colorado State Land Board
9. Colorado Water Conservation Board
10. Colorado Parks and Wildlife
11. Colorado Department of Public Health and Environment
12. Colorado Attorney General's Office
13. Utah Public Lands Policy Coordinating Office
14. Utah Division of Water Resources
15. Utah Division of Water Rights
16. Utah Division of Wildlife Resources
17. Colorado River Authority of Utah
18. Rio Blanco County
19. Moffat County
20. Uintah County

21. Town of Rangely
22. Town of Meeker
23. Rio Blanco Water Conservancy District
24. Colorado River Water Conservation District
25. Uintah Water Conservancy District
26. Douglas Creek Conservation District
27. White River Conservation District
28. Western Rio Blanco Metropolitan Recreation & Park District
29. Yellow Jacket Water Conservancy District

3.0 PREFERRED RESERVOIR SIZE AND LOCATION

The RBWCD was awarded a conditional water right for a 66,720 acre-foot reservoir in January of 2021. The RBWCD elected to move forward with the size and location of the reservoir included in the water right decree. Also, the RBWCD Board of Directors considered the preferred alternative to be the Wolf Creek Off-Channel Dam and Reservoir due to it having less impact to wetlands and the aquatic environment along the White River.

Based on discussions with the USACE, the RBWCD team considered it necessary to thoroughly document the purpose and need for new water supplies in the White River basin prior to initiating the NEPA review of the project. In the purpose and need refinement, six regional water needs were identified in the White River basin. The RBWCD intends to construct 66,720 acre-feet of new water supply which will meet a portion of the basin's current and reasonably projected future additional water supply needs, including replacement of the uses provided by Kenney Reservoir.

3.1 Purpose and Need Refinement

The RBWCD's original Purpose and Need Report, which documents the six regional water needs in the White River Basin, is included in Appendix D of this report (Wheeler & HE, 2022). The original Purpose and Need Summary and Statement was revised as part of the RBWCD's Plan of Development (POD), Version 2 (Wheeler, 2023). The revised Purpose and Need Statement is provided below, with additional documentation from POD, Version 2, included in Appendix D. Further refinements to the Purpose and Need statement are expected as the Federal permitting process develops. The revised Purpose and Need documentation in Appendix D also addresses some of the agency comments on the original Purpose and Need.

The purpose of the White River Regional Water Supply Project (WRRWSP) is to meet a portion of the current and reasonably projected future additional water supply needs in the White River Basin. The Project includes approximately 66,720 acre-feet of a new water supply, which includes the replacement of the water uses lost at Kenney Reservoir. The new water supply will be coordinated and operated by the Rio Blanco Water Conservancy District.

The six regional water needs in the White River are summarized below.

1. ***The municipal water supply need*** *- The Town of Rangely needs a water supply of 3,895 acre-feet. This includes a prudent three-year drought supply of 2,160 acre-feet for new municipal demand by the year 2070, which accounts for the effects of water conservation, plus the replacement of 1,735 acre-feet of municipal water storage lost to reservoir sedimentation at Kenney Reservoir.*

2. ***The hydropower need*** *- There is a need for up to 142,266 acre-feet of water to augment the RBWCD's direct flow water rights of 745 cubic feet per second (cfs) for renewable hydropower generation, to maintain funding for RBWCD's operations, and to replace water storage lost at Kenney Reservoir.*

3. ***The need for flatwater recreation*** *- There will be a complete loss of flatwater recreation at Kenney Reservoir by 2029, contributing to a projected growing need for flatwater recreation in northwestern Colorado of 2,530 surface acres by 2070.*

4. ***The Colorado River Compact curtailment need*** *- There is uncertainty regarding a future Colorado River Compact curtailment that would impact White River Basin water users with rights junior to November 24, 1922. The RBWCD needs 35,664 acre-feet of storage to protect these junior water users.*

5. ***The agricultural water supply need*** *- Basin irrigators have experienced shortages on existing irrigated lands of approximately 2,400 acre-feet per year since 1950. The projected average year agricultural gap is expected to increase to about 3,500 acre-feet per year and may be as great as 9,150 acre-feet under drought conditions. The WRRWSP can be used to offset shortages via augmentation.*

6. ***The need for environmental flows for Federally listed fish species*** *- The White River provides habitat for endangered and threatened fish species. Ongoing basin planning has identified the need for up to 27,778 acre-feet annually at the White River Watson Gage to benefit and contribute to the recovery of these fish species. More specific reservoir operations and release requirements to augment flows for endangered fish will be developed by the U.S. Fish & Wildlife Service as part of the consultation process with the BLM under Section 7 of the Endangered Species Act.*

3.1.1 Meeting Identified Needs with the RBWCD's Conditional Water Right

The RBWCD's conditional water right is discussed in detail in Section 1.5.3 of this report, with the complete decree and stipulation included in Appendix B. A summary of how a portion of each identified water need in the Purpose and Need Report could be met under the existing conditional water right is provided below.

1. **Municipal Water Needs** are explicitly identified as a use in the decree. Refer to Paragraph 13 in the decree in Appendix B.
2. **Taylor Draw Dam Hydropower Needs** could be met through the augmentation use, which is a use explicitly identified in the decree. Refer to Paragraph 13 in the decree in Appendix B. A discussion on how augmentation could be used is provided in Section 4.2 of the Purpose and Need Report (Wheeler and HE, 2022) in Appendix D.
3. **Flatwater Recreation Needs** are explicitly identified as a use in the decree. Refer to Paragraph 13 in the decree in Appendix B.
4. **Colorado River Compact Curtailment Needs** could be met through the augmentation use, which is a use explicitly identified in the decree. Refer to Paragraph 13 in the decree in Appendix B and the discussion in Section 4.2 of the Purpose and Need Report in Appendix D about how augmentation can be used.

Also, Paragraph 4 in the Stipulation (also included in Appendix B) indicates that releases can be made from Wolf Creek Reservoir as required or authorized by statute or rule. Theoretically if a compact curtailment were to occur, releases from Wolf Creek Reservoir could be authorized by a governing entity to meet compact obligations.

5. **Agricultural Water Needs** could be met through the augmentation use, which is a use explicitly identified in the decree. Refer to Paragraph 13 in the decree in Appendix B and the discussion in Section 4.2 of the Purpose and Need Report (Wheeler and HE, 2022) in Appendix D about how augmentation can be used.
6. **Water Needed for Endangered Fish** could be provided through augmentation use, which is a use explicitly identified in the decree. Refer to Paragraph 13 in the decree in Appendix B and the discussion in Section 4.2 of the Purpose and Need Report (Wheeler and HE, 2022) in Appendix D about how augmentation can be used. Paragraph 13 of the decree also states that mitigation of environmental impacts of the Wolf Creek Reservoir project is a proposed use of the reservoir. Releases from Wolf Creek Reservoir to augment downstream flows to enhance the habitat for endangered fish in the White River could be developed through the Section 7 consultation process. The BLM will be required to consult with the U.S. Fish & Wildlife Service under Section 7 of the Endangered Species Act as part of the NEPA process.

   Also, Paragraph 4 in the Stipulation (also included in Appendix B) indicates that releases can be made from Wolf Creek Reservoir as required or authorized by statute or rule. If minimum stream flows are necessary for endangered fish populations, releases from Wolf Creek Reservoir could be authorized by a governing entity to meet the White River flow targets for the endangered fish populations.

3.2 Summary of Design – Based on Preferred Size and Location

Due to the modifications in reservoir size associated with RBWCD's water right, refinements were made to the Wolf Creek Dam preliminary design to be consistent with a 66,720-acre-foot reservoir. The following facilities are planned to be built as part of the applicant's proposed project:

- An approximately 115-foot-high embankment dam;
- A 66,720 acre-foot reservoir with approximately 2,031 surface acres of water consistent with the RBWCD's existing water right;
- A 400-foot-wide excavated earth spillway located in the left abutment of the dam;
- A 10-foot-diameter, concrete-encased, steel outlet works conduit constructed through the maximum section of the dam. The outlet works will discharge into a stilling basin and concrete-lined discharge channel to convey water to the White River downstream of the dam;
- A pump station and 8-foot-diameter steel pipeline to convey water from the White River to fill the reservoir;

- Temporary and permanent improvements to existing BLM roads for construction and recreation access; and
- Development of flatwater recreation facilities adjacent to the new reservoir.

Since the 2018 preliminary dam designs were completed (Wheeler, 2018), the following refinements were made:

- Refinements to the embankment and spillway design associated with the preferred storage pool volume of 66,720 acre-feet.
- Two alternative designs were developed for the alignment of the reservoir fill and outlet works discharge features. Each alternative would impact separate private landowners. Alternative designs were established so that environmental impacts and benefits could be identified on each private property and to facilitate discussions between the RBWCD and the landowners regarding easements. The preliminary drain and fill designs were established so that these facilities could be constructed on one or both properties depending on the outcome of negotiations with the landowners.
- Initial recreation plans for two alternative flatwater recreation facilities.
- Additional details were developed for access roads.

Note that additional refinements have been made to the POD that were not part of this work but have occurred after permitting was initiated in June 2022. Significant refinements and details will be included in the POD as the Federal NEPA process develops.

4.0 RECREATION PLAN

A preliminary recreation analysis and plan was developed by Logan Simpson in 2019, with some additional refinement and additions made in 2022. The Wolf Creek Recreation Potential Report (Logan Simpson, 2019) and the Wolf Creek Reservoir Recreation Sites, Vehicular Access, and Trails Analysis (Logan Simpson, 2022) are included in Appendix E of this report. At the time the recreational studies were occurring in 2019, the RBWCD had not established the preferred reservoir size, so this 2019 report generally focuses on the Wolf Creek site with a range of size alternatives. The 2022 recreational analysis considered the preferred reservoir size of 66,720 acre-feet, consistent with the conditional water right.

The 2019 Recreation Potential Report evaluated the potential recreational demands and gaps in recreational opportunities in the region. To perform this evaluation, Logan Simpson reviewed and documented environmental and climatic factors that would influence the types of outdoor recreation; outdoor recreation trends; regional population growth; and existing regional recreation facilities with similar characteristics to the proposed Wolf Creek Reservoir. The report also identified potential recreational demands and gaps that could be fulfilled by the proposed Wolf Creek Reservoir. Logan Simpson considered it reasonable to expect that with the growing population in Colorado, specifically northwestern Colorado, more of the existing water-based recreation areas and camping areas will reach capacity, and Wolf Creek Reservoir could help to fill the gap between supply and demand. Logan Simpson determined that within 10 years, Wolf Creek Reservoir could potentially justify developing 120 to 140 campsites, 60 to 70 boat trailer parking areas, 1 or 2 boat ramps, and a fully equipped marina with fuel, boat rentals, supplies, and slips.

Logan Simpson reviewed the Wolf Creek Reservoir site for suitability of the land for the development of recreational facilities based on factors such as road access, land ownership, water levels, topography, and BLM travel management designations. The 2019 report contains a preliminary recreation plan for the parcel of land owned by the RBWCD.

The 2022 work by Logan Simpson focused on further evaluating access routes to the recreational facilities on the RBWCD land, refining the preliminary recreation plan for the RBWCD property, and developing a preliminary recreation plan for a parcel owned by the Colorado State Land Board that could be located on the northern shore of the 66,720 acre-foot reservoir.

The preliminary recreation plan on the RBWCD property (termed the East Reservoir Recreation Area) includes 100 campsites; a camper services building with showers, restrooms, and possibly laundry facilities and vending machines; a marina with 30 slips and a boat ramp; parking for 90 vehicles attached to trailers and 80 additional vehicles; and a visitor center and restaurant with 60 parking spaces. Logan Simpson indicated that future plans may include walk-in tent sites, large group camp sites, a trailhead, and various trails for motorized and non-motorized recreation.

The preliminary recreation plan on the Colorado State Land Board property (termed the West Reservoir Recreation Area) includes a total of 153 campsites; a camper services building; a

marina with 60 slips and a boat ramp; parking for 80 vehicles attached to trailers and 60 additional vehicles; and a visitor center and restaurant with 60 parking spaces. Logan Simpson indicated that facilities on the Colorado State Land Board parcel would likely require easements, land ownership transfer, or purchase by Colorado State Parks to be developed as a State Park.

Logan Simpson evaluated vehicular access routes to the potential recreation sites with the consideration that roads leading to recreation use areas would need be able to accommodate large recreational camping vehicles, passenger cars, and trucks pulling boats, and therefore must be wide, stabilized, and gentle in grades.

The preliminary recreation plans and access routes at both the east and west recreation sites were based on a maximum capacity recreation plan. Refinements to the recreation plans and access routes have been and will continue to be made as the project evaluations progress.

5.0 WHITE RIVER MANAGEMENT PLAN COORDINATION

5.1 Background on the WRMP and PBO

It was recommended that a Programmatic Biological Opinion (PBO) be developed for the White River in a 2002 Recovery Program Project 114 Annual Report, Tributary Basin Management Plans (Recovery Program, 2013). A Planning Team was formed consisting of representatives from the Upper Colorado River Basin (UCRB) water users, the Upper Colorado River Endangered Fish Recovery Program (Recovery Program), CWCB, Utah Division of Water Resources, The Nature Conservancy (TNC), the Ute Indian Tribe, and the RBWCD. The White River Management Plan Planning Team has been meeting since 2016 for the following purposes:

- To help guide the process of developing preliminary endangered fish flow targets for the White River;
- To determine future water demands in the White River basin;
- To evaluate the White River flows relative to the target flows under existing and future demand conditions; and
- To develop recovery actions that could offset depletion effects on endangered fish species.

Some of this work was done in conjunction with work performed by the Yampa/White/Green Basin Roundtable, using a modified version of the StateMod model (WWG, 2018).

In 2020, the CWCB, in cooperation with the Recovery Program, solicited proposals for a third-party contractor to assist with drafting the WRMP and preparing National Environmental Policy Act (NEPA) documentation. The goal was to develop a cooperative agreement to implement the WRMP. The signing of the cooperative agreement by the USFWS would result in a Federal agency action that "may affect listed species or critical habitat," triggering formal consultation under Section 7 of the Endangered Species Act (ESA), 50 C.F.R. § 402.14(a). Formal Section 7 consultation would generate a PBO for the White River to provide ESA compliance for existing depletions and a specified amount of projected future depletions in the basin through 2050. The Scope of Work (SOW) developed for the third-party contractor is attached in Appendix F.

As of April 2023, a draft WRMP was prepared and submitted to the Water Acquisition Committee (WAC) for review. The WAC consists of representatives from CWCB, Colorado River Authority of Utah, Wyoming State Engineer's Office, National Park Service, the Central Utah Water Conservancy District, the Recovery Program, water users' representative, Western Resource Advocates, and the U.S. Bureau of Reclamation. During the May 2023 White River Planning Team meeting, some team members expressed that they did not see a need to generate a PBO due to a historical lack of significant water development on the White River. As of December 2023, it was unclear if the White River Planning Team would continue pursuing a PBO for the White River. Of the White River Planning Team members, only the UCRB water users, RBWCD, the

Colorado River Water Conservation District, and Yampa White Green Basin Roundtable were in favor of pursuing a PBO as initially intended in 2016 when this process was initiated.

5.2 RBWCD's Participation in the White River Planning Team

The CWCB pre-permitting grant funded a portion of the RBWCD's participation in the working group for the development of the WRMP. During this process, the RBWCD has worked with the multi-agency team and contributed consulting resources to develop and review research; provided engineering evaluations of the work performed in support of the WRMP; and reviewed and provided comments on several drafts of the WRMP document. The RBWCD Team has participated in over 35 meetings with the White River Planning Team or technical working groups during this Pre-Permitting Project Phase (December 2018 – November 2023).

One of the goals that the RBWCD had for its participation in this process is to work collaboratively with the USFWS to better understand likely future depletions and minimum flow requirements that had the potential to impact or benefit Federally listed endangered fish in the White River. These discussions have identified important information on future water storage needs to recover endangered fish populations in the White River. Through this effort, the RBWCD team has gained a better understanding of the potential adverse consequences and benefits of the operation of the proposed Wolf Creek Reservoir with regard to Federally listed endangered fish in the White River.

The WRMP April 2023 draft identified Wolf Creek Reservoir as one of the more beneficial potential future management actions for flow protection in the White River. Wolf Creek Reservoir becoming operational and available to provide flow-augmentation benefits for the listed fish pursuant to the Section 7 consultation is one of the key triggers that would initiate a check point.

6.0 COORDINATION AND STAKEHOLDER MEETINGS

Throughout this planning effort, RBWCD has participated in more than 100 stakeholder meetings. The RBWCD team has held numerous pre-permitting meetings with key Federal and State agencies that would be involved in the NEPA review. The Streamlined Permitting meeting held in February 2019 involved key permitting agencies (refer to Section 2.1 in this report). The stakeholder meetings were designed to provide updated project planning information and gather comments to help streamline the NEPA evaluations and documentation.

The RBWCD has also provided several tours of the proposed project site to agencies and interested individuals, including Colorado congressional representatives and Colorado State legislators. Other formal meetings held during the pre-permitting work include:

- April 2, 2019 – Presentation at the State of the White River Forum
- August 28, 2019 – Presentation to Congressman Scott Tipton
- March 16, 2021 – Meeting with the Colorado Department of Agriculture
- July 27, 2021 – Meeting with the Colorado River Water Conservation District
- November 9, 2021 – Meeting with Moffat County
- March 3, 2022 – Pre-permitting meeting with Colorado Parks and Wildlife (CPW)
- March 24, 2022 – Pre-permitting meeting with the Colorado Department of Natural Resources
- March 29, 2022 – Pre-permitting meeting with Colorado Department of Public Health and Environment.

In addition, meetings were held with the following entities:

- White River Area Preparedness
- Associated Governments of Northwest Colorado (AGNC)
- Club 20
- Dinosaur Town Council
- Moffat County Land Use Board
- Rio Blanco County Board of County Commissioners (BOCC)
- Douglas Creek Conservation District
- White River Conservation District
- Juniper Water Conservancy District
- Three Springs Ranch
- Colorado Water Congress
- Rangely Community Networking
- Town of Meeker

- Frank M. Thompson et al.
- 4M Ranch LLC
- Rivers Edge West
- White River Electric Association
- Yellow Jacket Water Conservancy District (YJWCD)
- Colorado State Land Board
- Rangely Chamber of Commerce
- Moon Lake Electric Association
- Water Education Colorado
- Intermountain West Joint Venture
- WRRWSP Cooperating Agencies
- U.S. Congresswoman Lauren Boebert
- U.S. Senator John Hickenlooper
- U.S. Senator Michael Bennet staff

6.1 Agreements with Local Partners

One of the results of the stakeholder meetings is that the RBWCD has developed the following agreements with key local partners:

- On March 17, 2020, the RBWCD and Rio Blanco County executed an intergovernmental agreement to use Wolf Creek Reservoir to provide augmentation water to customers on the White River within Rio Blanco County.
- On April 23, 2020, the Town of Rangely provided a letter to the RBWCD indicating that they are committed to contract for at least 2,000 acre-feet of storage in Wolf Creek Reservoir for municipal use.
- On July 2, 2020, the RBWCD and Yellow Jacket Water Conservancy District (YJWCD) executed an intergovernmental agreement for use of Wolf Creek Reservoir water to provide augmentation water within the YJWCD boundaries.

7.0 FINANCING PLAN

There are numerous viable mechanisms for financing the design and construction of Wolf Creek Reservoir, but key Federal and state permits and a NEPA Record of Decision needs to be issued before any project financing can be finalized. Some of the financing mechanisms identified are as follows:

- One source of funding for a portion of the project cost would be for the RBWCD to raise funds through a mill levy increase within the RBWCD boundaries. The increased funds from a mill levy increase would be used to pay off a construction loan for a portion of the project. This is how the original Taylor Draw Dam and its associated hydropower project was financed. Such a mill levy increase would require an election.
- Rio Blanco County has extensive reserves that could be used to finance project construction. The use of these reserves would need to be authorized by the County Commissioners; however, the County and its residents would be primary project beneficiaries. A favorable Federal Record of Decision and obtaining the required State of Colorado permits would likely be required before the County Commissioners would agree to commit funds to the construction of the project. Rio Blanco County has already been a key funding partner to help pay for a portion of the pre-NOI EIS work.
- Additional funding will be sought from other local project beneficiaries, including the local municipalities and recreational districts. These entities and their constituents would be important project beneficiaries. Funding could come through debt financing or unallocated funds.
- The RBWCD will seek continued financial support from the Colorado River District. The River District could apply funds from their Community Funding Partnership or other funding mechanisms to pay for a portion of the project. The Colorado River District has been a key funding partner to help pay for some of the cost of the pre-NOI EIS work.
- The CWCB has more than $100 million budgeted in future water plan financing for additional water storage projects in Colorado. A favorable Federal Record of Decision and required State of Colorado permits would be necessary before the RBWCD could apply for these funds to help support the design and construction of Wolf Creek Reservoir.
- The Recovery Program could potentially provide funding, similar to its support for the enlargement of Elkhead Reservoir, when the USFWS contributed $13.5 million to provide water storage for Federally listed endangered fish species.
- There are several other Federal funding mechanisms available through Federal agencies such as the U.S. Department of Interior, the U.S. Army Corps of Engineers, the U.S. Department of Agriculture, and the U.S. Department of Energy that could be utilized to pay for a portion of the project construction. Obtaining a Federal Record of Decision and necessary State permits will be an important step in applying for and obtaining these funds.

- Congressionally directed spending from Colorado's senators and congressmen is another funding mechanism that could be used to pay for a portion of the project costs. At the time this report was written, Congresswoman Lauren Boebert had requested $5 million in congressionally directed funding to help pay for additional work on the project.
- After the project is permitted, private interests could also see the value of the project and could contribute to the construction cost of the project through a Private Public Partnership (PPP) for the construction or operation of the reservoir.
- After the reservoir is permitted, water users in the White River could purchase augmentation water from Wolf Creek, which would provide an increased annual revenue stream to the RBWCD for loan payments or operation and maintenance costs.

8.0 SUMMARY

This section of the report provides a general summary of work completed as part of the WRRWSP Pre-Permitting CWCB grant. This section also provides a brief overview of some of the obstacles that were encountered and how these obstacles were overcome. Any applicable guidance for mitigating similar obstacles in the future are also summarized below.

The pre-permitting work allowed the RBWCD to file a Right-of-Way (ROW) application with the BLM in June 2022. The ROW application initiated the Federal NEPA project evaluations.

One of the challenges of this project is the ever-evolving Federal rules and regulations. Any large-scale, multi-year water supply project will face this same challenge. The rules and regulations often change every few years, which can have a dramatic impact on the NEPA review of a project that takes multiple years to permit and construct. Being aware of upcoming regulatory changes and developing a plan to address them is important to keep moving forward.

Streamlined Permitting

The RBWCD initiated a streamlined planning and permitting process that had the potential to save time and money in the permitting phase of the project. The RBWCD had a strategy to develop a detailed permitting plan by the end of 2019. A meeting was held in February 2019 with key agencies that will be involved in the NEPA review of the Wolf Creek Reservoir project. During this meeting, the BLM expressed that the RBWCD needed to have a water right for Wolf Creek Reservoir before the BLM would do any further pre-permitting consultation. Also, the BLM and the USACE stressed the importance of developing the project purpose and need. The conditional water right was not awarded until January 2021, resulting in an approximate two-year delay. By the time discussions resumed with the BLM and USACE in 2021, the RBWCD had elected to move forward with developing the necessary documents for the permitting and did not continue the development of the streamlined permitting plan.

Although the streamlined permitting plan was not developed, the initial streamlined permitting meeting was helpful because it identified the potential agencies that would likely participate in the NEPA evaluations and resources that would need to be evaluated. It also provided participating agencies with an introduction to the Wolf Creek Dam project. This streamlined permitting process was proposed so that tasks could be performed simultaneously, developing a permitting plan while finalizing the necessary documents to trigger the NEPA review of the Wolf Creek project. However, the review agencies were not agreeable at that time to work in parallel on these tasks.

Development of the Preferred Reservoir Size and Refinement of the Preliminary Design

Pre-permitting grant funds were used to refine the design of the dam, reservoir, and appurtenant structures to be consistent with the volume associated with the conditional water right decree of 66,720 acre-feet. Coordination with the BLM and USACE in 2021 resulted in the RBWCD team recognizing that the two agencies had different initial design requirements. While the BLM required a design with significant detail, the USACE recommended that the purpose and need be

vetted prior to moving forward with project-specific design details. As a compromise, the RBWCD initially submitted a Plan of Development that was less detailed than the BLM originally required, with the expectation to further refine the design details after the purpose and need had been reviewed. It resulted in efficiencies to have early discussions and agreement regarding the initial submittal requirements for each agency.

Purpose and Need

A detailed Purpose and Need Report was developed that included six regional water needs, with supporting documentation. These six needs include municipal water supply, augmentation water for hydropower generation, flatwater recreation, augmentation water for potential future Colorado River Compact curtailment, augmentation water for agricultural needs and water that can be released from storage for environmental flows for Federally listed fish species. Based on early discussions and coordination with the USACE, the RBWCD team considered it necessary to thoroughly document the needs to be addressed by the project prior to initiating the NEPA review. Early coordination and the initiation of the streamlined permitting process was effective in determining that the purpose and need was a priority.

Also, the work performed to obtain the water right decree was considered helpful in further refining and affirming the purpose and need for Wolf Creek Reservoir. Note that the work associated with obtaining the conditional water right was not funded by the CWCB pre-permitting grant.

Recreation Plan

Preliminary recreation plans were developed for facilities on the RBWCD land, on the eastern side of the Wolf Creek reservoir, and for the Colorado State Land Board property, on the western side of the Wolf Creek reservoir. The preliminary recreation plans also included preliminary design considerations of the access routes to the recreational facilities. The development of these recreation plans was important to understand the total disturbance area that will need to be evaluated for NEPA and are continuing to be refined in the POD updates.

Financing Plan

A general financing plan was developed for this project so the RBWCD can continue collaboration and partnerships with appropriate local, state, and Federal entities.

WRMP and PBO Coordination

The RBWCD continued to participate in the WRMP meetings and assisted in the successful development of a WRMP draft. As of the date of this report, it was clear that several members of the WRMP Planning Team were not in support of the development of a PBO for the White River. As of December 2023, the only White River Planning Team members in favor of pursuing a PBO were the UCRB water users, RBWCD, Colorado River District, and the Yampa White Green Basin Roundtable.

Coordination and Stakeholder Meetings

The RBWCD has used the CWCB pre-permitting grant funds to continue meeting with key stakeholders as well as local, state, and Federal agencies to provide information about the project. This work resulted in agreements between RBWCD and Rio Blanco County, the Town of Rangely, and the YJWCD to use water stored in the proposed Wolf Creek Reservoir.

9.0 REFERENCES

1. Colorado (2017), *Colorado Water Supply Planning and Permitting Handbook*, October 2017.
2. Intergovernmental Agreement (IGA, 2020-1), *Intergovernmental Agreement between Rio Blanco County and the Rio Blanco Water Conservancy District*, dated March 17, 2020.
3. Intergovernmental Agreement (IGA, 2020-2), *Intergovernmental Agreement between Yellow Jacket Water Conservancy District and the Rio Blanco Water Conservancy District*, dated July 2, 2020.
4. Logan Simpson (Logan Simpson, 2019), *Draft Wolf Creek Reservoir Recreation Potential*, August 2019.
5. Logan Simpson (Logan Simpson, 2022), *Wolf Creek Reservoir Recreation Sites, Vehicular Access, and Trails Analysis*, March 14, 2022.
6. Rio Blanco Water Conservancy District (RBWCD, 1990) *Petition for the Organization of the Rio Blanco Water Conservancy District,* November 9, 1990.
7. Rio Blanco Water Conservancy District (RBWCD, 1996), *Bylaws for the Rio Blanco Water Conservancy District*, adopted April 24, 1996.
8. Rio Blanco Water Conservancy District (RBWCD, 2021-1), *Unopposed Motion to approve stipulation between applicant, the Rio Blanco Water Conservancy District and Opposers, the State Engineer and the Division Engineer for Water Division 6, Case No. 14CW3043,* January 5, 2021.
9. Rio Blanco Water Conservancy District (RBWCD, 2021-2), *Stipulation between Applicant Rio Blanco Water Conservancy District and the State Engineer and Division Engineer for Water Division No. 6*, *Case No. 14CW3043,* January 5, 2021.
10. Rio Blanco Water Conservancy District (RBWCD, 2021-3), *Findings of Fact, Conclusions of Law, and Judgement and Decree of the Water Court, Case No. 14CW3043,* January 7, 2021.
11. Wilson Water Group (WWG, 2018), *Yampa/White/Green Basin Roundtable Basin Implementation Plan Modeling Phase 3 Final Report*, April 2018.
12. Western Engineers, Inc. (Western, 1983), *Geologic and Geotechnical Report for the Proposed Wolf Creek Dam and Reservoir*, December 1983.
13. Western Engineers, Inc. (Western, 1983), *Construction Materials Investigation of the Wolf Creek Dam and Reservoir Site,* January 1985.
14. W. W. Wheeler and Associates, Inc. (Wheeler, 2015), *White River Storage Feasibility Study Final Report, Phase 1 and Phase 2*, March 4, 2015.
15. W. W. Wheeler and Associates, Inc. (Wheeler, 2018), *White River Storage Feasibility Study Final Report, Phase 2A*, September 30, 2018.

16. W. W. Wheeler and Associates, Inc., and Harvey Economics (Wheeler & HE, 2022), *White River Regional Water Supply Project, Purpose and Need Report*, June 15, 2022.

17. W. W. Wheeler and Associates, Inc. (Wheeler, 2022), *White River Regional Water Supply Project, Initial Plan of Development*, June 17, 2022.

18. W. W. Wheeler and Associates, Inc. (Wheeler, 2023), *White River Regional Water Supply Project, Plan of Development Version 2*, December 2023.

Appendix A

CWCB Grant – Statement of Work

GRANT AWARD LETTER
SUMMARY OF GRANT AWARD TERMS AND CONDITIONS

State Agency Colorado Department of Natural Resources Colorado Water Conservation Board (CWCB) 1313 Sherman St, Room 718 Denver, CO 80203	**Grant Agreement Number** CMS 121895 CTGG12019-2675 **Grant Amount** $350,000.00
Grantee Rio Blanco Water Conservancy District 2252 East Main Street Rangely, CO 81648	
Grant Issuance Date The Effective Date (the date the State Controller or an authorized delegate signs this Grant Agreement).	
Grant Expiration Date December 15, 2023	**Local Match Amount** 350,000.00
Grant Authority Colorado Revised Statutes (CRS) §37-60-106(1)(u) and House Bill 17-1248, Section 15.	

Grant Purpose

White River Storage Project-Pre-Permitting Phase

The water plan grant funding is available to promote progress on the critical actions identified in the water plan and its measurable objectives. CWCB funds projects, programs and activities that have the best opportunity to make progress on the water plan's objectives.

The objective of this project is to complete the pre-permitting phase of the White River Storage Project. This includes finalizing the preferred reservoir size and appurtenant facilities and firm-up financial commitments of key Project Partners so that applications for federal permits can be filed by the end of 2019.

Exhibits and Order of Precedence

The following Exhibits and attachments are included with this Grant:

1. Exhibit A, Statement of Work.
2. Exhibit B, Budget.

In the event of a conflict or inconsistency between this Grant and any Exhibit or attachment, such conflict or inconsistency shall be resolved by reference to the documents in the following order of priority:

1. The provisions of the other sections of the main body of this Grant.
2. Exhibit A, Statement of Work.
3. Exhibit B, Budget.

SIGNATURE PAGE CMS 121895 CTGG1 PDAA 2019-2675

THE SIGNATORIES LISTED BELOW AUTHORIZE THIS GRANT

STATE OF COLORADO John W. Hickenlooper, Governor Department of Natural Resources Robert W. Randall, Executive Director By: _____ Kirk Russell, P.E., Section Chief Colorado Water Conservation Board, Finance Section Date: 12/3/18	In accordance with §24-30-202 C.R.S., this Grant is not valid until signed and dated below by the State Controller or an authorized delegate. **STATE CONTROLLER** **Robert Jaros, CPA, MBA, JD** By: _____ Name: Maggie Van Cleef Title: Purchasing Director Department of Natural Resources Date: 12/17/2018

1. GRANT

As of the Grant Issuance Date, the State Agency shown on the first page of this Grant Award Letter (the "State") hereby obligates and awards to Grantee shown on the first page of this Grant Award Letter (the "Grantee") an award of Grant Funds in the amounts shown on the first page of this Grant Award Letter. By accepting the Grant Funds provided under this Grant Award Letter, Grantee agrees to comply with the terms and conditions of this Grant Award Letter and requirements and provisions of all Exhibits to this Grant Award Letter.

2. TERM

A. Initial Grant Term and Extension

The Parties' respective performances under this Grant Award Letter shall commence on the Grant Issuance Date and shall terminate on the Grant Expiration Date unless sooner terminated or further extended in accordance with the terms of this Grant Award Letter. Upon request of Grantee, the State may, in its sole discretion, extend the term of this Grant Award Letter by providing Grantee with an updated Grant Award Letter showing the new Grant Expiration Date.

B. Early Termination in the Public Interest

The State is entering into this Grant Award Letter to serve the public interest of the State of Colorado as determined by its Governor, General Assembly, or Courts. If this Grant Award Letter ceases to further the public interest of the State or if State or other funds used for this Grant Award Letter are not appropriated, or otherwise become unavailable to fund this Grant Award Letter, the State, in its discretion, may terminate this Grant Award Letter in whole or in part by providing written notice to Grantee that includes, to the extent practicable, the public interest justification for the termination. If the State terminates this Grant Award Letter in the public interest, the State shall pay Grantee an amount equal to the percentage of the total reimbursement payable under this Grant Award Letter that corresponds to the percentage of Work satisfactorily completed, as determined by the State, less payments previously made. Additionally, the State, in its discretion, may reimburse Grantee for a portion of actual, out-of-pocket expenses not otherwise reimbursed under this Grant Award Letter that are incurred by Grantee and are directly attributable to the uncompleted portion of Grantee's obligations, provided that the sum of any and all reimbursements shall not exceed the maximum amount payable to Grantee hereunder. This subsection shall not apply to a termination of this Grant Award Letter by the State for breach by Grantee.

3. DEFINITIONS

The following terms shall be construed and interpreted as follows:

A. "**Budget**" means the budget for the Work described in Exhibit B.

B. "**Business Day**" means any day in which the State is open and conducting business, but shall not include Saturday, Sunday or any day on which the State observes one of the holidays listed in §24-11-101(1) C.R.S.

C. "**CORA**" means the Colorado Open Records Act, §§24-72-200.1 *et. seq.*, C.R.S.

D. "**Grant Award Letter**" means this letter which offers Grant Funds to Grantee, including all attached Exhibits, all documents incorporated by reference, all referenced statutes, rules and cited authorities, and any future updates thereto.

E. "**Grant Funds**" means the funds that have been appropriated, designated, encumbered, or otherwise made available for payment by the State under this Grant Award Letter.

F. "**Grant Expiration Date**" means the Grant Expiration Date shown on the first page of this Grant Award Letter.

G. "**Grant Issuance Date**" means the Grant Issuance Date shown on the first page of this Grant Award Letter.

H. "**Exhibits**" exhibits and attachments included with this Grant as shown on the first page of this Grant

I. "**Extension Term**" means the period of time by which the Grant Expiration Date is extended by the State through delivery of an updated Grant Award Letter

J. "**Goods**" means any movable material acquired, produced, or delivered by Grantee as set forth in this Grant Award Letter and shall include any movable material acquired, produced, or delivered by Grantee in connection with the Services.

K. "**Incident**" means any accidental or deliberate event that results in or constitutes an imminent threat of the unauthorized access or disclosure of State Confidential Information or of the unauthorized modification, disruption, or destruction of any State Records.

L. "**Initial Term**" means the time period between the Grant Issuance Date and the Grant Expiration Date.

M. "**Matching Funds**" means the funds provided Grantee as a match required to receive the Grant Funds.

N. "**Party**" means the State or Grantee, and "Parties" means both the State and Grantee.

O. "**PII**" means personally identifiable information including, without limitation, any information maintained by the State about an individual that can be used to distinguish or trace an individual's identity, such as name, social security number, date and place of birth, mother's maiden name, or biometric records; and any other information that is linked or linkable to an individual, such as medical, educational, financial, and employment information. PII includes, but is not limited to, all information defined as personally identifiable information in §§24-72-501 and 24-73-101 C.R.S.

P. "**Services**" means the services to be performed by Grantee as set forth in this Grant Award Letter, and shall include any services to be rendered by Grantee in connection with the Goods.

Q. "**State Confidential Information**" means any and all State Records not subject to disclosure under CORA. State Confidential Information shall include, but is not limited to, PII, and State personnel records not subject to disclosure under CORA. State Confidential Information shall not include information or data concerning individuals that is not deemed confidential but nevertheless belongs to the State, which has been communicated, furnished, or disclosed by the State to Contractor which (i) is subject to disclosure pursuant to CORA; (ii) is already known to Contractor without restrictions at the time of its disclosure to Contractor; (iii) is or subsequently becomes publicly available without breach of any obligation owed by Contractor to the State; (iv) is disclosed to Contractor, without confidentiality obligations, by a third party who has the right to disclose such information; or (v) was independently developed without reliance on any State Confidential Information.

R. "**State Fiscal Rules**" means the fiscal rules promulgated by the Colorado State Controller pursuant to §24-30-202(13)(a) C.R.S.

S. "**State Fiscal Year**" means a 12 month period beginning on July 1 of each calendar year and ending on June 30 of the following calendar year. If a single calendar year follows the term, then it means the State Fiscal Year ending in that calendar year.

T. "**State Records**" means any and all State data, information, and records, regardless of physical form, including, but not limited to, information subject to disclosure under CORA.

U. "**Subcontractor**" means third-parties, if any, engaged by Grantee to aid in performance of the Work. "Subcontractor" also includes sub-grantees.

V. "**Work**" means the delivery of the Goods and performance of the Services described in this Grant Award Letter.

W. "**Work Product**" means the tangible and intangible results of the Work, whether finished or unfinished, including drafts. Work Product includes, but is not limited to, documents, text, software (including source code), research, reports, proposals, specifications, plans, notes, studies, data, images, photographs, negatives, pictures, drawings, designs, models, surveys, maps, materials, ideas, concepts, know-how, and any other results of the Work. "Work Product" does not include any material that was developed prior to the Grant Issuance Date that is used, without modification, in the performance of the Work.

Any other term used in this Grant Award Letter that is defined in an Exhibit shall be construed and interpreted as defined in that Exhibit.

4. STATEMENT OF WORK

Grantee shall complete the Work as described in this Grant Award Letter and in accordance with the provisions of Exhibit A. The State shall have no liability to compensate or reimburse Grantee for the delivery of any goods or the performance of any services that are not specifically set forth in this Grant Award Letter.

5. PAYMENTS TO GRANTEE

A. Maximum Amount

Payments to Grantee are limited to the unpaid, obligated balance of the Grant Funds. The State shall not pay Grantee any amount under this Grant that exceeds the Grant Amount shown on the first page of this Grant Award Letter. Financial obligations of the State payable after the current State Fiscal Year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available. The State shall not be liable to pay or reimburse Grantee for any Work performed or expense incurred before the Grant Issuance Date or after the Grant Expiration Date.

Grantee shall provide the Local Match Amount shown on the first page of this Grant Award Letter and described in Exhibit A (the "Local Match Amount"). Grantee shall appropriate and allocate all Local Match Amounts to the purpose of this Grant Award Letter each fiscal year prior to accepting any Grant Funds for that fiscal year. Grantee does not by accepting this Grant Award Letter irrevocably pledge present cash reserves for payments in future fiscal years, and this Grant Award Letter is not intended to create a multiple-fiscal year debt of Grantee. Grantee shall not pay or be liable for any claimed interest, late charges, fees, taxes or penalties of any nature, except as required by Grantee's laws or policies.

D. Reimbursement of Grantee Costs

The State shall reimburse Grantee's allowable costs, not exceeding the maximum total amount described in this Grant Award Letter for all allowable costs described in this Grant

Award Letter and shown in the Budget, except that Grantee may adjust the amounts between each line item of the Budget without formal modification to this Agreement as long as the Grantee provides notice to the State of the change, the change does not modify the total maximum amount of this Grant Award Letter or the maximum amount for any state fiscal year, and the change does not modify any requirements of the Work. The State shall only reimburse allowable costs if those costs are: **(i)** reasonable and necessary to accomplish the Work and for the Goods and Services provided; and **(ii)** equal to the actual net cost to Grantee (i.e. the price paid minus any items of value received by Grantee that reduce the cost actually incurred).

E. Close-Out.

Grantee shall close out this Grant within 45 days after the Grant Expiration Date. To complete close out, Grantee shall submit to the State all deliverables (including documentation) as defined in this Grant Award Letter and Grantee's final reimbursement request or invoice. The State will withhold 5% of allowable costs until all final documentation has been submitted and accepted by the State as substantially complete.

6. REPORTING - NOTIFICATION

A. Performance and Final Status

Grantee shall submit all financial, performance and other reports to the State no later than the end of the close out described in §5.E, containing an evaluation and review of Grantee's performance and the final status of Grantee's obligations hereunder.

B. Violations Reporting

Grantee shall disclose, in a timely manner, in writing to the State all violations of State criminal law involving fraud, bribery, or gratuity violations. The State may impose any penalties for noncompliance which may include, without limitation, suspension or debarment.

7. GRANTEE RECORDS

A. Maintenance and Inspection

Grantee shall make, keep, and maintain, all records, documents, communications, notes and other written materials, electronic media files, and communications, pertaining in any manner to this Grant for a period of three years following the completion of the close out of this Grant. Grantee shall permit the State to audit, inspect, examine, excerpt, copy and transcribe all such records during normal business hours at Grantee's office or place of business, unless the State determines that an audit or inspection is required without notice at a different time to protect the interests of the State.

B. Monitoring

The State will monitor Grantee's performance of its obligations under this Grant Award Letter using procedures as determined by the State. The State shall have the right, in its sole discretion, to change its monitoring procedures and requirements at any time during the term of this Agreement. The State shall monitor Grantee's performance in a manner that does not unduly interfere with Grantee's performance of the Work.

C. Final Audit Report

Grantee shall promptly submit to the State a copy of any final audit report of an audit performed on Grantee's records that relates to or affects this Grant or the Work, whether the audit is conducted by Grantee or a third party.

8. CONFIDENTIAL INFORMATION-STATE RECORDS

A. Confidentiality

Grantee shall hold and maintain, and cause all Subcontractors to hold and maintain, any and all State Records that the State provides or makes available to Grantee for the sole and exclusive benefit of the State, unless those State Records are otherwise publically available at the time of disclosure or are subject to disclosure by Grantee under CORA. Grantee shall not, without prior written approval of the State, use for Grantee's own benefit, publish, copy, or otherwise disclose to any third party, or permit the use by any third party for its benefit or to the detriment of the State, any State Records, except as otherwise stated in this Grant Award Letter. Grantee shall provide for the security of all State Confidential Information in accordance with all policies promulgated by the Colorado Office of Information Security and all applicable laws, rules, policies, publications, and guidelines. If Grantee or any of its Subcontractors will or may receive the following types of data, Grantee or its Subcontractors shall provide for the security of such data according to the following: **(i)** the most recently promulgated IRS Publication 1075 for all Tax Information and in accordance with the Safeguarding Requirements for Federal Tax Information attached to this Grant as an Exhibit, if applicable, **(ii)** the most recently updated PCI Data Security Standard from the PCI Security Standards Council for all PCI, **(iii)** the most recently issued version of the U.S. Department of Justice, Federal Bureau of Investigation, Criminal Justice Information Services Security Policy for all CJI, and **(iv)** the federal Health Insurance Portability and Accountability Act for all PHI and the HIPAA Business Associate Agreement attached to this Grant, if applicable. Grantee shall immediately forward any request or demand for State Records to the State's principal representative.

B. Other Entity Access and Nondisclosure Agreements

Grantee may provide State Records to its agents, employees, assigns and Subcontractors as necessary to perform the Work, but shall restrict access to State Confidential Information to those agents, employees, assigns and Subcontractors who require access to perform their obligations under this Grant Award Letter. Grantee shall ensure all such agents, employees, assigns, and Subcontractors sign nondisclosure agreements with provisions at least as protective as those in this Grant, and that the nondisclosure agreements are in force at all times the agent, employee, assign or Subcontractor has access to any State Confidential Information. Grantee shall provide copies of those signed nondisclosure restrictions to the State upon request.

C. Use, Security, and Retention

Grantee shall use, hold and maintain State Confidential Information in compliance with any and all applicable laws and regulations in facilities located within the United States, and shall maintain a secure environment that ensures confidentiality of all State Confidential Information wherever located. Grantee shall provide the State with access, subject to Grantee's reasonable security requirements, for purposes of inspecting and monitoring access and use of State Confidential Information and evaluating security control effectiveness. Upon the expiration or termination of this Grant, Grantee shall return State Records provided to

Grantee or destroy such State Records and certify to the State that it has done so, as directed by the State. If Grantee is prevented by law or regulation from returning or destroying State Confidential Information, Grantee warrants it will guarantee the confidentiality of, and cease to use, such State Confidential Information.

D. Incident Notice and Remediation

If Grantee becomes aware of any Incident, it shall notify the State immediately and cooperate with the State regarding recovery, remediation, and the necessity to involve law enforcement, as determined by the State. After an Incident, Grantee shall take steps to reduce the risk of incurring a similar type of Incident in the future as directed by the State, which may include, but is not limited to, developing and implementing a remediation plan that is approved by the State at no additional cost to the State.

E. Safeguarding PII

If Grantee or any of its Subcontractors will or may receive PII under this Agreement, Grantee shall provide for the security of such PII, in a manner and form acceptable to the State, including, without limitation, State non-disclosure requirements, use of appropriate technology, security practices, computer access security, data access security, data storage encryption, data transmission encryption, security inspections, and audits. Grantee shall be a "Third-Party Service Provider" as defined in §24-73-103(1)(i), C.R.S. and shall maintain security procedures and practices consistent with §§24-73-101 *et seq.*, C.R.S.

9. CONFLICTS OF INTEREST

Grantee shall not engage in any business or activities, or maintain any relationships that conflict in any way with the full performance of the obligations of Grantee under this Grant. Grantee acknowledges that, with respect to this Grant, even the appearance of a conflict of interest shall be harmful to the State's interests and absent the State's prior written approval, Grantee shall refrain from any practices, activities or relationships that reasonably appear to be in conflict with the full performance of Grantee's obligations under this Grant. If a conflict or the appearance of a conflict arises, or if Grantee is uncertain whether a conflict or the appearance of a conflict has arisen, Grantee shall submit to the State a disclosure statement setting forth the relevant details for the State's consideration.

10. INSURANCE

Grantee shall maintain at all times during the term of this Grant such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the Colorado Governmental Immunity Act, §24-10-101, *et seq.*, C.R.S. (the "GIA"). Grantee shall ensure that any Subcontractors maintain all insurance customary for the completion of the Work done by that Subcontractor and as required by the State or the GIA.

11. REMEDIES

In addition to any remedies available under any exhibit to this Grant Award Letter, if Grantee fails to comply with any term or condition of this Grant, the State may terminate some or all of this Grant and require Grantee to repay any or all Grant funds to the State in the State's sole discretion. The State may also terminate this Grant Award Letter at any time if the State has determined, in its sole discretion, that Grantee has ceased performing the Work without intent to resume performance, prior to the completion of the Work.

12. DISPUTE RESOLUTION

Except as herein specifically provided otherwise, disputes concerning the performance of this Grant that cannot be resolved by the designated Party representatives shall be referred in writing to a senior departmental management staff member designated by the State and a senior manager or official designated by Grantee for resolution.

13. NOTICES AND REPRESENTATIVES

Each Party shall identify an individual to be the principal representative of the designating Party and shall provide this information to the other Party. All notices required or permitted to be given under this Grant Award Letter shall be in writing, and shall be delivered either in hard copy or by email to the representative of the other Party. Either Party may change its principal representative or principal representative contact information by notice submitted in accordance with this **§13**.

14. RIGHTS IN WORK PRODUCT AND OTHER INFORMATION

Grantee hereby grants to the State a perpetual, irrevocable, non-exclusive, royalty free license, with the right to sublicense, to make, use, reproduce, distribute, perform, display, create derivatives of and otherwise exploit all intellectual property created by Grantee or any Subcontractors or Subgrantees and paid for with Grant Funds provided by the State pursuant to this Grant.

15. GOVERNMENTAL IMMUNITY

Liability for claims for injuries to persons or property arising from the negligence of the Parties, their departments, boards, commissions committees, bureaus, offices, employees and officials shall be controlled and limited by the provisions of the Colorado Governmental Immunity Act, §24-10-101, et seq., C.R.S.; the Federal Tort Claims Act, 28 U.S.C. Pt. VI, Ch. 171 and 28 U.S.C. 1346(b), and the State's risk management statutes, §§24-30-1501, et seq. C.R.S. No term or condition of this Contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions, contained in these statutes.

16. GENERAL PROVISIONS

A. Assignment

Grantee's rights and obligations under this Grant are personal and may not be transferred or assigned without the prior, written consent of the State. Any attempt at assignment or transfer without such consent shall be void. Any assignment or transfer of Grantee's rights and obligations approved by the State shall be subject to the provisions of this Grant Award Letter.

B. Captions and References

The captions and headings in this Grant Award Letter are for convenience of reference only, and shall not be used to interpret, define, or limit its provisions. All references in this Grant Award Letter to sections (whether spelled out or using the § symbol), subsections, exhibits or other attachments, are references to sections, subsections, exhibits or other attachments contained herein or incorporated as a part hereof, unless otherwise noted.

C. Entire Understanding

This Grant Award Letter represents the complete integration of all understandings between the Parties related to the Work, and all prior representations and understandings related to the Work, oral or written, are merged into this Grant Award Letter.

D. Modification

The State may modify the terms and conditions of this Grant by issuance of an updated Grant Award Letter, which shall be effective if Grantee accepts Grant Funds following receipt of the updated letter. The Parties may also agree to modification of the terms and conditions of the Grant in a formal amendment to this Grant, properly executed and approved in accordance with applicable Colorado State law and State Fiscal Rules.

E. Statutes, Regulations, Fiscal Rules, and Other Authority.

Any reference in this Grant Award Letter to a statute, regulation, State Fiscal Rule, fiscal policy or other authority shall be interpreted to refer to such authority then current, as may have been changed or amended since the Grant Issuance Date. Grantee shall strictly comply with all applicable State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

F. Digital Signatures

If any signatory signs this agreement using a digital signature in accordance with the Colorado State Controller Contract, Grant and Purchase Order Policies regarding the use of digital signatures issued under the State Fiscal Rules, then any agreement or consent to use digital signatures within the electronic system through which that signatory signed shall be incorporated into this Contract by reference.

G. Severability

The invalidity or unenforceability of any provision of this Grant Award Letter shall not affect the validity or enforceability of any other provision of this Grant Award Letter, which shall remain in full force and effect, provided that the Parties can continue to perform their obligations under the Grant in accordance with the intent of the Grant.

H. Survival of Certain Grant Award Letter Terms

Any provision of this Grant Award Letter that imposes an obligation on a Party after termination or expiration of the Grant shall survive the termination or expiration of the Grant and shall be enforceable by the other Party.

I. Third Party Beneficiaries

Except for the Parties' respective successors and assigns described above, this Grant Award Letter does not and is not intended to confer any rights or remedies upon any person or entity other than the Parties. Any services or benefits which third parties receive as a result of this Grant are incidental to the Grant, and do not create any rights for such third parties.

J. Waiver

A Party's failure or delay in exercising any right, power, or privilege under this Grant Award Letter, whether explicit or by lack of enforcement, shall not operate as a waiver, nor shall any single or partial exercise of any right, power, or privilege preclude any other or further exercise of such right, power, or privilege.

Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Prepared Date:	**November 19, 2018**
Name of Grantee:	**Rio Blanco Water Conservancy District (RBWCD)**
Name of Water Project:	**White River Storage Project**
Funding Sources:	**Water Plan Grant – Storage & RBWCD**

Water Project Overview:

Through this project, the Rio Blanco Water Conservancy District (District) will complete the pre-permitting phase of the White River Storage Project. The District was formed in 1992 to facilitate, operate, and maintain Taylor Draw Dam that created Kenney Reservoir, which originally provided 13,800 acre-feet (AF) of storage. Kenny Reservoir is silting in at an average rate of 300 AF per year. It is estimated that the 2018 active storage in the reservoir is about 3,400 AF. In order to develop replacement for the lost storage, the District began evaluating potential sites in the White River Basin. The new reservoir is expected to be between 44,000 AF and 400,000 AF. The District believes the project can: provide drought mitigation; enhance endangered fish habitat with non-consumptive reservoir releases; preserve municipal, industrial, and agricultural water supplies; and provide recreational opportunities.

Project Objectives:

The objective of the pre-permitting phase is to finalize the preferred reservoir size and firm-up financial commitments of key project partners so that applications for federal permits can be filed.

Tasks
Task 1 – Pre-permitting consulting
Description of Task:
The pre-permitting work includes: A) Project management, outreach, and public meetings; B) Coordination on the Programmatic Biological Opinion (PBO) for endangered fish; C) Development of a Lean permitting plan with the US Department of Interior; D) Development of a recreation plan at the reservoir; E) Final decision on the proposed reservoir size and location; and, F) Development of a financing plan to identify how the construction will funded.
Method/Procedure:
A) Project Management and Coordination: Includes project management; subcontractor management; coordination of key study criteria, methods, and results; meeting coordination; and continued Project communications. The District's consultant will conduct public outreach, stakeholder collaboration, and meetings with key Project stakeholders. **B) Programmatic Biological Opinion Coordination:** The District's consultant work as a technical consultant to the PBO development process and will attend PBO coordination meetings and provide technical comments on behalf of the District. **C) Lean Permitting:** This work will include several coordination meetings with key federal, state, and local agencies to develop a comprehensive Work Plan to streamline key environmental and other analysis required for federal, state and local permits. **D) Recreational Plan Development:** The recreation plan will be based on a site visit and review of information to identify physical and operational recreational constraints. The District's consultant will interview key stakeholders to identify recreational needs and gaps in the general Project vicinity. This information will be used to develop a conceptual Recreation Plan that would be included in the Project description with the federal permit applications. **E) Development of preferred size and location of dam**: This work will involve a series of internal purpose and need workshops that will be an iterative and integrated effort the Financial Plan. Once a preferred reservoir size and location is determined, there will be some supplemental analysis to refine the preliminary designs, cost opinions, and water modeling work completed to date to update the Project cost and reservoir firm yield for the Preferred Alternative. **F) Financing Plan**: The funding strategy will be completed by a sub-consultant and will be performed iteratively with the purpose and need refinement work described under subtask E. The funding plan will evaluate repayment capabilities and committed interest on the part of each of the key Project beneficiaries. The consultant will evaluate the District, local communities and counties, private parties, the energy industry, the River District, the CWCB, Federal agencies, and other potential Project Stakeholders. The goal is to seek firm commitments for those entities who would be responsible for participating in the Financing Plan. The Financing Plan will outline how the initial capital costs and the annual operating costs will be paid for.
Deliverable:

At completion of the project, a final report will be provided to the CWCB that:

- Summarizes the Project and the pre-permitting work.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the grantee shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Project costs not covered by this or other grants are the responsibility of the grantee. Project costs that are eligible for CWCB funds will be disbursed at the following percentages: 50% Water Plan Grant funds to 50% matching funds.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to CWCB in hard copy and electronic format as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
(b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.
(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Water Plan Grant
Budget and Schedule - Exhibit B

Prepared Date: November 19, 2018

Name of Grantee: Rio Blanco Water Conservancy District

Name of Project: White River Storage Project - Pre-Permitting Phase

Project Start Date: December 15, 2018

Project End Date: December 15, 2023

Task No.	Task Description	Task Start Date	Task End Date	CWCB Grant Funding Request	Match Funding	Total
1	Pre-permitting consulting	12/15/2018	12/15/2023	$350,000	$350,000	$700,000
						$0
			Total	$350,000	$350,000	$700,000

Appendix B

Wolf Creek Dam Water Right

(*for information, not completed as part of this work*)

DISTRICT COURT, WATER DIVISION NO. 6, STATE OF COLORADO Routt County Justice Center 1955 Shield Drive, Unit 200 Steamboat Springs, CO 80487 (970) 879-5020 *telephone*	DATE FILED: January 7, 2021 6:04 PM CASE NUMBER: 2014CW3043
CONCERNING THE APPLICATION FOR WATER RIGHTS OF **The RIO BLANCO WATER CONSERVANCY DISTRICT, a Colorado Water Conservancy District** **In the White River or its Tributaries** **In RIO BLANCO COUNTY, COLORADO**	**▲ COURT USE ONLY ▲** Case Number: 2014CW3043

FINDINGS OF FACT, CONCLUSIONS OF LAW,
AND
JUDGMENT AND DECREE OF THE WATER COURT

The above-entitled Application was filed on December 29, 2014 (referred to herein as the "Application"). This matter was referred to the Water Referee on December 30, 2014 for Water Division No. 6, State of Colorado, by the Water Judge of said Court in accordance with Article 92 of Chapter 37, C.R.S. 1973, known as The Water Right Determination and Administration Act of 1969. On December 4, 2015, the Water Referee at his discretion re-referred the matter back to the Water Judge, however, the Water Judge acted as the Referee until October 9, 2019, when the at issue date was set and the matter was put on a trial track.

The Court, having reviewed the files, and having become fully advised with respect to the subject matter of the Application, does hereby make the following determinations in this matter, to-wit:

FINDINGS OF FACT

1. The statements in the Application are true.

2. Name and Address of Applicant:

Rio Blanco Water Conservancy District
c/o Alden Vanden Brink, Manager
2252 East Main Street
Rangely, Colorado 81648
E-mail: rbwcd@yahoo.com
(970) 675-5055

3. Neither the subject water rights nor their sources are located within a designated ground water basin.

4. Timely and adequate notice of the filing of this Application was given as required by law.

5. Statements of Opposition were filed by John W. Savage aka John W. Savage, Jr., Joan L. Savage, Roy E. Savage, Marshall T. Savage and Daniel W. Savage (Savage) on February 9, 2015; Exxon Mobil Corporation (Exxon) on February 25, 2015; United States of America, Department of the Interior, Bureau of Land Management, White River Field Office (BLM) on February 26, 2015; TerraCarta Energy Resources, LLC (TerraCarta) on February 27, 2015 and Oscar S. Wyatt, Jr. (Wyatt) on February 27, 2015. 4 M Ranch, LLC (4MRanch) gave Notice Regarding Name Change of Named Opposer from Wyatt to 4MRanch on April 13, 2016. 4MRanch was substituted as a party for Savage on November 5, 2019. The Colorado Water Conservation Board (CWCB) intervened in the case and the court entered an order approving its intervention on July 13, 2015. The Colorado State Engineer and the Division 6 Engineer (Engineers) intervened in this case and the court entered an order approving their intervention on February 12, 2020. The time for filing Statements of Opposition has expired.

6. Stipulations have been filed and orders approving those Stipulations have been entered by the Court as follows:

a. Savage March 14, 2016; Order approving same March 20, 2016 (Savage Stipulation). 4MRanch is bound by the Savage Stipulation.
b. BLM August 26, 2016; Order approving same August 27, 2016.
c. CWCB March 6, 2017; Order approving same March 13, 2017.
d. TerraCarta June 27, 2018; Order approving same June 28, 2018.
e. Exxon November 25, 2019; Order approving same November 29, 2019; Amended Stipulation July 7, 2020; Order approving same July 8, 2020.
f. 4M withdrew its Statement of Opposition on July 6, 2020.
g. Engineers January 5, 2021; Order approving same on January 7, 2021.

7. The Division Engineer issued the Summary of Consultation Report in this matter on March 17, 2015, an Additional Written Report on October 4, 2018 and a Second Additional Report on August 2, 2019. *See* C.R.S. § 37-92-302(4). The Water Judge has considered the Summary of Consultation and the two Additional Reports and those issues have been addressed to the satisfaction of the Division Engineer in this Decree.

CLAIM FOR WATER STORAGE RIGHT

8. Name of structure: Wolf Creek Reservoir

9. Legal description for alternative places of storage:

Wolf Creek Off-Channel Dam and Reservoir: The left abutment (looking downstream) of the Wolf Creek Off-Channel Dam is located in the NW¼ of the SW¼ of Section 23, Township 3N., Range 99 W. of the 6th P.M., at a point 1,007 feet east of the west section line of Section 23 and 1,450 feet north of the south section line of Section 23, in Rio Blanco County, Colorado. Maps showing the location of the Wolf Creek Off-Channel Reservoir are attached as Figures 1 and 2.

Wolf Creek Mainstem Dam and Reservoir: The left abutment (looking downstream) of the Wolf Creek Mainstem Dam is located in the SW¼ of the NW¼ of Section 34, Township 3N., Range 99 W. of the 6th P.M., at a point 390 feet east of the west section line of Section 34 and 3,730 feet north of the south section line of Section 34, in Rio Blanco County, Colorado. Maps showing the location of the Wolf Creek Mainstem Dam and Reservoir are attached as Figures 3 and 4.

10. Sources:

Wolf Creek Off-Channel Dam and Reservoir:

a. White River, diverting up to 400 cfs at the Wolf Creek Reservoir Pump and Pipeline located in the NE¼ of the SE¼ of Section 27, Township 3 N., Range 99 W. 6th P.M., 480 feet west of the east section line of Section 27 and 2,620 feet north of the south section line of Section 27, in Rio Blanco County, Colorado. A map showing the location of the Wolf Creek Reservoir Pump and Pipeline is attached as Figure 1.

b. Natural inflow from Divide Creek, Wolf Creek, Middle Fork Wolf Creek, East Fork Wolf Creek, and Coal Creek, all tributary to the White River.

Wolf Creek Mainstem Dam and Reservoir: White River

11. Date of appropriation: March 31, 2013.

a. How appropriation was initiated: formation of requisite intent to appropriate water coupled with actions manifesting such intent, including but not limited to public discussions and meetings, numerous engineering, planning and feasibility studies, site visits, field surveying, land acquisition, pre-permitting activities, and formal District action to adjudicate water rights.

b. Date water applied to beneficial use: N/A.

12. Amount claimed: 66,720 acre-feet, conditional. Only one of the two alternative places of storage will be utilized and upon making the water right at one location absolute, the alternative place of storage shall be cancelled.

13. Use or Proposed Use: municipal use (including but not limited to domestic, irrigation, commercial, and industrial uses) for the Town of Rangely, augmentation (to augment depletions through a future blanket augmentation plan for water users within the District Boundaries and within the Yellow Jacket Water Conservancy District boundaries pursuant to leases or exchanges of water under C.R.S. § 37-83-106), mitigation of environmental impacts of the Wolf Creek Reservoir project ("Mitigation"), hydroelectric power generation exercised only in conjunction with releases for other decreed beneficial uses, and in-reservoir uses for recreation, piscatorial, and wildlife habitat.

14. Dam and Reservoir Information:

Wolf Creek Off-Channel Dam and Reservoir:

a. Surface area of high water line: 2,025 acres

b. Vertical height of dam in feet: 110 feet.

c. Length of dam in feet: 3,800 feet.

d. Total capacity of reservoir in acre-feet: 66,720

e. Active capacity: 66,720 acre-feet Dead storage: None

Wolf Creek Mainstem Dam and Reservoir:

a. Surface area of high water line: 2,257 acres

b. Vertical height of dam in feet: 127 feet.

c. Length of dam in feet: 2500 feet.

d. Total capacity of reservoir in acre-feet: 66,720 acre-feet

e. Active capacity: 66,720 acre-feet Dead storage: None

Remarks: Applicant will not construct both reservoirs. Applicant's preferred alternative is the Wolf Creek Off-Channel Dam and Reservoir.

STIPULATED TERMS AND CONDITIONS

15. The following stipulated terms and conditions are incorporated herein:

a. That the use of stored water by exchange upstream of the outlet works for the reservoir, including augmentation use wherein upstream out-of-priority depletions are replaced with downstream reservoir water, shall be made only after resume notice and a new water court application that includes this augmentation source has been decreed or substitute water supply plan approved by the State and Division Engineer's Office pending a final decree. In the event an administrative exchange is sought by Applicant, Applicant shall give CWCB prior notice of such request for administrative exchange with sufficient time, if possible, for opportunity for the CWCB to propose protective terms and conditions if the exchanges extend through any instream flow reach. Notice shall be via e-mail to the Stream and Lake Protection Section of the CWCB, dnr_cwcbisf@state.co.us, but if this email address is unavailable or email is otherwise ineffective notice shall be sent via

Certified U.S. Mail to: CWCB, Section Chief, Stream and Lake Protection Section, 1313 Sherman Street, Room 719, Denver CO 80203.

b. In the event the Applicant applies for and is successful in moving any of its existing or acquired water storage rights to either the Wolf Creek Off-Channel Dam and Reservoir or Wolf Creek Mainstem Reservoir Dam and Reservoir, all or a portion of the subject water right decreed herein in the amount and for the uses so moved shall be cancelled, thereby reducing the total amount decreed for the subject water right. However, notwithstanding the forgoing, Applicant may maintain that portion of the water right decreed herein for which Applicant has no similar water uses available from other water rights.

   i. In the event all other decreed uses for the subject water right are cancelled under this paragraph 15.b except Mitigation, all amounts of the subject water right shall also be cancelled except for that amount of water determined in the future to be necessary for Mitigation.

   ii. Similarly, in the event the municipal and augmentation uses for the subject water right are cancelled under this paragraph 15.b, the only remaining decreed use for which water may specifically be released from the reservoir is Mitigation. Thus, in this event, the annual amount of water that may be released from the reservoir under the subject water right shall be limited to the amount of water determined in the future to be necessary for Mitigation in approvals for the project.

c. Pursuant to the January 5, 2021 stipulation between the Applicant and the Engineers, the terms of which are fully incorporated by this reference, the following shall apply to the subject water right decreed herein:

   i. Annual releases from the reservoir under the subject water right shall be limited to 7,000 acre-feet for municipal and augmentation uses and 20,720 acre-feet for Mitigation, as those uses are described in paragraph 13, above.

   ii. Up to 20,720 acre-feet of the total decreed amount of 66,720 acre-feet may be used for Mitigation. Water released for Mitigation shall be limited to the amount of water as may be determined in the future to be necessary for that purpose in approvals for the project. Once that determination has been made, the difference between the 20,720 acre-foot amount and the amount determined to be necessary for Mitigation shall be cancelled, thereby reducing the total amount decreed for the subject water right as well as the amount that may be released for Mitigation by that cancelled amount.

CONCLUSIONS OF LAW

16. The foregoing Findings of Fact are fully incorporated herein.

17. Notice of the Application was properly given. The Court has jurisdiction over the Applicant and over all persons or entities who had standing to appear, even though they did not do so.

18. The Application is complete, covering all applicable matters required pursuant to the Water Right Determination and Administration Act of 1969, C.R.S. §§ 37-92-101 through -602.

19. Pursuant to C.R.S. § 37-45-118(1)(j), Applicant shall use the water rights claimed herein within its district boundaries, as those boundaries currently exist or may be expanded by inclusion of additional lands pursuant to C.R.S. § 37-45-136. Applicant may also provide water to other areas pursuant to intergovernmental agreement as authorized by C.R.S. § 29-1-203 and C.R.S. § 37-83-106.

20. The subject Application is in accordance with Colorado law. Applicant has fulfilled all legal requirements for entry of a decree in this case.

JUDGMENT AND DECREE OF COURT

21. The foregoing Findings of Fact and Conclusions of Law are incorporated herein by this reference.

22. The Applicant is hereby granted the conditional water rights claimed herein.

23. Should the Applicant desire to maintain the conditional water rights confirmed herein, an Application for Finding of Reasonable Diligence shall be filed by January 31, 2027, unless a determination has been made that such conditional rights have been made absolute by reason of the completion of the appropriation, or is otherwise disposed of.

24. Pursuant to Rule 9 of the Uniform Local Rules for All State Water Court Divisions, upon the sale or other transfer of the conditional water rights decreed herein, the transferee shall file with the Division 6 Water Court a notice of transfer which shall state:

a. The title and case number of this Case No. 2014CW3043;

b. The description of the conditional water right transferred;

c. The name of the transferor;

d. The name and mailing address of the transferee; and

e. A copy of the recorded deed.

The owner of said conditional water rights shall also notify the Clerk of the Division 6 Water Court of any change in mailing address. The Clerk shall place any notice of transfer or

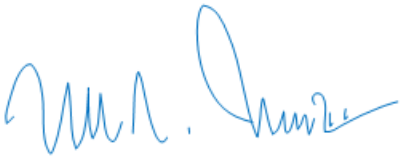
change of address in the case file of this Case No. 2014CW3043 and in the case file (if any) in which the Court first made a finding of reasonable diligence.

It is accordingly ordered that this Judgment and Decree shall be filed with the Water Clerk and shall become effective upon such filing, subject to judicial review pursuant to C.R.S. § 37-92-304, as amended.

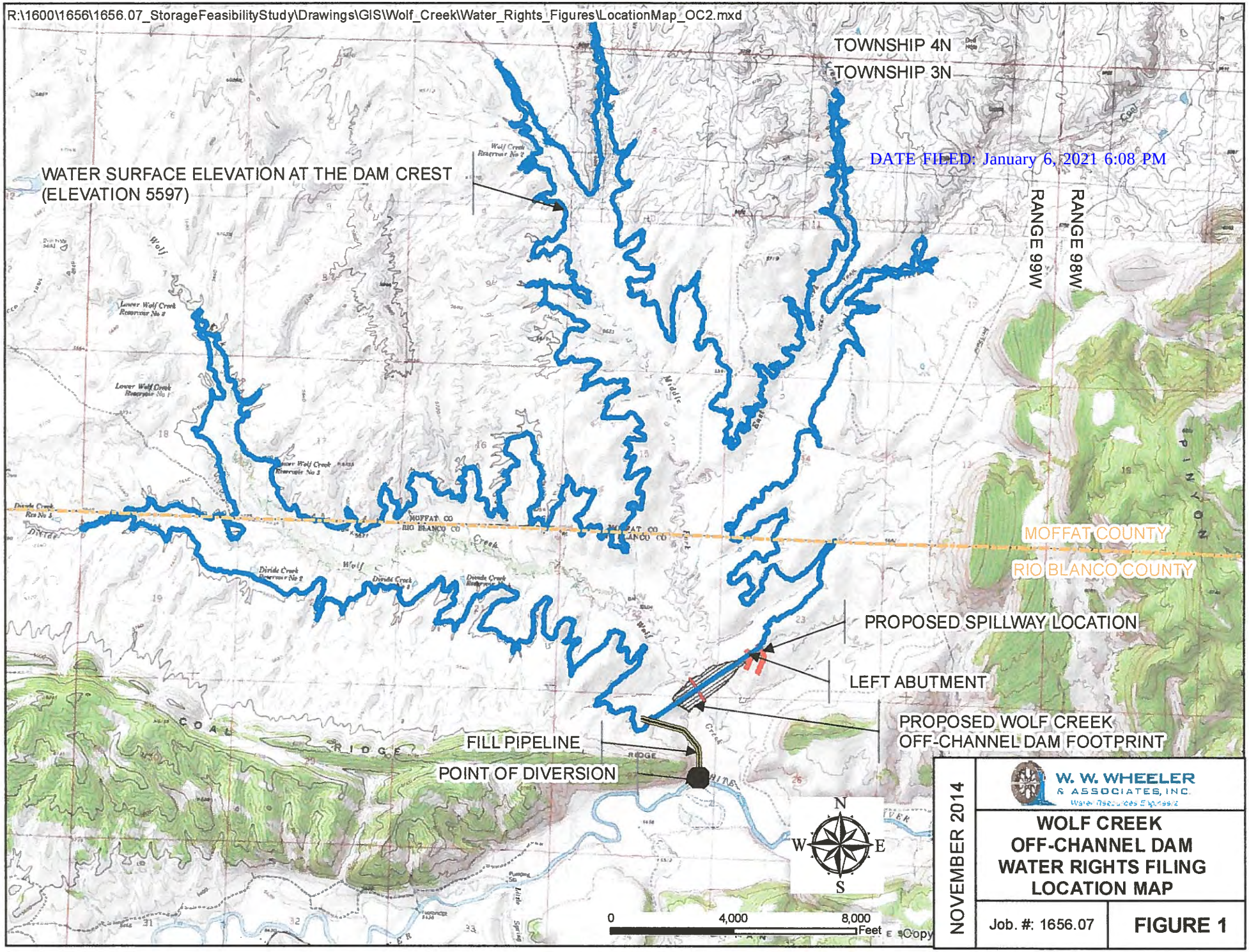
It is further ordered that a copy of this Judgment and Decree shall be filed with the State Engineer and the Division Engineer for Water Division No. 6.

DATED this 7th day of January, 2021.

BY THE COURT:



Michael A. O'Hara, III, Water Judge
Water Division 6, State of Colorado


R:\1600\1656\1656.07_StorageFeasibilityStudy\Drawings\GIS\Wolf_Creek\Water_Rights_Figures\LocationMap_OC2.mxd
TOWNSHIP 4N
TOWNSHIP 3N
DATE FILED: January 6, 2021 6:08 PM
WATER SURFACE ELEVATION AT THE DAM CREST
(ELEVATION 5597)
RANGE 99W
RANGE 98W
MOFFAT COUNTY
RIO BLANCO COUNTY
PROPOSED SPILLWAY LOCATION
LEFT ABUTMENT
PROPOSED WOLF CREEK
OFF-CHANNEL DAM FOOTPRINT
FILL PIPELINE
POINT OF DIVERSION
N
W
E
S
0
4,000
8,000
Feet
NOVEMBER 2014
W. W. WHEELER
& ASSOCIATES, INC.
WOLF CREEK
OFF-CHANNEL DAM
WATER RIGHTS FILING
LOCATION MAP
Job. #: 1656.07
FIGURE 1

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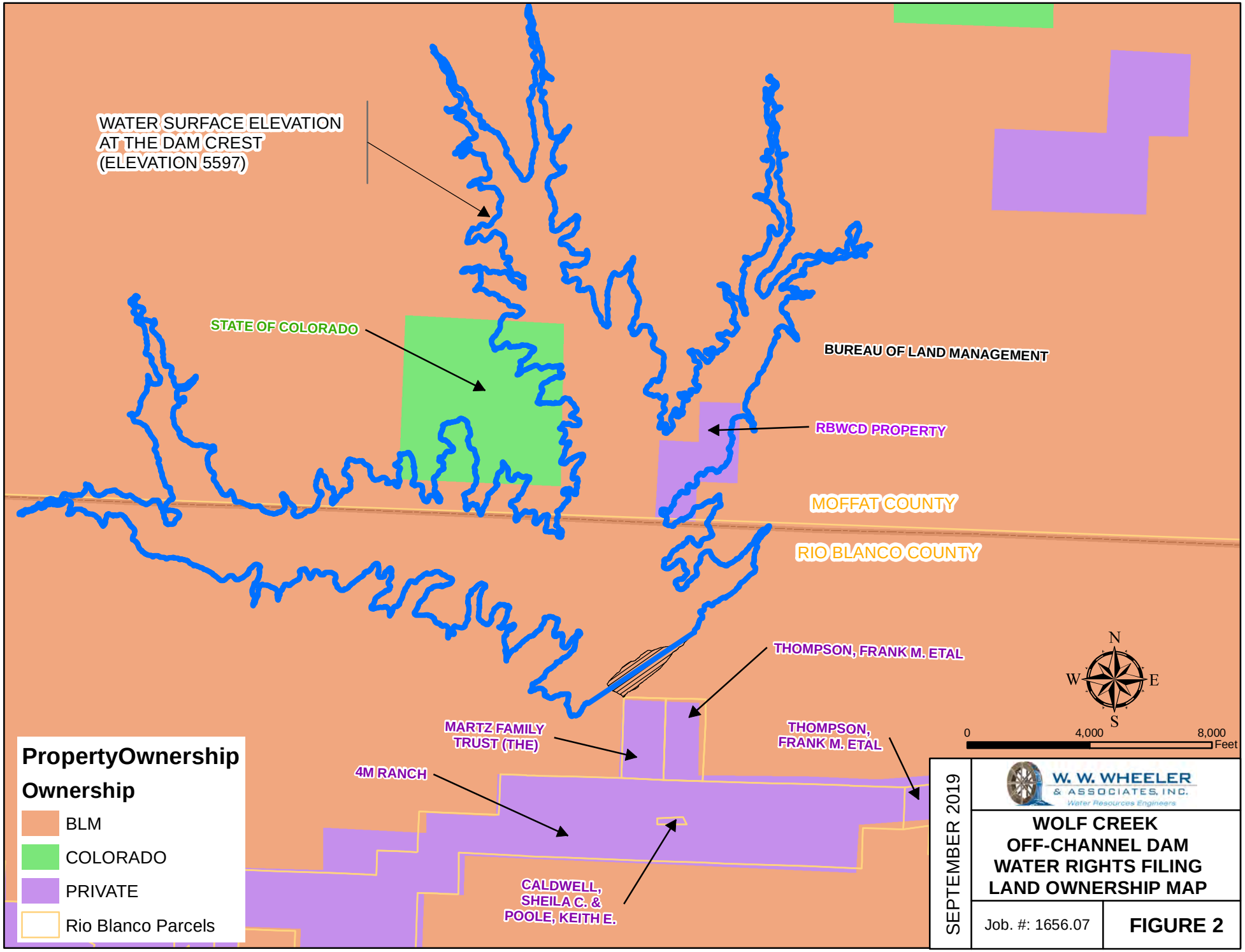


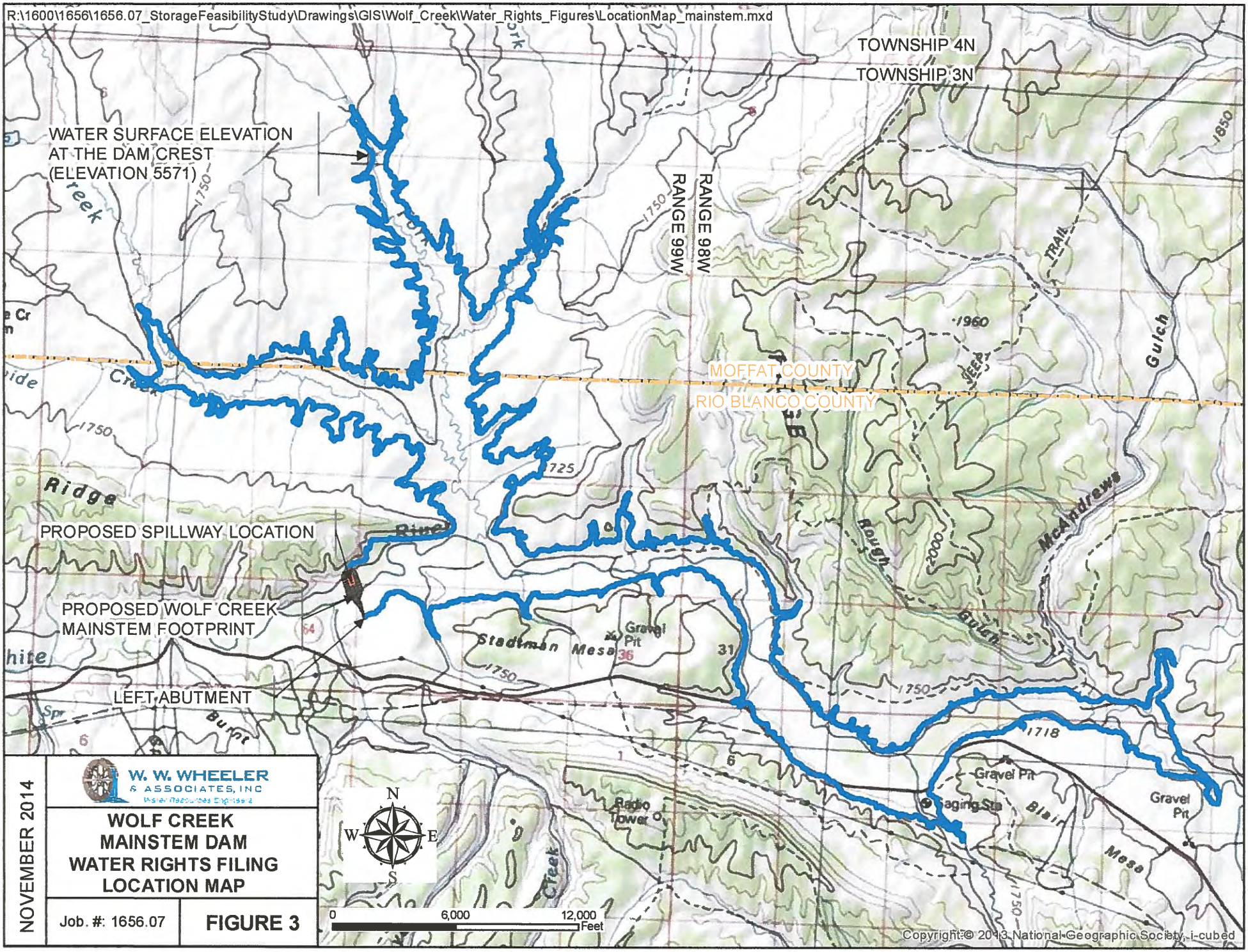
SEPTEMBER 2019

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

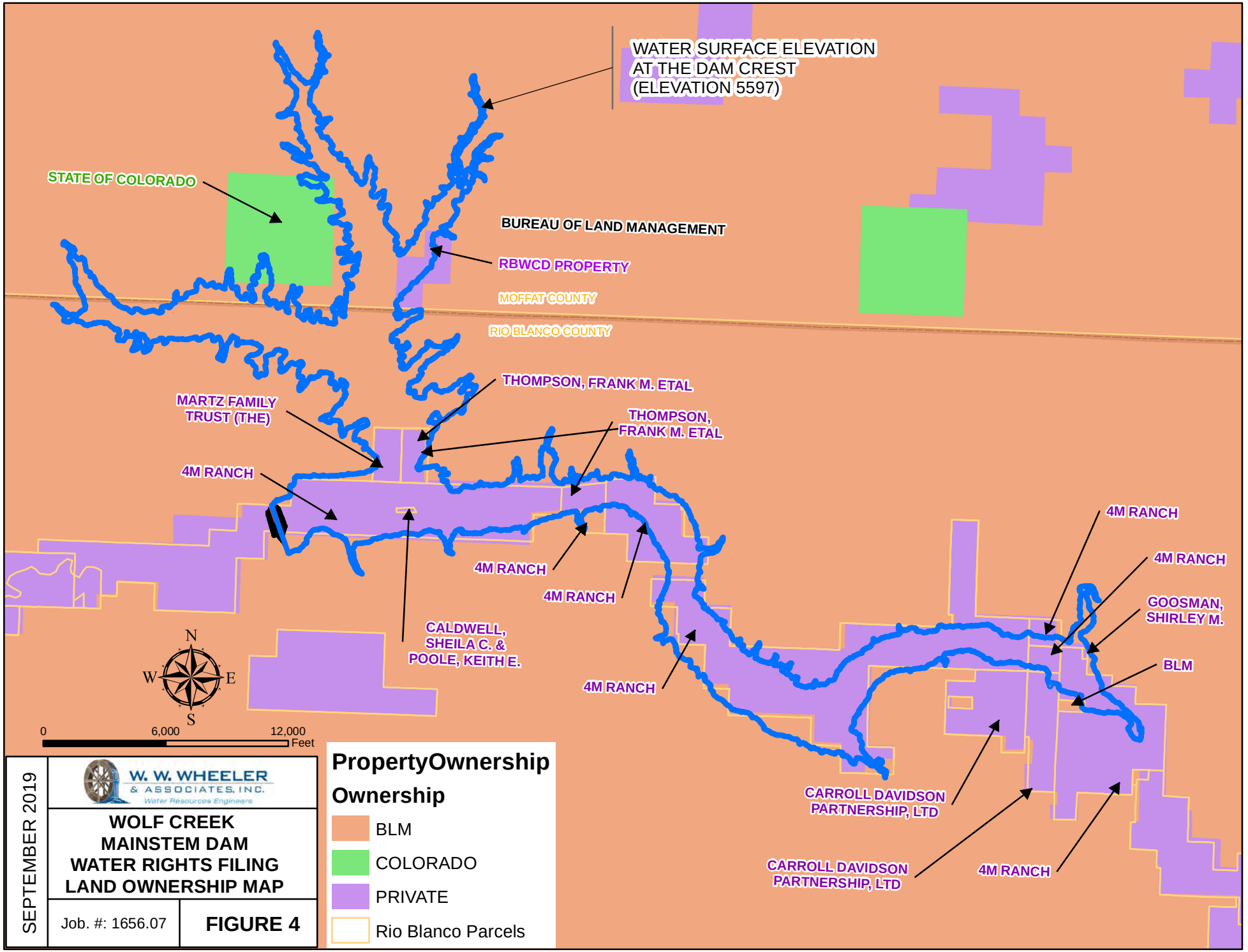
WOLF CREEK OFF-CHANNEL DAM WATER RIGHTS FILING LAND OWNERSHIP MAP

Job. #: 1656.07

FIGURE 2


R:\1600\1656\1656.07_StorageFeasibilityStudy\Drawings\GIS\Wolf_Creek\Water_Rights_Figures\LocationMap_mainstem.mxd
TOWNSHIP 4N
TOWNSHIP 3N
WATER SURFACE ELEVATION AT THE DAM CREST (ELEVATION 5571)
RANGE 99W
RANGE 98W
MOFFAT COUNTY
RIO BLANCO COUNTY
PROPOSED SPILLWAY LOCATION
PROPOSED WOLF CREEK MAINSTEM FOOTPRINT
LEFT ABUTMENT
Stadtman Mesa
Gravel Pit
Radio Tower
Gaging Sta
Blair Mesa
McAndrews Gulch
Rough Gulch
Jeep Trail
1750
1725
1960
2000
1718
N
S
E
W
0
6,000
12,000
Feet
Copyright © 2013 National Geographic Society, i-cubed
W. W. WHEELER & ASSOCIATES, INC
NOVEMBER 2014
WOLF CREEK MAINSTEM DAM WATER RIGHTS FILING LOCATION MAP
Job. #: 1656.07
FIGURE 3

R:\1600\1656\1656.07_StorageFeasibilityStudy\Drawings\GIS\Wolf_Creek\Water_Rights_Figures\PropertyOwnership_MAINSTEM.mxd



DISTRICT COURT, WATER DIVISION NO. 6, COLORADO Routt County Justice Center 1955 Shield Drive, Unit 200 Steamboat Springs, CO 80487 (970) 879-5020	
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: **The RIO BLANCO WATER CONSERVANCY DISTRICT, a Colorado Water Conservancy District** **In the White River or its Tributaries** **In RIO BLANCO COUNTY, COLORADO**	▲ **COURT USE ONLY** ▲
Attorneys for Rio Blanco Water Conservancy District Edward B. Olszewski, #24723 OLSZEWSKI, MASSIH & MAURER, P.C. P.O. Box 916 1204 Grand Ave. Glenwood Springs, CO 81602 Tele: (970) 928-9100 Fax: (970) 928-9600 ed@ommpc.com David C. Taussig, #16606 Alan E. Curtis, #34571 Virginia M. Sciabbarrasi, #39753 Heather A. Warren, #35952 WHITE & JANKOWSKI LLC 1333 W. 120th Ave., Suite 302 Westminster, CO 80234 Tele: (303) 595-9441 Fax: (303) 825-5632 davet@white-jankowksi.com; alanc@white-jankowski.com virginias@white-jankowski.com heatherw@white-jankowski.com	Case No.: 14CW3043 Division: 2B

Attorneys for the State Engineer and Division Engineer, Water Division 6: PHILIP J. WEISER Attorney General ANDREW NICEWICZ Assistant Attorney General Attorney Reg. # 44903* MARC D. SARMIENTO Assistant Attorney General Attorney Reg. # 46322* WILLIAM D. DAVIDSON Assistant Attorney General Attorney Reg. No. 49099* Water Resources Unit Natural Resources & Environment Section Office of the Colorado Attorney General 1300 Broadway, 7th Floor Denver, CO 80203 Telephone: (720) 508-6259 (Nicewicz); (720) 508-6429 (Sarmiento); (720) 508-6280 (Davidson) Email: andy.nicewicz.@coag.gov; marc.sarmiento@coag.gov; will.davidson@coag.gov *Counsel of Record	

STIPULATION BETWEEN APPLICANT RIO BLANCO WATER CONSERVANCY DISTRICT AND THE STATE ENGINEER AND DIVISION ENGINEER FOR WATER DIVISION NO. 6

Applicant, the Rio Blanco Water Conservancy District ("RBWCD"), and Opposers, the State Engineer and the Division Engineer for Water Division 6 ("Engineers"), by and through their undersigned attorneys, enter into this stipulation ("Stipulation"):

1. The Engineers agree to the entry of a decree in this case that is no less restrictive on the RBWCD and no less protective of the Engineers' administrative-related interests than the Proposed Decree dated January 5, 2020, attached hereto, and is not otherwise inconsistent with this Stipulation.

2. Up to 20,720 acre-feet of the total decreed amount of 66,720 acre-feet may be used for mitigation of environmental impacts of the Wolf Creek Reservoir project

("Mitigation"), as that term is described in the Proposed Decree. Water released for Mitigation shall be limited to the amount of water as may be determined in the future to be necessary for that purpose in approvals for the project. Once that determination has been made, the difference between the 20,720 acre-foot amount and the amount determined to be necessary for Mitigation shall be cancelled, thereby reducing the total amount decreed for the subject water right as well as the amount that may be released for Mitigation by that cancelled amount.

3. Annual releases from the reservoir under the subject water right shall be limited to 7,000 acre-feet for municipal and augmentation uses and 20,720 acre-feet for Mitigation, as those uses are described in the Proposed Decree.

4. The above limits on annual releases are not intended to prevent releases in excess of those amounts to the extent any such additional releases are required or authorized by statute or rule.

5. The Engineers consent to a motion to approve this Stipulation.

6. The parties agree to (a) vacate the Court's December 23, 2020, Order on the Engineers' Motion for Partial Summary Judgment; (b) vacate the trial in this matter; and (c) entry of the Proposed Decree.

7. The Engineers will remain a party to these proceedings for the limited purpose of ensuring that any decree entered herein is consistent with this Stipulation.

8. The RBWCD and the Engineers stipulate and agree that each will bear their own costs and fees associated with this matter.

9. This Stipulation shall benefit and be binding upon heirs, successors, and assigns of the undersigned parties.

10. This Stipulation may be enforced both as an agreement of the parties and as an order of the Water Court.

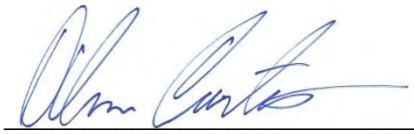
11. This Stipulation is entered into by way of compromise and settlement of this litigation. Any agreements or terms and conditions herein are due solely to the unique circumstances of this case and the resulting Stipulation. This Stipulation shall not establish any precedent and shall not be construed as a commitment to include any specific findings of fact, conclusions of law, or specific engineering methodologies or administrative practices in future stipulations.

Dated: January 5, 2021.

PHILIP J. WEISER
Attorney General

ANDREW NICEWICZ, #44903*
Assistant Attorney General
MARC D. SARMIENTO, #46322*
Assistant Attorney General
WILLIAM D. DAVIDSON, #49099*
Assistant Attorney General
Water Resources Unit
Natural Resources and Environment Section
Attorneys for the State and Division Engineers
*Counsel of Record

WHITE & JANKOWSKI LLC



David C. Taussig (#16606)
Alan E. Curtis (#34571)
Virginia M. Sciabbarrasi (#39753)
Attorneys for the RBWCD

OLSZEWSKI, MASSIH & MAURER, P.C.

Alan E. Curtis for Edward B. Olszewski
Edward B. Olszewski (#24723)
Attorney for the RBWCD

Appendix C

Streamlined Permitting Meeting Summary & USACE Letter

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& ASSOCIATES, INC.
Water Resources Engineers
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303-761-4130 | fax 303-761-2802

WHITE RIVER STORAGE PROJECT
Pre-Permitting Agency Meeting No. 1 Summary

Glenwood Springs, CO
Wednesday, February 6, 2019

This summary was prepared to summarize key discussions and decisions from an initial pre-permitting meeting for the White River Storage Project that was held with representatives of key federal and state agencies and the Project sponsor, the Rio Blanco Water Conservancy District (RBWCD). The following attachments are included to this meeting summary:

1. The meeting agenda
2. A list of meeting attendees
3. Meeting presentation slides for the Project Overview and slides as modified by the group on:
    a. Required Permits, and
    b. Who Does What by When
4. List of potential resources that would need to be evaluated in the Environmental Impact Statement
5. Proposed Permitting Work Plan Development Process

Meeting Discussions

Mike Eytel, Colorado River District, and Alden Vanden Brink, RBWCD, thanked everyone for their participation. Danielle Hannes, Project Engineer with W. W. Wheeler & Associates, Inc. (Wheeler), provided a brief overview presentation of the planning work completed for the White River Storage Project work from 2013 to present.

Steve Jamieson, Wheeler, indicated that the purpose of these pre-permitting meetings was to develop a process streamlining the federal and state permitting process. The goal of this process is to develop a detailed work plan for the permitting analysis that is required so that similar permit issues can be analyzed concurrently rather than in series to save time. At the end of the year, the goal would be to have a detailed permitting plan written and be ready to hire a third-party contractor to perform the permitting analysis and prepare the permitting documents.

Key Discussion During & After the Project Overview Presentation

- Heather Sauls, with the Bureau of Land Management (BLM), indicated that the endangered black-footed ferret habitat that could be impacted by the Project should not

be discounted and needs to be analyzed even though the population that was released in the area did not survive.

- The BLM indicated that motorized and non-motorized travel will need to be analyzed and the BLM may be able to approve new routes on a case by case basis.
- Sue Nall, with the U.S. Army Corps of Engineers (USACE), recommended that the Project have a strong Purpose and Need statement. The USACE will scrutinize the Purpose and Need very thoroughly. Sue Nall indicated that multiple Project purposes will complicate the alternative evaluations.
- Roy Smith, with BLM, requested that the Project Team provide a timeline for when the RBWCD's conditional water right for the Project will be finalized. Alden Vanden Brink indicated that the RBWCD was actively working with objectors to the case to finalize the water right and expects this to be complete in the next year. David Graf with Colorado Parks and Wildlife (CPW) inquired about Terra Carta moving their water right to the location of the Wolf Creek Reservoir. Alden Vanden Brink stated that the Terra Carta water rights filing was done without coordination with the RBWCD and the RBWCD is an active objector in the Terra Carta water rights case.
- Roy Smith, with BLM, asked if there were plans to generate electricity from the Project and recommended involving the Federal Energy Regulatory Commission (FERC) if this was planned. Steve Jamieson indicated that hydroelectric generation is not part of the Project at this time. Heather Sauls suggested getting FERC involved if one of the alternatives, such as the White River Dam on the White River, has is a hydroelectric component included with it.
- Roy Smith, with BLM, inquired if changes would be made at Kenney Reservoir once this project is complete. Alden Vanden Brink indicated that Kenney Reservoir will continue to operate the same as it does currently as a run-of-the-river project. Alden indicated that additional hydropower maybe generated at Kenney Reservoir because more water could be available throughout the year from releases from Wolf Creek Dam.
- It was asked if the Bureau of Reclamation could be a potential funding partner. Steve Jamieson indicated that this would be evaluated by Harvey Economics as part of the financing plan that will be developed as part of the Pre-Permitting Phase of the work. The group concluded that financing partners for the Project may dictate how the National Environmental Policy Act (NEPA) process will need to be documented.
- Bill deVergie, with CPW, asked if the reservoir could be filled reliably. Danielle Hannes indicated that the modeling by Wilson Water Group for the Basin Roundtable shows that the reservoir can be filled in that vast majority of the years that were modeled. The modeling was based on historic stream gage data on the White River.
- Sue Nall asked what the Project life was. Steve Jamieson indicated that the Project Team had not developed a specific Project life term yet, but this could certainly be done. Steve Jamieson indicated that reservoir Projects are generally given a 50- to 100-year life even though most reservoirs last much longer than this. Alden Vanden Brink indicated that the life of Kenney Reservoir was estimated to be 30 years, which has already been exceeded.

Steve Jamieson indicated that a sediment pool has been incorporated into the initial planning work for the reservoirs to increase the Project life.

Discussion of Permitting Process

Heather Sauls discussed the One Federal Decision Memorandum of Understanding (MOU) between federal permitting agencies that became effective on April 10, 2018. This MOU sets a goal of completing environmental reviews and authorization decisions to an average of not more than two years after publishing a Notice of an Intent (NOI) to prepare an EIS. Heather Sauls indicated that this Project would qualify as a Major Infrastructure Project because it would be a water resources project with multiple federal authorizations required to proceed to construction. Heather Sauls suggested that the group use the term "One Federal Decision" when discussing this process rather than Lean Permitting because the MOU has been signed by Secretary of the Interior, the Secretary of the U.S. Army Corps of Engineers, and the Administrator of the U.S. Environmental Protection Agency.

Heather Sauls also discussed the requirements for selecting the lead federal agency and the roles of the Lead Agency that are documented in CFR 1501.5C. The Lead Federal Agency requires significant project management staff time and the Lead Agency will select the NEPA third-party contractor. The Lead Agency also need to draft a letter to establish how the federal and state agencies will work together. The agencies will also need to have written concurrence on the established Purpose and Need, the alternatives evaluated, and the preferred alternative. Tribes typically don't sign on as cooperating agencies, but an opportunity to be a cooperating agency is generally offered to the Tribes. The Lead Agency will also reach out to local governments to be in cooperation with the process as well.

- Lauren Brown, with the BLM, indicated that the BLM will need to have further internal discussions about this Project to confirm that the BLM will be the Lead Agency. Lauren Brown indicated that the BLM would prefer having a timeline when the conditional water rights are decreed before the BLM puts significant effort into this project. Heather also stated that the One Federal Decision Memorandum of Understanding requires that the funds are reasonably available, so the BLM would want this documented before significant work is done on the Project.
- Susan Nall indicated that the USACE will have Lisa Gibson serve as their internal subject-matter expert for this Project and that she works out of the San Francisco office. Sue Nall also indicated that the USACE has always assumed that BLM would be the Lead Agency on this Project.
- Amy Moyer, with the Colorado Department of Natural Resources, provided a general overview of the Colorado Water Supply Planning and Permitting Handbook. Amy Moyer indicated that the document was prepared to provide information on the permitting process after the Colorado Water Plan was complete in 2016. The Handbook emphasizes the importance of early involvement of the agencies early in the permitting process and provides a good resource to start this process. Steve Jamieson responded that the Handbook is an excellent resource to start with and that it was the goal of the pre-

permitting process to develop a detailed work plan to describe the permitting process for this Project.

- Alden Vanden Brink indicated that the Town of Rangely will also likely need to add an addendum to their Source Water Protection Plan in the future to address a new reservoir in their watershed.
- The BLM also indicated that they would need a Right-of-Way application from the Project Sponsor and the NEPA process would also involve an amendment to the BLM Land Use Plan.
- The EPA indicated that they would serve in a co-regulation and cooperating role during Project permitting.
- Scott Garncarz, with the Colorado Department of Public Health and Environment (CDPHE) stated that the NEPA water quality assessments are usually not detailed enough to make 401 certifications. As a result, it is easier if the EIS considers the 401 water quality certification requirements during the EIS process. It was discussed that CDPHE is not part of the One Federal Decision Memorandum of Understanding and there were some questions on how CDPHE will work with this process. The EPA suggested an early coordination meeting to review the water quality requirements that will be evaluated for this Project. Agencies that should be involved would include the USACE, EPA, CDPHE, and USGS.
- David Graf, with Colorado Parks and Wildlife (CPW), stated that some additional hydrology work would be required for adequate assessment of aquatic resources. Danielle Hannes indicated that developing these data and analysis needs would be one of the elements of the permitting Work Plan and the goal would be to develop hydrology and water quality needs that are need for each of the key agencies.
- Sue Nall asked if there would be a potential conflict of interest if the Colorado Water Conservation Board (CWCB) needs to make a permit decision as part of the Fish and Wildlife Coordination Act and is also a potential funding entity. Anna Mauss, with the CWCB, confirmed that the existing pre-permitting Grant is a study and is not considered part of the Project funding. Anna Mauss also indicated that the if the RBWCD gets a CWCB Loan for the Project, this is not considered to be a conflict of interest because the loan would be paid back by the Project sponsor. There was also some discussion on whether or not a Fish and Wildlife Coordination Act decision would be required for this Project or not.
- After Steve Jamieson reviewed the proposed Permitting Work Plan development process, which would involve four more similar workshops, Sue Nall expressed her opinion that she thought that the proposed Work Plan development schedule was too aggressive. Sue Nall indicated that the USACE would not even look at data collection needs until USACE has a comfort level with the proposed Project Purpose and Need.
- Heather Sauls indicated that much of the field data would need to be collected this summer if a NOI is published in the fall, but the Purpose and Need would need to be developed better prior to issuing a NOI. Heather Sauls also stated that she would prefer not having another interagency workshop until there is a definite schedule to secure the Project

conditional water right and there is a funding source for the Project documented. Heather also stated that the BLM still does not have a Right-of-Way application submitted to the BLM to officially start the BLM's review process.

Next Steps

The group agreed on the following next steps:

- The RBWCD needs to do some additional work on developing the Project Purpose and Need in early March.
- The BLM and RBWCD need to discuss a cost share agreement and Right-of-Way application.
- The RBWCD needs to provide a timeline for finalizing the Project's conditional water right.
- It was agreed to tentatively plan on the next workshop being scheduled for April 3, 2019, which would be a smaller meeting between the BLM and USACE to work through their potential joint NEPA analysis requirements and processes.
- CPW requested that the RBWCD provide a list of studies that have been completed on the White River as well as providing the available water quality data to the group.
- Provide existing water quality data to provide to the group (Project Team).
- It was also suggested that the USGS and the Bureau of Reclamation be invited to the next interagency workshop, provided that Reclamation would be potential funding source for the Project.
- The BLM also requested the details and guidance documents for each agencies NEPA analysis process.

White River Storage Project

Interagency Lean Permitting Kick-off Meeting Agenda
Wednesday, February 6, 2019 – 10:00 to 14:00 MST

Colorado River District Office
201 Centennial Street
Glenwood Springs, CO

Conference Call Number : 720-996-0554
Conference Access Code: 1357
https://global.gotomeeting.com/join/792936021

10:00 – 10:05	Colorado River District Welcome	(Mike Eytel)
10:05 – 10:15	Project Sponsor Welcome	(Al Vanden Brink)
10:15 – 10:30	Meeting Participant Introductions	(Brad McCloud)
10:30 – 11:00	Brief Project Overview & Update	(Danielle Hannes)
11:00 – 11:30	Discuss Lean Permitting (What, Why, & How)	(Steve Jamieson)
	Brief Lunch Break (Lunch is provided)	
12:00 – 12:15	Discuss Required Permits & Clearances	(Jamieson/Everyone)
12:15 – 13:00	Discuss Key Agency Roles & Requirements	(Jamieson/Everyone)
13:00 – 13:15	Confirm Lead Agency	(Everyone)
13:15 – 13:30	Review & Discuss Initial Work Plan Outline	(Jamieson)
13:30 – 13:45	Discuss Work Plan Development Process	(Jamieson)
13:45 – 14:00	Review Next Actions (Who Does What By When)	(Jamieson)
14:00	Adjourn Meeting	

Meeting Facilitator – Steve Jamieson
Meeting Recorder – Danielle Hannes
Meeting Time Keeper – Brad McCloud

White River Storage Project - Interagency Lean Permitting Kick-off Meeting
Glenwood Springs, CO
6-Feb-19

	Name	Title	Organization	Phone	e-mail	Notes:
1	David Graf	Regional Water Specialist	Colorado Parks and Wildlife (CPW)	970-640-8343	david.graf@state.co.us	In Person
2	Brad Petch	Senior Wildlife Biologist	CPW	970-255-6185	brad.petch@state.co.us	In Person
3	Lori Martin	Sr. Aquatic Biologist	CPW	970-255-6186	Lori.martin@state.co.us	In Person
4	Susan Nall	Section Chief	U.S. Army Corps of Engineers (USACE)	970-243-1199	Susan.Nall@usace.army.mil	In Person
5	Creed Clayton	Biologist	U.S. Fish and Wildlife Service (FWS)	970-628-7187	creed_clayton@fws.gov	In Person
6	Tyler Adams	Project Manager	USACE	970-243-1199	Tyler.R.Adams@usace.army.mil	In Person
7	Bill deVergie	Area Wildlife Manager	CPW	970-878-6061	bill.devergie@state.co.us	In Person
8	Brandon Bainer	Field Rep.	Congressman Scott Tipton	970-241-2499	brandon.bainer@mail.house.gov	In Person
9	Jana McKenzie	Principal	Logan Simpson	970-449-4100	JMcKenzie@LOGANSIMPSON.COM	In Person
10	Bruce Meighen	Principal	Logan Simpson	970-214-9349	BMeighen@LOGANSIMPSON.COM	In Person
11	Mike Eytel	Sr. WRS	Colorado River Water Conservation District	970-488-0483	meytel@crwcd.org	In Person
12	Alden Vanden Brink	District Manager	Rio Blanco Water Conservancy District	970-675-5055	al@rioblancowcd.org	In Person
13	Brad McCloud	Project Manager	EIS Solutions	970-250-7988	BMcCloud@eissolutions.com	In Person
14	Betsy Bair	Regional Director	Senator Gardner	970-245-9553	betsy_bair@gardner.senate.gov	In Person
15	Kent Rider	Biologist/Env. Scientist	WestWater Engineering	970-241-7076	kjr@westwaterco.com	In Person
16	Michael Klish	Biologist	WestWater Engineering	970-241-7076	mwk@westwaterco.com	In Person
17	Amie Wilsey	Biologist	WestWater Engineering	970-241-7076	amw@westwaterco.com	In Person
18	Steve Jamieson	Principal	W. W. Wheeler and Associates, Inc.	303-761-4130	Steve.Jamieson@wwwheeler.com	In Person
19	Danielle Hannes	Project Engineer	W. W. Wheeler and Associates, Inc.	303-761-4130	danielle.hannes@wwwheeler.com	In Person
20	Amy Moyer	Assistant Director for Water	Colorado Department of Natural Resources	303-866-3311	amy.moyer@state.co.us	Phone/webinar
21	Susan Walker	Director	Harvey Economics	720-889-2755	walker@harveyeconomics.com	Phone/webinar
22	Anna Mauss	Finance	Colorado Water Conservation Board	303-866-3441	anna.mauss@state.co.us	Phone/webinar
23	Don Anderson	Hydrologist	Upper Colorado River Recovery Program, FWS	303-236-9883	donald_anderson@fws.gov	Phone/webinar
24	Tom Chart	Director	Upper Colorado River Recovery Program, FWS	303-236-9885	tom_chart@fws.gov	Phone/webinar
25	Lauren Brown	Assistant Field Manager	Bureau of Land Management, White River Field Office	970-878-3868	lpbrown@blm.gov	Phone/webinar
26	Heather Sauls	Planning and Env. Coord.	Bureau of Land Management, White River Field Office	970-878-3800	hsauls@blm.gov	Phone/webinar
27	Stacey Burke	Reality Specialist	Bureau of Land Management, White River Field Office	970-878-3800	sburke@blm.gov	Phone/webinar
28	Paul Daggett	Mining Engineer	Bureau of Land Management, White River Field Office	970-878-3800	pdaggett@blm.gov	Phone/webinar
29	Erin Jones	NW Dist. NEPA Coord.	Bureau of Land Management, Northwest District Office	970-244-3000	erjones@blm.gov	Phone/webinar
30	Roy Smith	Water Rights Specialist	Bureau of Land Management, CO State Office		r20smith@blm.gov	Phone/webinar
31	Alicia Austin Johnson	Associate District Manager	Bureau of Land Management, Northwest District Office	970-244-3000	aaustinjohnson@blm.gov	Phone/webinar
32	Scott Garncarz		Colorado Department of Public Health and Environment (CDPHE)		scott.garncarz@state.co.us	Phone/webinar
33	Judy Bloom		Environmental Protection Agency (EPA)		Bloom.Judy@epa.gov	Phone/webinar
34	Tanya Code		EPA		code.tanya@epa.gov	Phone/webinar
35	Trevor Klein		CDPHE		trevor.klein@state.co.us	Phone/webinar
36	Matt Hubner	NEPA Compliance and Review Program	EPA Region 8	303-312-6500	Hubner.Matt@epa.gov	Phone/webinar
37	Phil Strobel	Director, NEPA Compliance and Review Program	EPA Region 8	303-312-6704	Strobel.Philip@epa.gov	Phone/webinar
38	Jim Berkley		EPA Region 8		Berkley.Jim@epa.gov	Phone/webinar

WHITE RIVER STORAGE PROJECT
Overview
Lean Permitting Workshop #1

February 6, 2019

RIO BLANCO WATER CONSERVANCY DISTRICT

W. W. WHEELER & ASSOCIATES, INC.
Water Resources Engineers

EIS | A PATH TO VICTORY

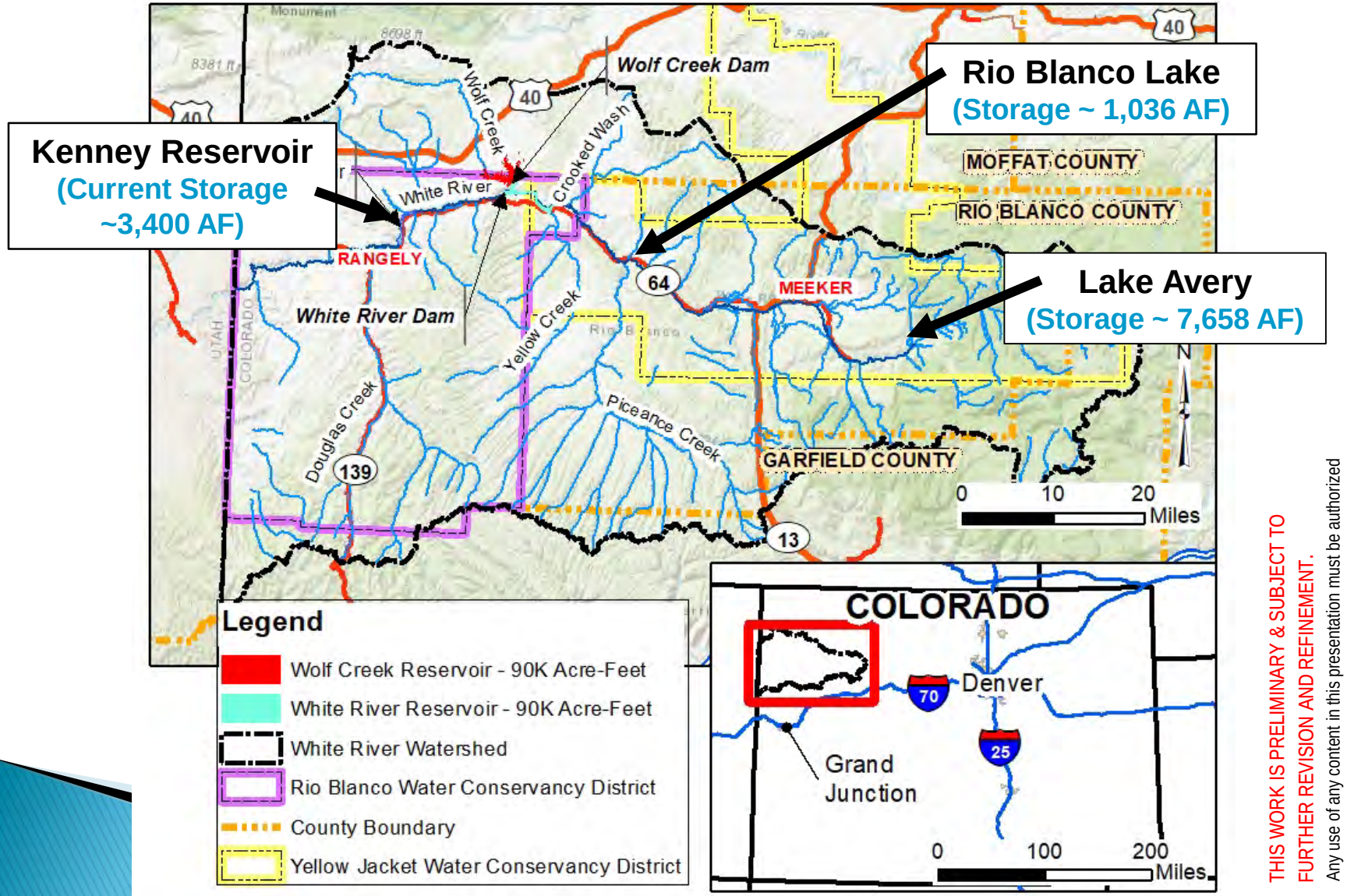
PRESENTATION OVERVIEW

- Who is the Rio Blanco Water Conservancy District?
- Overview of the pending White River Water Crisis.
- Overview of the White River Storage Feasibility Study from 2013 - Present.

Who is the Rio Blanco Water Conservancy District?

- Formed in 1978 as part of the Water Users Association #1 (WUA#1)
- Constructed Taylor Draw Dam (Kenney Reservoir) in 1984
  - Included project permitting & financing
- In 1992 all WUA#1 assets were transferred to the RBWCD
- Hydroelectric Plant constructed in 1993
- The RBWCD has operated the FERC-licensed Taylor Draw Hydroelectric Project since 1993
  - 2MW Run of the River Project
  - Average Annual Revenues of:
    - $500,000 from hydropower
    - $192,000 from the general fund
  - Kenney Reservoir has
    - Been locally funded.
    - Eliminated ice jams & winter flooding in Rangely.
    - Provided local recreation for > 30 years.
    - Provided renewable energy for the Rangely Community.

Who is the Rio Blanco Water Conservancy District?



White River storage is consistent with the mission of the RBWCD

In line with their mission, the RBWCD took it upon themselves to lead this study in an effort to start the initial steps to mitigate a developing water crisis.

Why was the 2014 Water Storage Study completed?

- **The RBWCD is facing a water crisis:**
  - Half of the surface area of Kenney Reservoir is silted in.
  - Siltation is eliminating water storage for the Town of Rangely.
  - Kenney Reservoir recreation use is dramatically reduced.
  - The RBWCD wishes to be a partner to proactively address White River endangered fish issues.
- **The RBWCD Board understood the need to begin a multi-year planning process for a new reservoir.**
- **Water Storage is needed for the Colorado Water Plan.**

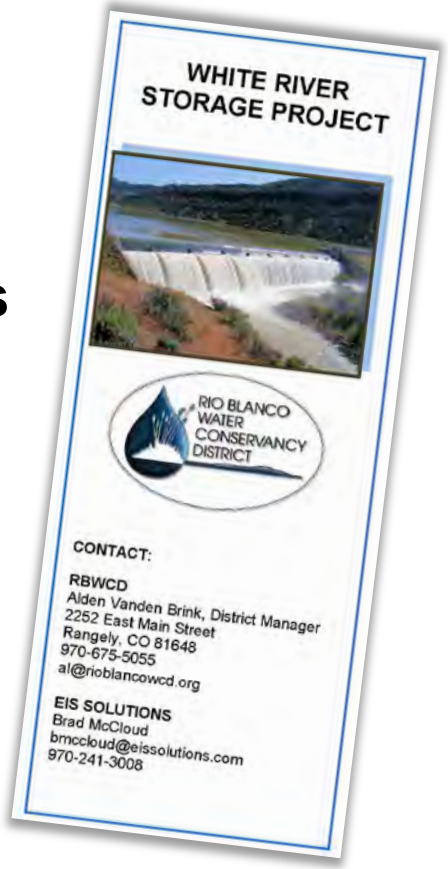
White River Storage Feasibility Study
PHASES 1, 2, & 2A SUMMARY

KEY PROJECT TASKS:

- Purpose & Need Evaluation
- Map Study for Reservoir Location
- Course Screening of Alternatives
- Feasibility Designs for 4 Primary Reservoirs
- Evaluated gravity and pump fill options
- Alternative Evaluation & Selection
- RBWCD filed a 2014 Water Right

STAKEHOLDER MEETINGS INCLUDED:

- Public Workshop Meetings (10)
- Y/W/G Roundtable Meetings (8)
- Other Stakeholder Meetings (70+)



THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

White River Storage Feasibility Study
2065 WATER DEMANDS

"Working Pool" Future Water Demands (Harvey Economics, 2014):

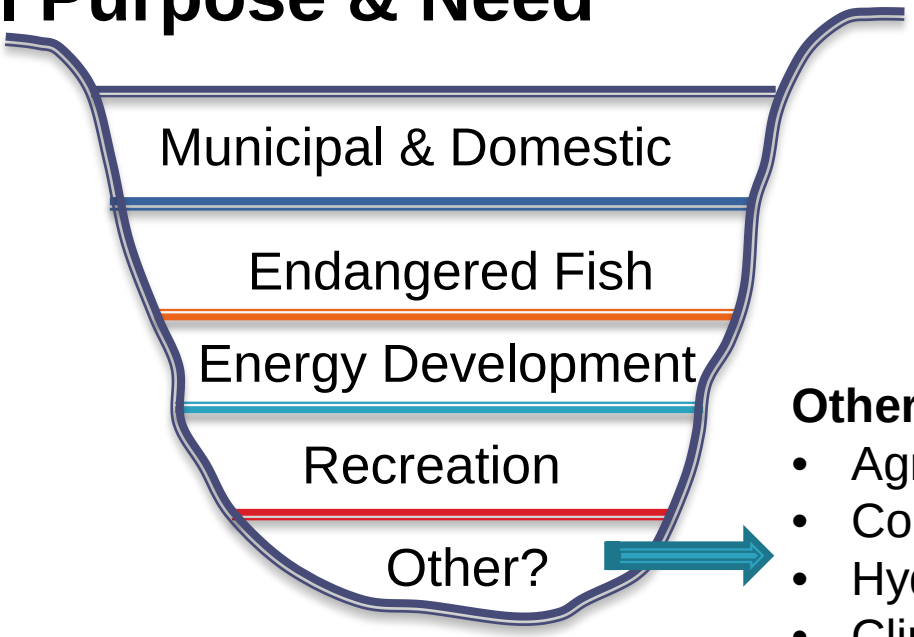
Water Use Sectors	Long-Term (through year 2065)	
	Low End of Range (acre-feet)	High End of Range (acre-feet)
Municipal and Industrial (M&I)	1,600	3,150
Oil and Natural Gas	3,500	3,500
Oil Shale	8,500	42,300
Endangered Fish	3,000	42,000
Other	-	-
TOTAL	16,600	90,950

Note: The Energy Demands from this study were used in the Basin Implementation Plan (BIP) Phase III Modeling of the White River by Wilson Water Group.

Working Pool ranges rounded to
20,000 acre-foot and 90,000 acre-foot.

White River Storage Feasibility Study
PURPOSE AND NEED

Original Purpose & Need



Other Potential Needs:

- Agriculture
- Colorado River Risk Reduction
- Hydropower
- Climate Change
- Water Quality
- Water Conservation

Solution:

1. **Wolf Creek Reservoir**
2. **20,000 to 90,000 acre-feet working pool with Pump Station**

White River Storage Feasibility Study
ALTERNATIVE EVALUATIONS

ALTERNATIVE SCREENING:

- **Enlargement of Taylor Draw Dam**

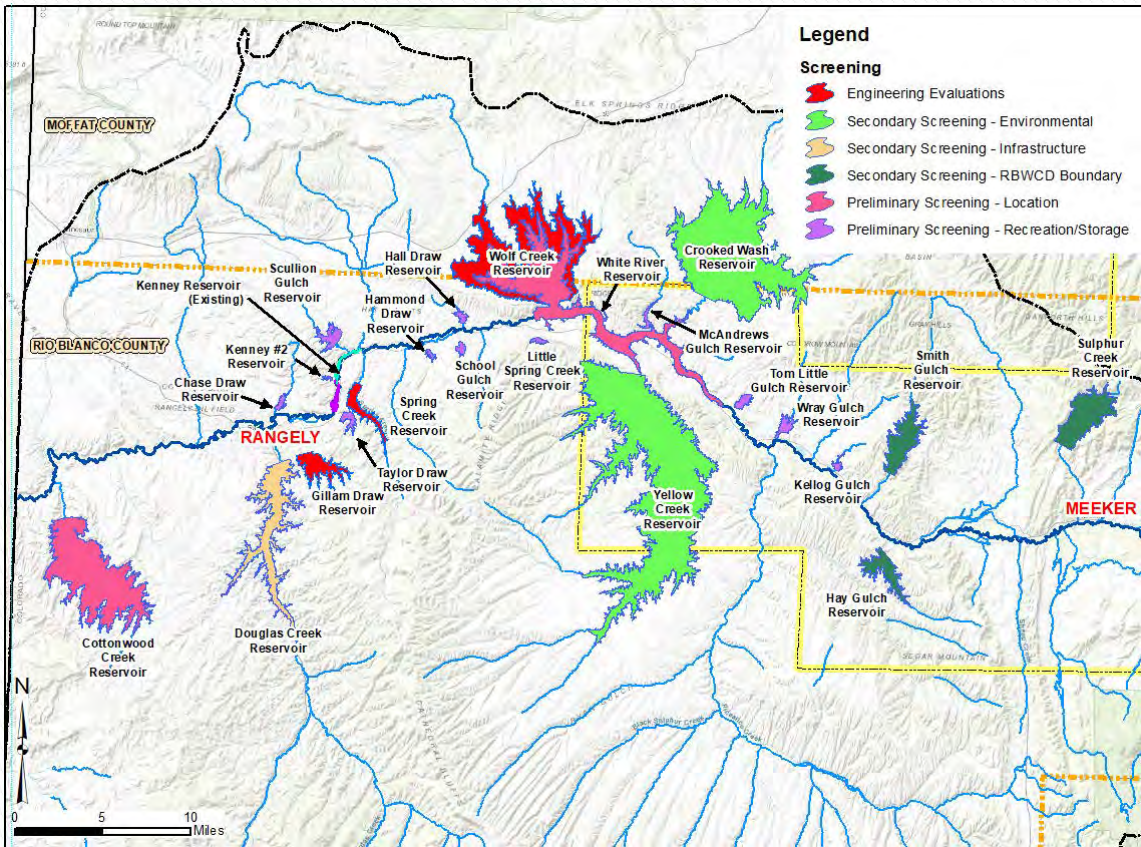
  Eliminated due to current reservoir siltation and infrastructure impacts.

- **Dredging of Kenney Reservoir**

  Eliminated due to estimated cost of dredging in excess of $700 million
  Unidentified disposal location.

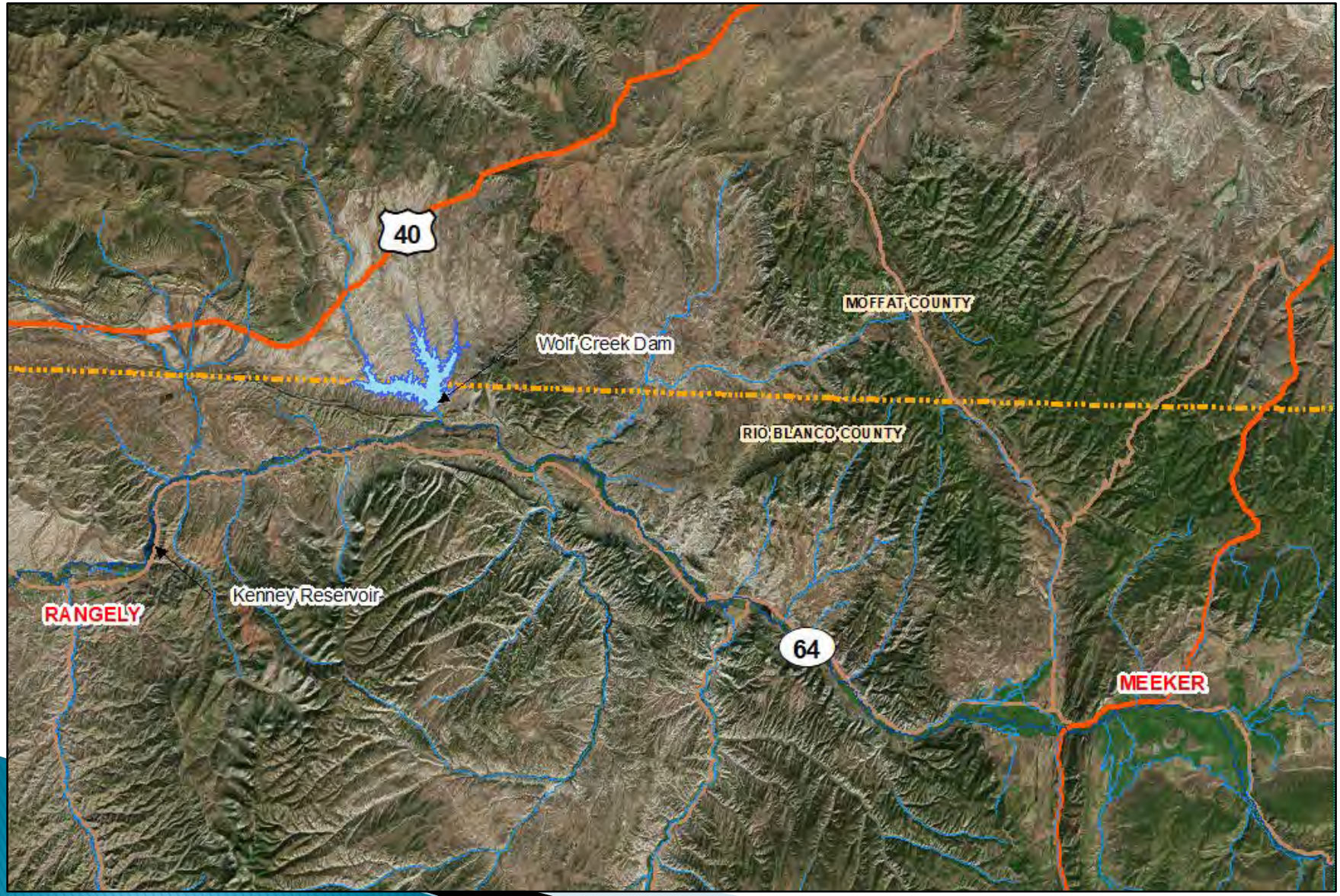
- **More than 20 Alternatives Evaluated**

- **Intended Address NEPA Alternatives Analysis**



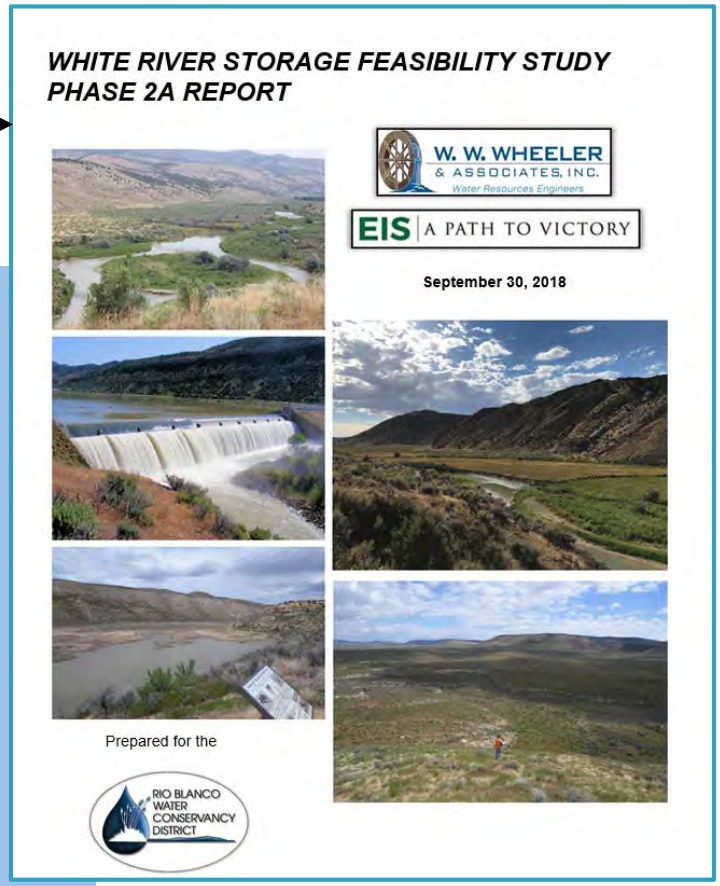
RIO BLANCO WATER CONSERVANCY DISTRICT

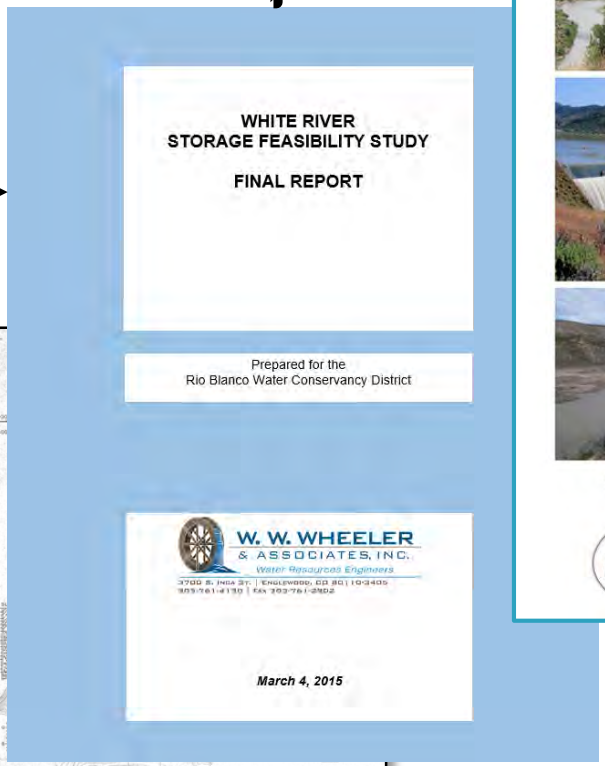
GENERAL LOCATION MAP

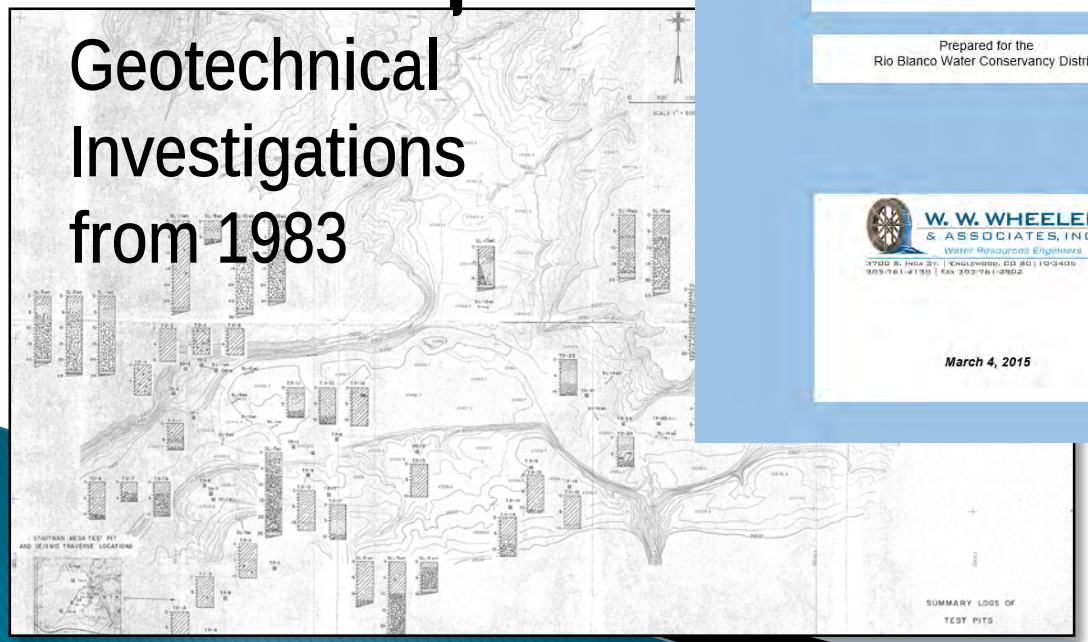


OVERVIEW OF PREVIOUS STUDIES

Wolf Creek Reservoir has been considered as an important storage location since the 1980's.

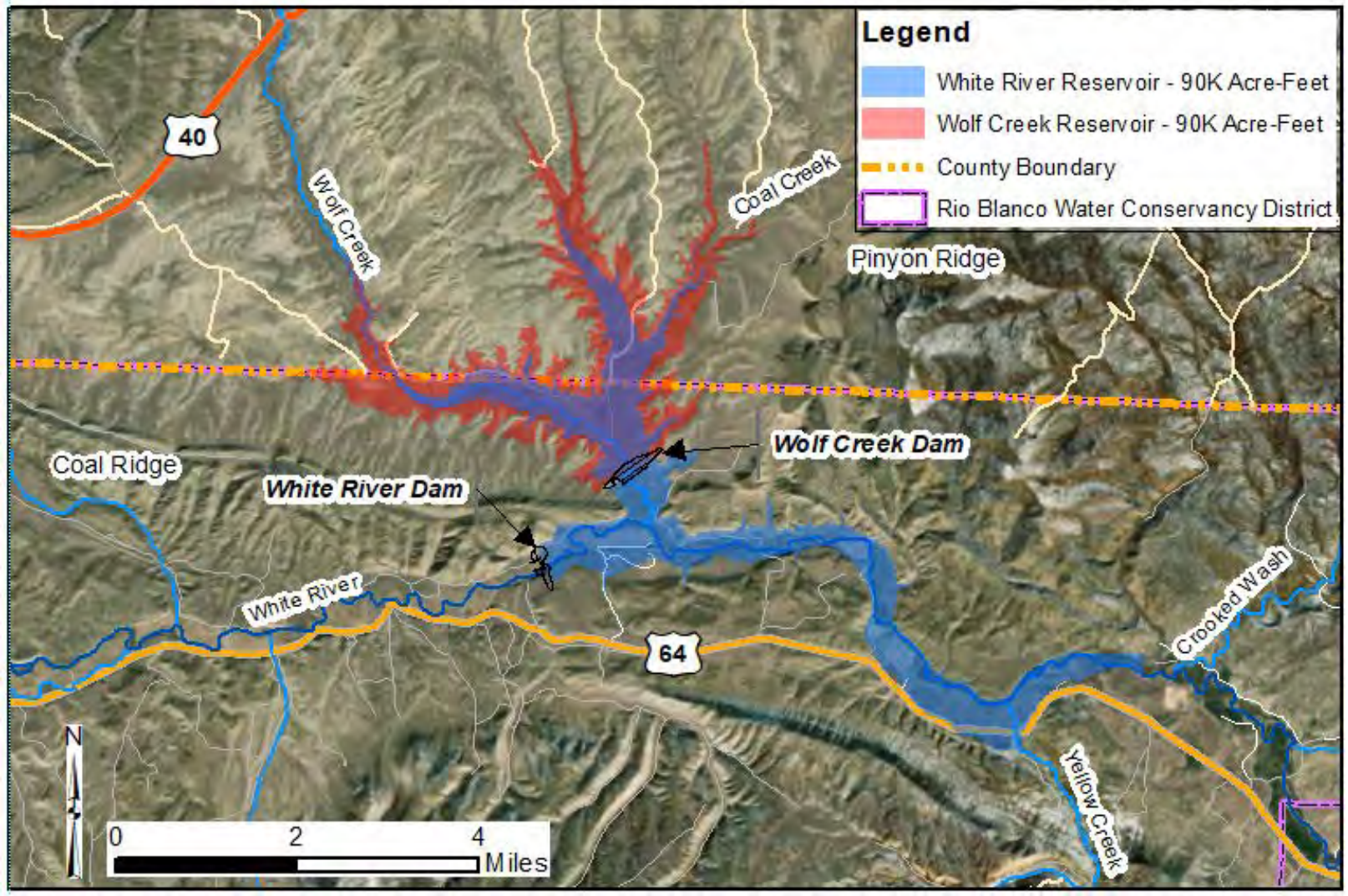






THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

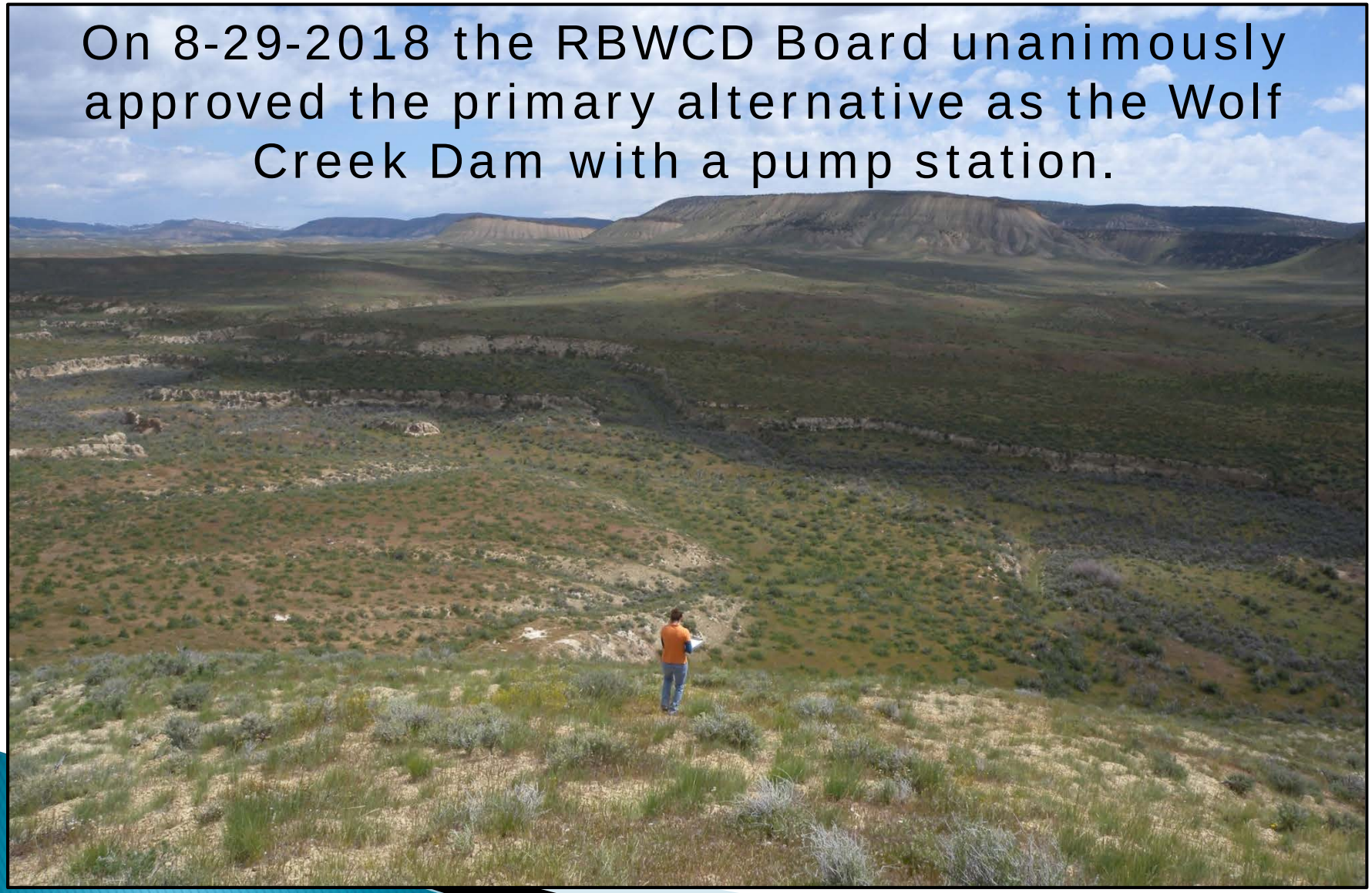
White River Storage Feasibility Study
PHASE 2A - completed in September 2018



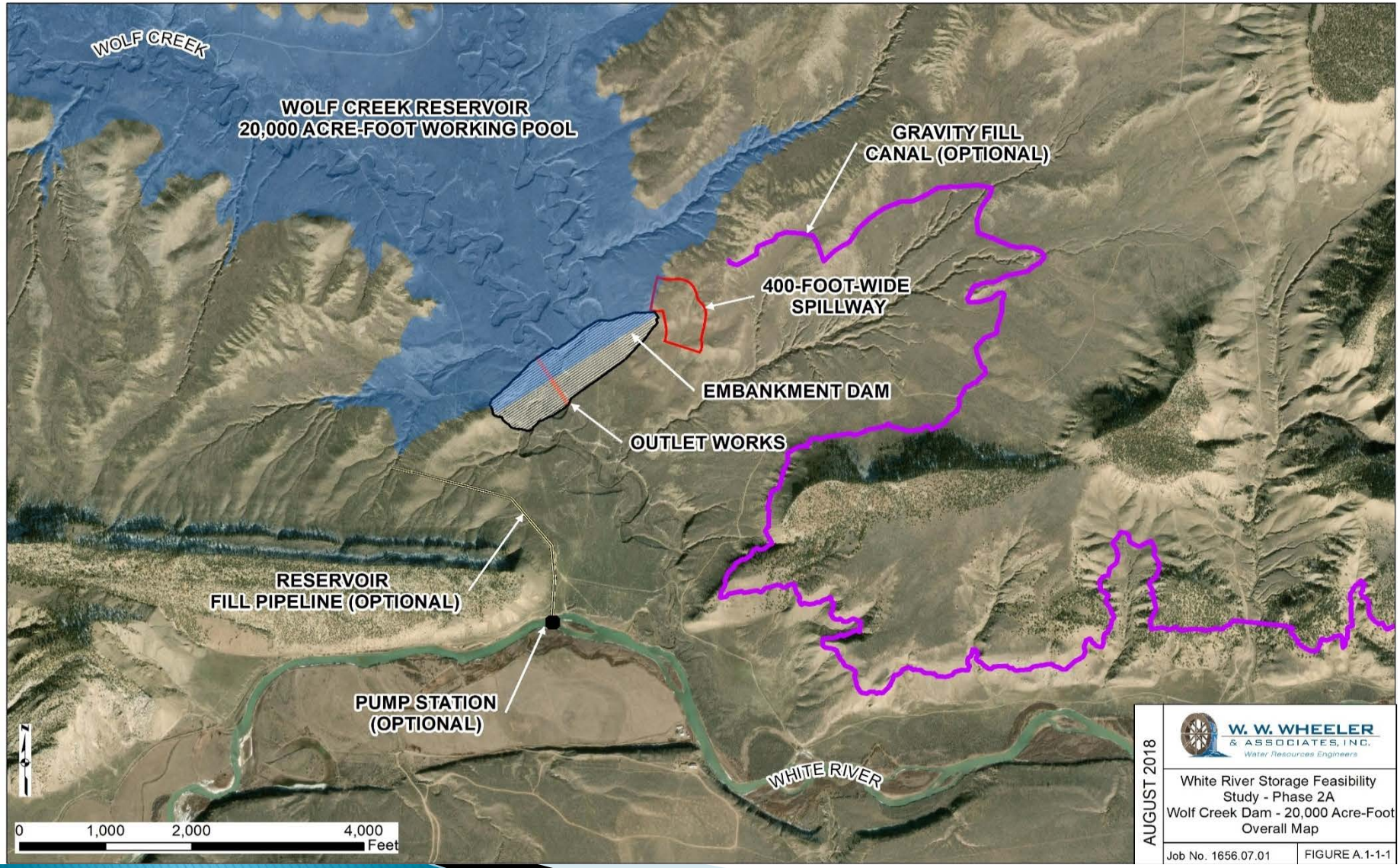
THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

White River Storage Feasibility Study
WOLF CREEK DAM

On 8-29-2018 the RBWCD Board unanimously approved the primary alternative as the Wolf Creek Dam with a pump station.



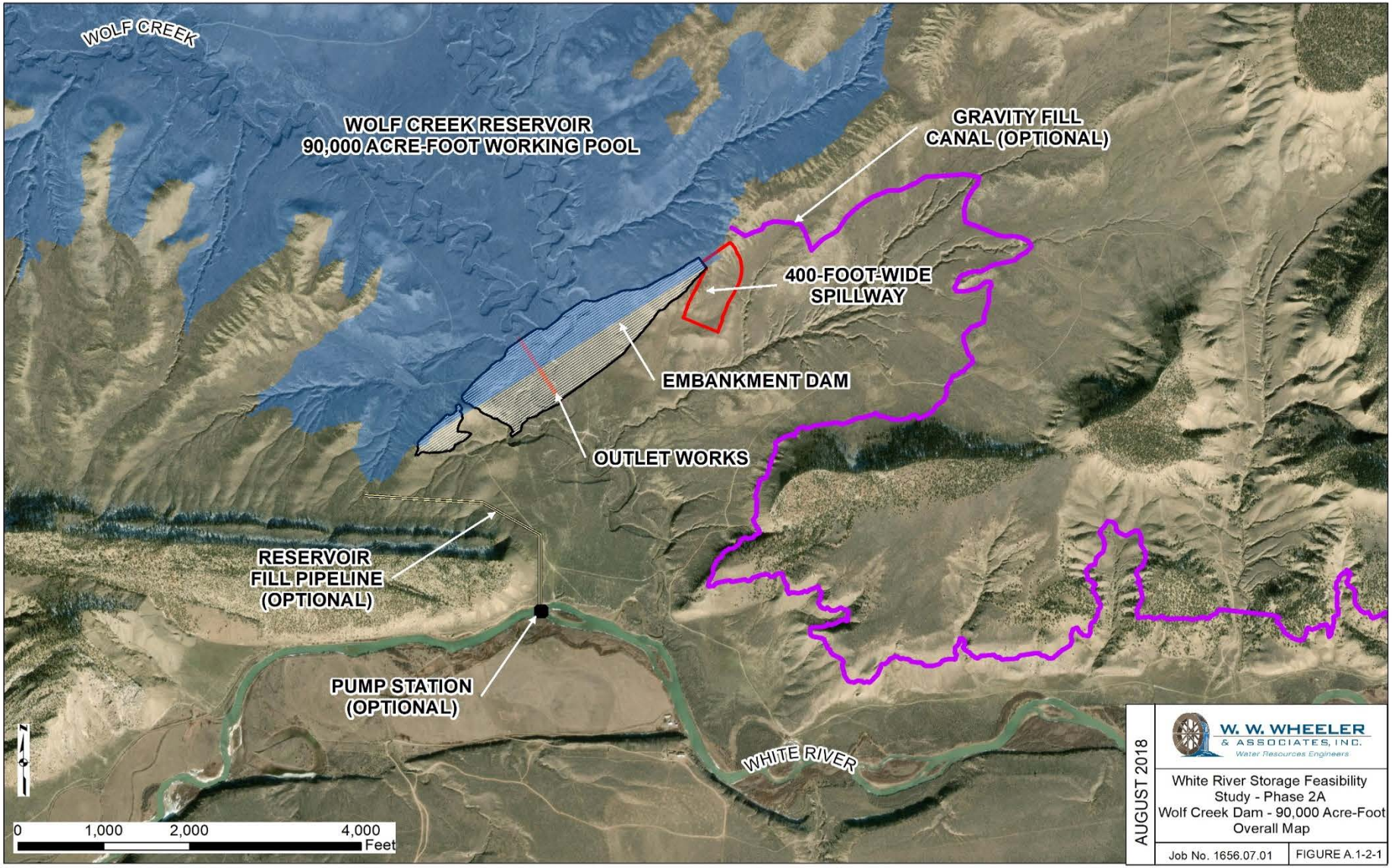
White River Storage Feasibility Study
WOLF CREEK DAM
20,000 AF WORKING POOL



White River Storage Feasibility Study

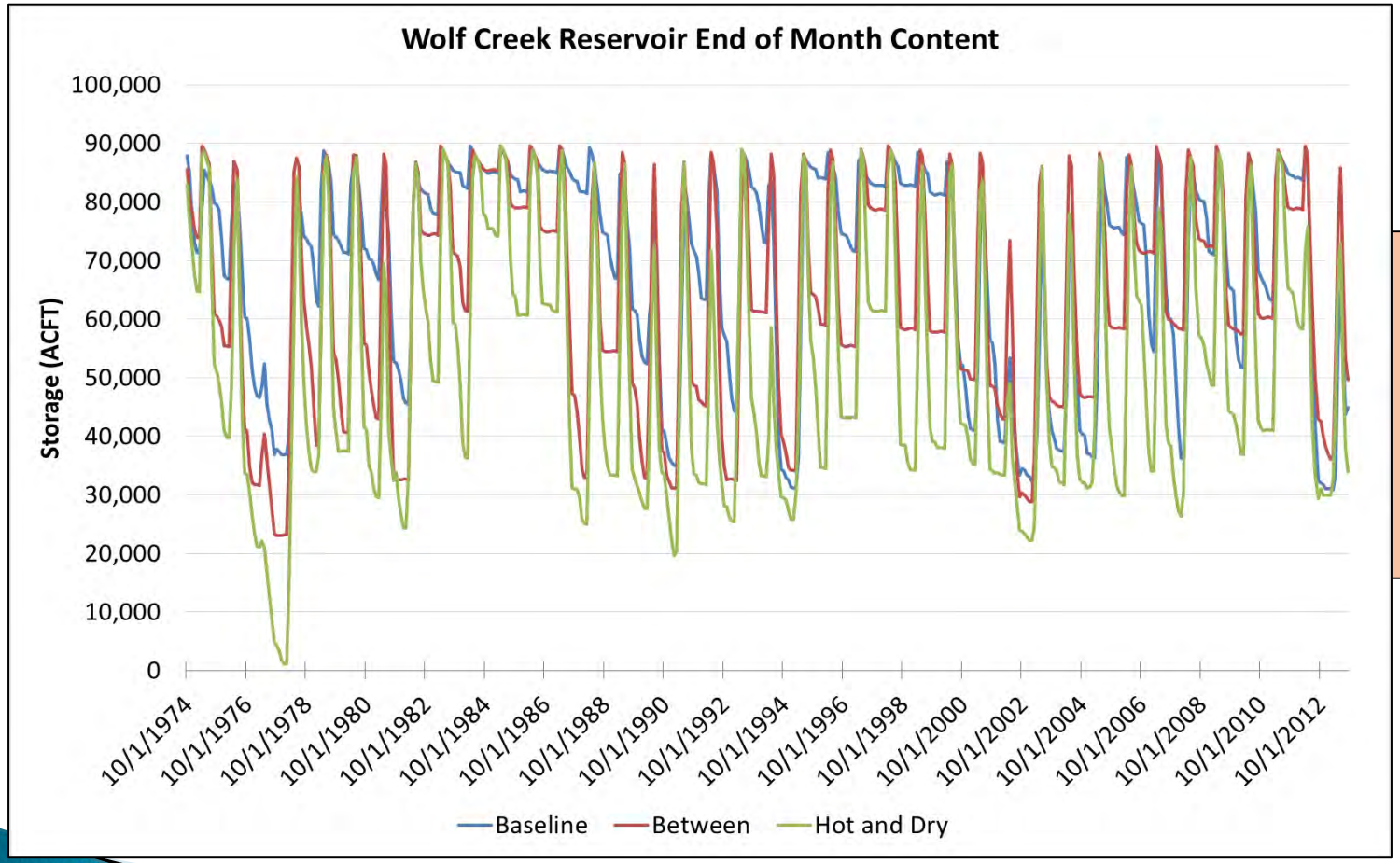
WOLF CREEK DAM

90,000 AF WORKING POOL



White River Modeling for the White/Yampa/Green Basin Roundtable

Modeling work by Wilson Water Group (April 2018)



Bottom Line: *Storage is needed on the White River to meet future demands.*

White River Storage Feasibility Study
ALTERNATIVE EVALUATIONS FOR PHASE 2A

Size:	20,000 acre-foot Working Pool				90,000 acre-foot Working Pool		
Dam Site:	Wolf Creek Dam			White River Dam	Wolf Creek Dam		White River Dam
Fill Method:	Canal Fill	Pipeline Fill	Pump Fill	Direct	Canal Fill	Pump Fill	Direct
Construction Cost (2018 dollars)	$195M	$329M	$119M	$275M	$318M	$191M	$360M
Cost per AF based on Construction Costs & Total Reservoir Storage	$4,800/AF	$8,000/AF	$2,900/AF	$4,000/AF	$2,400/AF	$1,500/AF	$2,600/AF
Average Annual O&M Costs	$300,000	$100,000	$263,000	$100,000	$300,000	$638,000	$100,000
Average Annual Potential Hydropower Revenue	$31,000	$31,000	$31,000	$468,000	$153,000	$153,000	$468,000
Average Annual Storage loss from Sediment (acre-feet)	57	57	57	472	57	57	472
Anticipated Relative Environmental Impacts	Moderate	Lower	Lower	Higher	Moderate	Lower	Higher
Long-term Private Land Impacts	Moderate	Less	Less	More	Moderate	Less	More
Major Highway Impacts	Yes, Highway 64 at Diversion	Yes, Highway 64 at Diversion	No	No	Yes, Highway 64 at Diversion	No	Yes, Highway 64 reservoir inundation
BLM Lands Impacted	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BLM Areas of Critical Environmental Concern Impacted	No	No	No	Yes	No	No	Yes
BLM Wilderness Study Areas Impacted	No	No	No	No	No	No	No

THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION.

White River Storage Feasibility Study
RESULTS AND CONCLUSIONS

- Additional storage is needed to alleviate a pending water crisis in the lower White River Basin.
- The unit cost for storage at Wolf Creek Dam is very economical.
- The Wolf Creek Dam with a pump station is the most economical alternative for construction costs.
- A gravity fill canal or pipeline was not considered to be economical.
- RBWCD is prepared to initiate federal permitting by the end of 2019.

THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

WHAT'S NEXT ?

- **Pre-Permitting Phase**
- **Permitting Phase**
- **Design**
- **Construction**

THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

2019: PRE-PERMITTING PHASE

1. Continued Project Management and Facilitation;
2. Continued coordination with the Programmatic Biological Opinion (PBO) and White River Management Plan developments;
3. Implementation of a Lean permitting process;
4. Preliminary Recreation Plan;
5. Purpose and need refinement and strengthening;
6. Financing Plan; and
7. Final Report.

THIS WORK IS PRELIMINARY & SUBJECT TO FURTHER REVISION AND REFINEMENT.

Questions?

REQUIRED PERMITS

Approval	Lead	Cooperating
NEPA	BLM	USACE,CDNR,USF&WS,CDPHE, EPA
Section 7 ESA	USF&WS	CPW,BLM
Section 106 NHPA	SHPO	BLM
404 Permit	USACE	CDPHE, EPA
401 Water Quality Certification	CDPHE	USACE,CPW,CWCB, EPA, USGS
Fish & Wildlife Mitigation Plan, and FWS Coordination?	RBWCD	CPW, CWCB, CDPHE
State Lands	CSLB	
1041 Permits	N/A	
Watershed Permits	?	
Others ? BLM ROW permit, BLM Land use plan amendment,		*What are we missing ?*

NEXT STEPS
(Who Does What By When)

- District needs to work on P&N before 3/31
- Lauren and RBWCD need to discuss cost share agreement and application.
- Provide more information on water rights, funding, and timeline.
- Tentatively plan on meeting 4/3 (need to have field crews scheduled if field work is planned for the summer).
- Share minutes, slides, Lean document, meeting attendance with group
- List of bibliography of studies that have been done on the White River. Summarize all of the studies done on this section of the river. (Req. by CPW)
- Send Phase 2A and 2015 Report with USACE.
- Start finding any water quality data that we have and potentially forward to water quality data to everyone.
- Potentially invite USGS and BOR (if they will be a funding source).
- Get details on everyone's EIS process for all the agencies involved. (Req. by BLM).

White River Storage Project
Potential Resources that Would Be Analyzed
As Discussed on February 6, 2019

1. Wetlands – Aquatic Resources
2. Cultural
3. Section 7 consultation for endangered species
    a. Biological Assessment
    b. Biological Opinion
4. Water Quality
5. Wildlife
6. Fisheries
7. Vegetation
8. Socioeconomics
9. Livestock-grazing
10. Visual Impacts
11. Mineral resources .
12. Construction impacts/construction materials
13. Recreation/access impacts
14. Air Quality
15. Paleontology
16. Cumulative Effects, Indirect Effects
17. Existing Travel Infrastructure/Travel Management

White River Storage Project
Proposed 2019 Lean Permitting Process Development

Pre-Kick-off Work	Kick-off Workshop Wednesday, January 9, 2019	Interim Work Products	Workshop #2 Wednesday, March 13, 2019	Interim Work Products
- Establish Kick-off location & date - Kick-off invites out - Establish Kick-off Agenda	- Brief Project update - Why Lean Permitting Process? - Review required permits & clearances - Discuss key agency roles & requirements - Agreement on Lead Agency - Discuss proposed processes - Develop Initial Work Plan Outline - Work on a Group Mission Statement - Next Actions (Who does what by when) - ID key resources & specialists	- Prepare detailed Work Plan outline	- Review potential EIS alternatives - Review key impacted resources - Initial resource work group discussions - Develop list of data needs - Initial discussion of EIS analysis methodology	Prepare annotated Work Plan outline

Preliminary for Initial Discussion with the BLM

Lean Permitting Workshop #3 Wednesday, May 8, 2019	Interim Work Products	Lean Permitting Workshop #4 Wednesday, July 10, 2019	Interim Work Products	Lean Permitting Workshop #5 Wednesday, September 18, 2019	Next Steps
- Work group finalize data needs - Work group finalize methodology - Initial discussion of proposed EIS schedule - Initial discussion of 3rd party contractor selection	- Initial Work Plan Draft - 3rd Party Contract Scope Outline - Refine EIS Schedule	- Discuss Draft Work Plan - Discuss 3rd Party scope outline - Discuss proposed EIS schedule	- Final Work Plan Draft - Draft 3rd Party RFP	- Final review of Work Plan - Final 3rd Party Scope - Final review of 3rd party RFP	- Finalize Work Plan - Finalize 3rd Party Scope - File EIS NOI - Initiate 3rd Party Selection

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109-3435

December 17, 2021

CESPA-RD-W (SPK-2015-00192)

SUBJECT: Proposed Wolf Creek Reservoir EIS Project

Rio Blanco Water Conservancy District (RBWCD)
Attn: Alden Vanden Brink, District Manager
2252 East Main Street
Rangley, Colorado 81648
al@rioblancowcd.org

Dear Mr. Vanden Brink & RBWCD Members:

I am writing in regard to your proposed water storage project. The proposed 2,024-surface-acre, 70,000-acre-foot, water storage reservoir is proposed on Wolf Creek in Rio Blanco County, Colorado. This proposal is located on public lands administered by the Bureau of Land Management (BLM) and is anticipated to require an Environmental Impact Statement (EIS) and a Department of the Army (DA) permit, both of which involve a high level of effort, preparation, and evaluation, and we are here to assist you. The purpose of this letter is to reiterate our previous discussions to help you, and those copied on this letter, in understanding the sequential steps necessary for a water supply (i.e., growth) or water management (i.e., existing systems) project.

Thank you for meeting with us and your agents on November 12, 2021. This is the fourth meeting I have participated in concerning this project dating back to 2015. As discussed during our meetings, the steps listed below are critical to project success and listed in order of sequence:

1. **Describe Need and Define Purpose** –

Project Purpose and Need (P&N) are separate but interrelated. They should be articulated individually since the project's purpose is framed in relation to addressing a need that is quantifiable or measured. Fundamentally, the project need describes a problem, whereas project purpose describes the action(s) to be taken to solve that problem. The three project purposes you provided during our meeting appear speculative and a detailed needs analysis that provides rationale and justification for project need(s) is required. Our agency must analyze the project need and if deemed speculative or unsupported, we cannot process the application. A documented detailed needs analysis is the critical fundamental first step for this project. A needs analysis will also help determine which purpose (action) is fundamental to the project and which are more appropriately considered as secondary goals. Treating multiple purposes or needs as the basic project purpose can constrain the range of alternatives, including potentially less environmentally damaging practicable alternatives, from analysis. This is why, when multiple purposes are proposed, a distinct alternatives analysis may be necessary for each one.

The purpose of a water supply project is to provide for increased water deliveries to customers (generally stated as firm yield with specified reliability criteria) to satisfy a documented demand. The need for water supply projects is based on demands that include short- and long-term growth projections (usually more than 5 years but less than 50 years) that identify the quantity of water needed above the current supply and the reasoning behind the need.

The P&N statement should be carefully considered and developed, as it will define and drive the complexity of the alternatives analysis, including constraints and practicability considerations. The purpose should not be defined in such a restrictive manner to unduly restrict or preclude other alternatives. Note that conservation measures should be considered as a demand reducer at the project purpose stage. Please be aware that the use of property rights owned by the applicant (such as real estate, mineral rights, or water rights) should normally not be included in the P&N statement.

Finally, The Council on Environmental Quality within the Executive Office of the President advises that "*In situations involving two or more agencies that have a decision to make for the same proposed action and responsibility to comply with the National Environmental Policy Act (NEPA) or a similar statute, it is prudent to jointly develop a purpose and need statement that can be utilized by both agencies*." As a cooperator to any EIS action on this project, we will strive to reach agreement on a single P&N statement, or we will independently define the overall project purpose.

2. Alternatives Analysis –

Once project P&N are supported, a documented detailed alternatives analysis is required. Reasonable alternatives for a water supply project under NEPA would typically fall into two general categories of concepts (sources) and components (infrastructure). NEPA is relatively broad compared to our process; and to address the regulatory requirements of our agency, alternatives must be practicable (i.e., the alternative is available and capable of being done after taking into consideration the cost, existing technology, and/or logistics in light of the overall project purpose). We aim to integrate NEPA, the 404(b)(1) Guidelines, and the Public Interest Review factors into one analysis. Concepts can include the purchase or lease of agricultural or other junior or senior water rights, water exchanges, groundwater (alluvial and bedrock), reuse, system connections and/or cooperative agreements with other water providers, and/or new sources of water, such as out-of-basin diversions. Components can include storage (surface and subsurface), pumping and treatment facilities, intakes, tunnels, and other infrastructure to obtain, store, transport, and treat sources. Water supply projects will include management alternatives and strategies that increase efficiencies and reduce demand (conservation, interruptible supply contracts, drought response actions such as watering restrictions, etc.) as part of their alternatives analysis. For example, an efficiency improvement on existing irrigation delivery systems is an alternative for water

management; multiple reservoirs may be appropriate for meeting various increased water supply needs as opposed to one large reservoir project.

The three purposes recently proposed for this project appear to be separable, such that distinct alternatives analysis should be conducted for each - assuming need for each is first verified. This could lead to finding that the different purposes could be realized through more than one project. It's also possible that combining the purposes into one alternative, while not the only practicable approach, would lead to a proposal that causes the least damage to the aquatic environment. While this may be the outcome, the applicant should expect to document the analysis of alternatives as separable as well as together so defensible determinations can be made.

3. Least Environmentally Damaging Practicable Alternative (LEDPA) –

The Clean Water Act Section 404(b)(1) implementing regulations (40 CFR Part 230, referred to as the 404(b)(1) Guidelines) constitute the substantive environmental criteria used in evaluating regulated activities. In evaluation of the project alternatives, the Corps is required to select the LEDPA for issuance of a DA permit and cannot permit any other alternative. Although an alternative may be preferred, and additional compensatory mitigation may be offered, it cannot be selected if there is a practicable, less damaging alternative available. For example, if one practicable alternative provides greater social benefits with greater impacts to aquatic resources compared to another with less aquatic resource impacts and less social or economic benefits, a DA permit can only be approved for the alternative with the lower aquatic resource impact. While this is only one of many determinations the Corps will make, the LEDPA requirement is important to understand.

4. Mitigation –

To offset unavoidable project impacts (including habitat losses, water depletions, threatened and endangered (T&E) species, aquatic resources, etc.), compensatory mitigation is required. Mitigation evaluation is also sequential and involves first avoidance, then minimization, and finally compensation. The initiation of mitigation occurs later in the project development process as a full understanding of project impacts is required to identify appropriate proposed compensation for unavoidable impacts.

You have indicated the possibility of submitting an individual permit application in February 2022. This is not advised given the detailed research and study steps required for our consideration of a complete permit application. As mentioned above, if the project need is considered speculative, that will prevent us from evaluating any application submittal. In fact, project timelines may need to be revised given the up-front analyses required.

As stated above, it appears that this project will require an EIS, and that BLM will be the lead federal agency. Cooperation among all federal, state, and local agencies is required,

and the NEPA scoping process will be helpful in developing a P&N statement that supports both NEPA and the DA permitting process. Because we intend to utilize the EIS process in cooperation with BLM, any DA application should be planned to be submitted after issuance of the final Record for Decision.

Working with a consultant(s) familiar with the EIS process and the 404(b)(1) Guidelines is recommended. Again, this effort will require a sequential approach and significant front-end work, beginning with a thorough and detailed needs analysis to show project viability. RBWCD can evaluate need now, yet please be aware that a third party contractor may be necessary to prepare major environmental documents under NEPA, to independently evaluate and supplement any need analysis, and that the subsequent P&N statement will be used by the Corps during the evaluation of alternatives and the decision to issue or deny a DA permit. We know that you have put effort and money into this project over the last several years. Our intention is to assist you in understanding the permit processes so that your time and effort are best spent on the needs required to prepare application submittals.

We appreciate the opportunity to meet with you, and to provide you input on the proposed project, which we have assigned action number SPK-2015-00192. Please do not hesitate to contact us if you have questions or if we can provide additional information. Travis Morse is our Senior Project Manager in the office and may be reached at W.Travis.Morse@usace.army.mil or telephone 970-243-1199, extension 1014.

Sincerely,

Susan Bachini Nall
Chief, Northwestern Colorado Branch

cc:
Mr. Steve Jamieson, W. W. Wheeler & Associates, Incorporated, Steve_Jamieson@wwwheeler.com
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Appendix D

Revised Purpose and Need Statement for Plan of Development Version 2 (Wheeler, 2023)

Purpose & Need Report (Wheeler and HE, 2022)

Appendix O
Plan of Development, Version 2
White River Regional Water Supply Project
Revised Purpose & Need Statement

The Rio Blanco Water Conservancy District (RBWCD) has reviewed the initial comments from the Bureau of Land Management (BLM) and their Cooperating Agencies regarding the RBWCD's Project Purpose and Need statement (Wheeler & HE, 2022). The RBWCD has considered these comments and has made clarifications to, and minor refinements of, the Purpose and Need statement for the Project. A revised Purpose and Need statement is provided below along with responses to the BLM's letter to RBWCD dated May 24, 2023, for the comments that were noted to be of particular interest to the BLM. The six needs documented in the June 2022 Purpose and Need report are still considered valid and important for the White River Basin. The amount of water required to address these six needs exceeds the proposed 66,720 acre-feet of storage in the proposed Wolf Creek Reservoir.

Revised Purpose and Need Statement

The purpose of the White River Regional Water Supply Project (WRRWSP) is to meet a portion of the current and reasonably projected future additional water supply needs in the White River Basin. The Project includes approximately 66,720 acre-feet of a new water supply, which includes the replacement of the water uses lost at Kenney Reservoir. The new water supply will be coordinated and operated by the Rio Blanco Water Conservancy District.

The six regional water needs in the White River are summarized below.

1. **The municipal water supply need** – The Town of Rangely needs a water supply of 3,895 acre-feet. This includes a prudent three-year drought supply of 2,160 acre-feet for new municipal demand by the year 2070, which accounts for the effects of water conservation, plus the replacement of 1,735 acre-feet of municipal water storage lost to reservoir sedimentation at Kenney Reservoir.
2. **The hydropower need** – There is a need for up to 142,266 acre-feet of water to augment the RBWCD's direct flow water rights of 745 cubic feet per second (cfs) for renewable hydropower generation, to maintain funding for RBWCD's operations, and to replace water storage lost at Kenney Reservoir.
3. **The need for flatwater recreation** – There will be a complete loss of flatwater recreation at Kenney Reservoir by 2029, contributing to a projected growing need for flatwater recreation in northwestern Colorado of 2,530 surface acres by 2070.
4. **The Colorado River Compact curtailment need** – There is uncertainty regarding a future Colorado River Compact curtailment that would impact White River Basin water

users with rights junior to November 24, 1922. The RBWCD needs 35,664 acre-feet of storage to protect these junior water users.

5. **The agricultural water supply need** – Basin irrigators have experienced shortages on existing irrigated lands of approximately 2,400 acre-feet per year since 1950. The projected average year agricultural gap is expected to increase to about 3,500 acre-feet per year and may be as great as 9,150 acre-feet under drought conditions. The WRRWSP can be used to offset shortages via augmentation.

6. **The need for environmental flows for federally listed fish species** – The White River provides habitat for endangered and threatened fish species. Ongoing basin planning has identified the need for up to 27,778 acre-feet annually at the White River Watson Gage to benefit and contribute to the recovery of these fish species. More specific reservoir operations and release requirements to augment flows for endangered fish will be developed by the U.S. Fish & Wildlife Service as part of the consultation process with the BLM under Section 7 of the Endangered Species Act.

Responses to the BLM's May 2023 Letter

In the BLM's May 24, 2023 letter to the RBWCD, the BLM identified five fundamental questions of particular interest to the BLM regarding the RBWCD's identified needs. These questions were based on comments from other regulatory agencies. These questions are stated below with the RBWCD's corresponding response. The RBWCD is the appropriate government agency tasked with long-term water planning within its boundaries. The Project is intended to provide flexibility to address a portion of the current and future water needs. The loss of storage at Kenney Reservoir makes many of these needs imminent. Providing a reliable water supply to meet these needs will become more important as climate change and aridification continue to impact the water supply in the White River.

BLM Concern #1

The U.S. Fish & Wildlife Service (FWS) commented that "The current hydrologic regime of the White River largely meets the flow recommendations. Thus, at present, there is not a clear need for supplemental water for endangered fish." (comment #270), and also "The substantial and persistent populations of these endangered and other native fish in the White River is likely related to the relatively unaltered White River flow regime." (comment #269).

RBWCD Response to BLM Concern #1

These two FWS comments focus on present conditions and not future conditions. The RBWCD has participated with the FWS and other key stakeholders for more than 10 years to work towards the development of a White River Management Plan for federally listed endangered fish in the White River. This has included the development of interim target river flows at the Watson stream gage station, just downstream of the Colorado/Utah border (Anderson et al., 2019). Supplemental analysis by Miller Ecological Consultants, Inc. has documented that some of the low flow recommendations developed by Anderson et al. are actually not large enough to create the habitat required to recover the federally listed fish species (Miller, 2020). These critical low-flow targets are not being fully met under certain conditions and could be more fully met by releasing

augmentation water stored such as from Wolf Creek Reservoir. A conservation measure is documented in the Biological Opinion for the Taylor Draw Reservoir Project for the Colorado Squawfish that "*The majority of the time the Taylor Draw Reservoir Project will be operated so that the outflow from the dam is the same as the inflow into the reservoir. During drought years, the dam will release a minimum of 144,800 acre-feet (a drought year is when the annual flow is 315,000 acre-feet or less) or natural flow entering the reservoir, whichever is less.*" (USFWS, 1982). Kenney Reservoir (aka the Taylor Draw Reservoir Project) is currently at dead pool with no water storage available (Wheeler and HE, 2022). Climate change and future water development in the White River will result in lower flows at the Watson stream gage, which will make it more challenging to recover the federally listed endangered fish species in the future.

The RBWCD's stated Project needs take into account present as well as the projected future needs and changes in the basin. As the agency responsible for planning for the conservation of land and water resources within its boundaries (RBWCD, 1996), the RBWCD recognizes that planning for the future conditions in the basin and for the augmentation of future water supplies to help actions to recover federally listed endangered fish species in the White River are vital to the health of the White River. The FWS focus on existing flow conditions does not take into account climate change, cumulative impacts, or future water demands.

BLM Concern #2

The Colorado Division of Water Resources (CDWR) commented: "The legal water uses for Wolf Creek Reservoir are defined and limited in the Decree entered by the Colorado Division 6 Water Court in Case No. 14CW3043 (attached as Appendix D.1 to the POD) ("Decree"). The "regional water needs" identified in the POD and Purpose & Need report (Wheeler, 2022) are inconsistent with the Decree and therefore are not legally authorized uses for Wolf Creek Reservoir. Specifically, protection of junior water users in the event of curtailment under the Colorado River Compact, agriculture/irrigation, and environmental flows for federally listed species are not authorized uses in the Decree. Additionally, the Decree limits hydropower use to times when water is being released for other decreed beneficial uses, but the POD does not recognize this limitation. BLM's Purpose and Need statement should not include purported water demands based on uses that are not legally authorized by the Decree." (comment #35)

RBWCD Response to BLM Concern #2

The RBWCD's water rights decree and the water rights stipulation were discussed during the August 24, 2023 BLM-RBWCD Coordination Call (Galileo, 2023). In attendance were Roy Smith, the Colorado water rights lead for the BLM, and David Taussig, the RBWCD water counsel. As discussed and agreed on in the meeting, one does not need a decree in Colorado to divert water, such as during free river conditions. The decree only confirms the use of the water right. At the BLM's request, and to show commitment to the Project, the RBWCD obtained a water right decree for Wolf Creek Reservoir. And as also discussed, a water decree, including a conditional decree and the types of uses can be changed, if needed, to conform to the needs authorized by the BLM Right-of-Way approval if Wolf Creek Reservoir is selected as the least environmentally damaging alternative. The RBWCD could also file for new water rights to match any approved needs in the BLM's Right-of-Way approval. As discussed with the BLM, the decree does not control or drive

the federal permitting process. As Roy Smith noted, the permitting process can include as a condition any water decree adjustments that may need to be made. The CDWR is therefore mistaken in its comments that the needs are not “legally authorized.” The needs exist irrespective of the water right decree for Wolf Creek Reservoir.

The CDWR comments also do not take into account the flexibility to address future unknowns such as Compact Curtailment and endangered fish species concerns that were built into the stipulation associated with the Wolf Creek Reservoir water rights decree that was agreed to between the RBWCD and the State and Division Engineer dated January 5, 2021 (CDC, 2021). Key language in Article 3 and 4 of this Stipulation is provided below.

> “3. Annual releases from the reservoir under the subject water right shall be limited to 7,000 acre-feet for municipal and augmentation uses and 20,720 acre-feet for Mitigation, as those uses are described in the Proposed Decree.
>
> 4. The above limits on annual releases are not intended to preclude releases in excess of those amounts the extent any such additional releases are required or authorized by statue or rule.”

The inclusion of this language in the stipulation should be put into context. Earlier in the water case, the State and Division Engineer had lost a summary judgment motion where they argued that Compact Curtailment, endangered species use, and hydropower were not authorized under augmentation. The RBWCD also lost some of its claimed water uses in that Court Order. As a matter of compromise, this language cited above was included to provide flexibility to address future unknowns. This flexibility especially relates to how reservoir releases could be used to benefit the State of Colorado to address future unknown endangered fish or Compact Curtailment issues as those uncertainties may be addressed and implemented through statute or rule.

In summary, a state water court decree does not control this federal permitting process or the Purpose and Needs of the Project. Any inconsistencies between a decree and the permitted purpose and needs can be addressed by a condition in the Right-of-Way approval, if needed.

BLM Concern #3

The U.S. Army Corps of Engineers (USACE) commented: "The blanket augmentation plan for water users within the RBWCD and Yellow Jacket Water Conservancy District boundaries be approved prior to finalizing the project's Purpose and Need statements. The approved augmentation plan is necessary to justify and determine the need for specific agricultural users and uses. The specific users and uses also need to be identified so that they can be incorporated into modeling of water use and potential environmental effects. For example, if an exchange with an upstream user is needed, hydrologic modeling will need to be specific enough to identify the effect of the exchange on stream flows, timing, of water quality within the reaches between the exchange locations." (comment #30)

RBWCD Response to BLM Concern #3

The RBWCD's consultants performed modeling of the White River to examine various Wolf Creek Reservoir operational scenarios for the Plan of Development, Version 2 (Wheeler and WWG, 2023). The modeling was performed using StateMod, a water rights allocation planning model that uses the prior appropriation water rights system to model diversions of available water in the White River system. The model scenarios include the representation of Wolf Creek Reservoir augmentation of upstream out-of-priority depletions to Taylor Draw demands associated with the July 3, 1962 water right. The model scenarios represent the potential environmental effects of augmenting the water rights in the White River basin upstream of Taylor Draw Dam that have water rights appropriated between July 3, 1962 and March 31, 2013 (the appropriation date for Wolf Creek's water right). The model scenarios were intended to simulate a high estimate of augmentation that could reasonably occur during routine reservoir operations for evaluations under this Environmental Impact Statement (EIS).

The results of the high-estimate modeling indicates minimal affects to the White River flows. The modeling performed by the RBWCD's consultants can be used by the BLM to evaluate the environmental effects of this high-estimate augmentation scenario. The BLM could also elect to use their third-party consultants to perform additional modeling of diversion scenarios to determine the environmental effects. However, it is our understanding that BLM wants to evaluate the high-end estimates of uses such that the range of potential reservoir operations are evaluated and documented in the EIS. Therefore, potential future operations with less impacts would have already been considered in the high-end use scenarios.

Moreover, the RBWCD has executed agreements in-place with the Yellow Jacket Water Conservancy District and Rio Blanco County that allows for the future planning and the development of specific future water augmentation plans as needed to address future water shortages. Any future augmentation plans are subject to review and approval by the Colorado Water Court.

BLM Concern #4

The USACE commented: "The stated need for hydropower is based on a water right. A water right does not represent a need for power, but rather a legal ability to create power. The need for hydropower must be based on the need for power by the users. It is stated in the 2022 Purpose and Need report (Wheeler & HE, 2022) that the RBWCD has not produced all the hydropower that it could due to insufficient water availability. We will need information to answer several questions related to this matter including 1. What were the implications of not achieving full power productions? 2. What users did not receive power due to a lack of hydropower generation? 3. What effect did this have on the cost of power? It is also stated that RBWCD has exercised its water right by placing a call on the river, thereby indicating a lack of a need for the power, and apparently offering a less damaging practicable alternative that involves placing a call on the river to achieve the power needed. Therefore, the USACE is concerned that there may be lesser environmentally damaging and practicable alternatives available that would require the USACE to recommend permit denial in relation to the currently proposed project." (comment #27)

RBWCD Response to BLM Concern #4

The RBWCD has refined its description of the hydropower need to help the USACE better understand the need for hydropower augmentation. The RBWCD's hydropower need is to increase power production at Taylor Draw Dam by augmenting or adding to the flows so as to maximize their water rights at Taylor Draw. The RBWCD requested administration of its Taylor Draw Power conduit water right on December 1, 2022. This administration has not significantly increased White River flows to Kenney Reservoir. Releases from storage are necessary to augment the flow in the White River to Taylor Draw. Increasing hydro power production at Taylor Draw Dam increases revenues to the RBWCD which it uses to pay its expenses and increases renewable electricity into the power grid. The increase of renewable electricity is important as the United States and Colorado are actively transitioning towards renewables and conserving nonrenewable fossil fuels. This transition also reduces emissions of byproducts caused by the combustion of fossil fuels.

A recent letter from the Moon Lake Electric Association (MLEA) states that MLEA has the electric power demands to use all the electricity that can be generated by hydropower at Taylor Draw Dam (MLEA, 2023). This is not an issue of people going without power or the cost of power production.

BLM Concern #5

The U.S. Environmental Protection Agency commented: "The purpose of the project to meet the Town of Rangely's need could be met (in part or whole) by water conservation efforts. We recommend that all alternatives to address this need should evaluate conservation as a demand reducer. For example, among other measures we recommend assessing to what extent the need for supplemental water supply could be reduced or resolved through conservation and efficiency measures such as turf and landscape irrigation restrictions or requirements; rate structures that incentivize conservation; incentives for xeriscaping; certification requirements for landscapers; use of advanced metering; non-potable reuse of treated wastewater and stormwater for industrial uses, landscape irrigation, supplying fire hydrants, and flushing toilets; direct and indirect potable reuse; and implementation of smart growth principles. For any remaining need, we recommend evaluating whether it could be partially or fully met through temporary or permanent agreements for use of agricultural water rights, including payments for rotational fallowing or dry year leasing." (comment #38)

RBWCD Response to BLM Concern #5

The RBWCD supports water conservation efforts, and notes that conservation measures will be part of an alternatives analysis. The Town of Rangely has instituted efforts to conserve water as is evident by conservation plans and capital improvement investments that have been implemented (Rangely, 2023). Part of the Town's needs are for storage to replace the 1,735 acre-feet of water storage that has already been lost to sedimentation at Kenney Reservoir. Rangely is 100% dependent upon White River flows; they have therefore requested that the RBWCD replace this lost storage and provide a reliable water supply to address future water emergencies. RBWCD has determined Rangely must have the 3,895 acre-feet of water requested of water

storage as a means of emergency protections since conservation alone cannot replace lost storage or provide a reliable water supply to address future water emergencies.

WHITE RIVER REGIONAL WATER SUPPLY PROJECT

PURPOSE AND NEED REPORT

Prepared for:

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June 15, 2022

EXECUTIVE SUMMARY

This report was prepared by W. W. Wheeler & Associates, Inc. (Wheeler) and Harvey Economics (HE) for the Rio Blanco Water Conservancy District (RBWCD) to document the purpose and need for new water supplies in the White River basin.

The RBWCD is located in western Rio Blanco County and is political subdivision of the State of Colorado. The RBWCD is responsible for water planning and management within its boundaries and has recognized a water crisis associated with the loss of water storage at Kenney Reservoir. That water crisis is exacerbated by the effects of climate change and aridification and the lack of usable water storage in the White River basin in Colorado. The RBWCD is the appropriate organization to address this regional water crisis because it is the regional water planning and managing authority in the lower White River basin. In the last decade, the RBWCD has embarked on a responsible, transparent, planning process to address the water challenges in the White River. The RBWCD's planning process has been co-funded by Rio Blanco County, the Town of Rangely, the Town of Meeker, the Yampa/White/Green River Basin Water Roundtable, the Colorado Water Conservation Board, Colorado River Water Conservation District, and the RBWCD.

The purpose of the White River Regional Water Supply Project (WRRWSP) is to meet the different needs of water users in the White River drainage basin with approximately 66,720 acre-feet of new water supply, coordinated by the RBWCD, which will meet a portion of the basin's current and reasonably projected future additional water supply needs, including replacement of the uses provided by Kenney Reservoir.

There are six regional water needs to be addressed by the WRRWSP including municipal water supply, hydropower generation, flatwater recreation, water supply for Colorado River Compact curtailment, water for agricultural needs and environmental flows for federally listed fish species. An expanded summary of the purpose and need is provided in Section 2 with supporting documentation for each need described in this report.

WHITE RIVER REGIONAL WATER SUPPLY PROJECT

PURPOSE AND NEED REPORT

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1.0 INTRODUCTION

The White River watershed encompasses approximately 3,750 square miles of land in Rio Blanco, Moffat, and Garfield Counties in northwestern Colorado. The location of the White River is shown on Figure 1-1. The White River begins in a high alpine environment approximately 50 river miles upstream of the Town of Meeker and flows for 185 miles to its confluence with the Green River near Vernal, Utah. About five river miles downstream and west of the Town of Meeker, the White River begins to flow through a high desert environment. The Town of Rangely and the White River in Utah are located in this high desert environment in the lower White River basin.

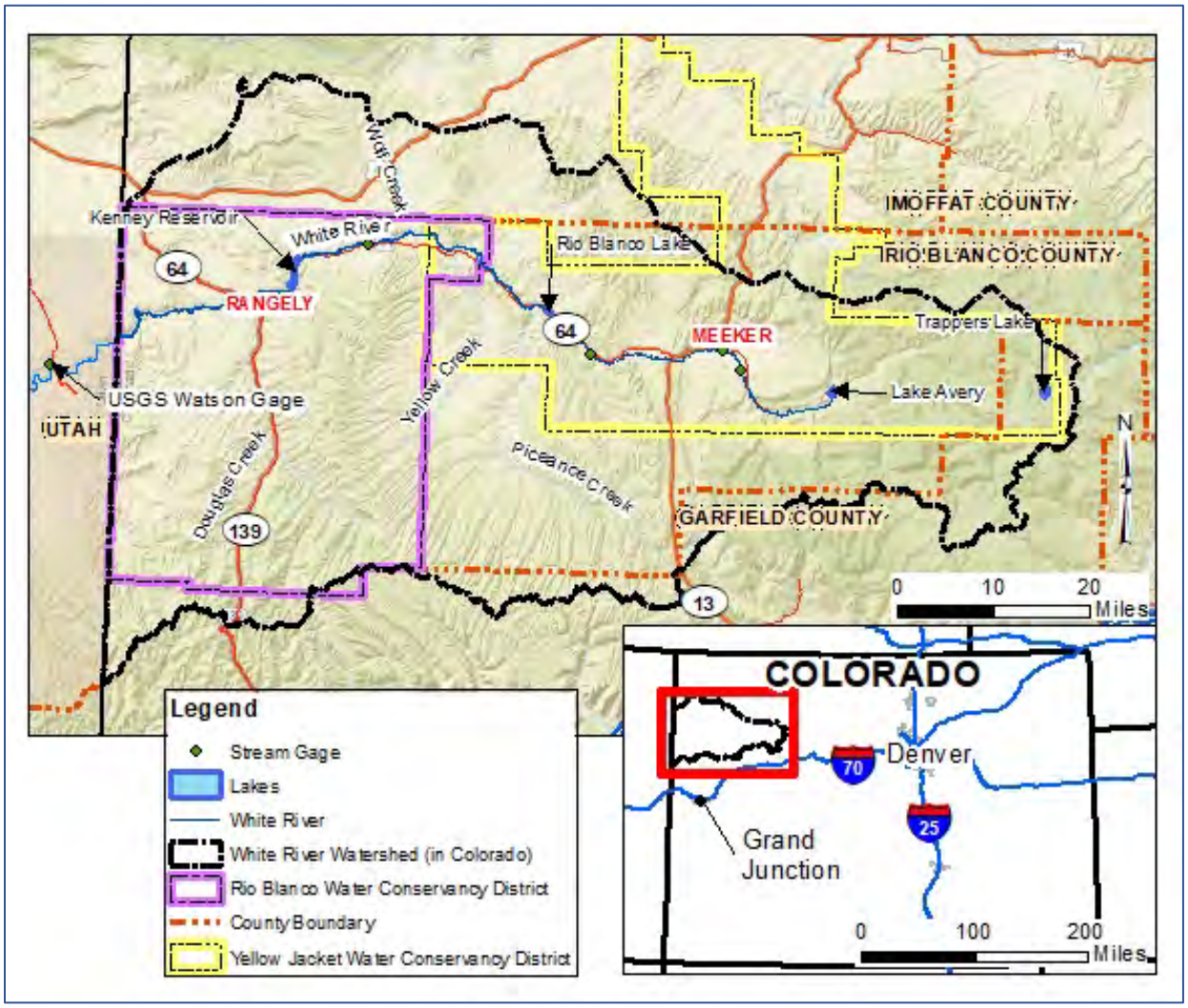


Figure 1-1: White River Basin Location Map

The White River is in the midst a water crisis because it cannot reliably meet the existing or future water needs in the basin during drought conditions. The primary water storage for the White River basin is Kenney Reservoir, which is losing capacity because of the accumulation of sediment in

the reservoir. In addition, future droughts and the effects of climate change are expected to further limit available water in the basin. Reduced water flow is expected to decrease the habitat of four threatened or endangered fish species and other fish species of special concern in the White River. Reduced White River flows are also expected to continue to degrade the water quality in the White River. This report outlines the need for additional water supplies in the White River basin for the benefit of the aquatic and human environment.

This report was prepared for the Rio Blanco Water Conservancy District (RBWCD) as the entity responsible for water resource operations and water supply planning in the lower White River basin. The White River Regional Water Supply Project (WRRWSP) is needed, in part, to replace the uses being lost at Kenney Reservoir, the RBWCD's only water storage and flatwater recreational reservoir. As a regional water supplier, the RBWCD also considered it prudent to investigate and identify all the existing and future water needs in the White River basin as a whole, in addition to their identified need to replace Kenney Reservoir. The multiple current and projected future regional water needs in the White River basin generally include the following in no particular order:

1. Municipal water supply for the Town of Rangely;
2. Water supply to satisfy the RBWCD's decreed water rights for generating hydropower;
3. Replacement of regional flatwater recreational opportunities that are lost due to the ongoing sedimentation at Kenney Reservoir;
4. Water supply to satisfy existing and future agricultural needs;
5. Water supply to protect the majority of water users in Rio Blanco County who would be junior to a Colorado River Compact curtailment; and
6. Water supply to meet streamflow targets to aid in the protection and recovery of endangered fish species in the White River.

Each need is examined and evaluated on its own merits; each is important to the region.

Kenney Reservoir, located on the White River about six miles upstream of the Town of Rangely, was constructed in the 1980s and has been accumulating about 315 acre-feet of sediment every year. Seventy-five percent of the reservoir volume now consists of accumulated sediment and is now unusable. Kenney Reservoir is expected to have only minimal water storage after the year 2029. Taylor Draw Dam is a Federal Energy Regulatory Commission (FERC) licensed project that impounds Kenney Reservoir and provides, among other benefits, hydropower energy to the people in Rangely and western Rio Blanco County. Despite the continuing loss of reservoir volume, the Taylor Draw Dam intake power conduit can be modified to allow continued future hydropower operations as a run-of-the-river project beyond 2029. Kenney Reservoir also has dedicated water storage for the Town of Rangely and recreation, as described in the U.S. Army Corps of Engineers (USACE) 1982 report titled "*Taylor Draw Reservoir Project Final Environmental Impact Statement* (USACE, 1982).

Outside of Kenney Reservoir, the only other water storage within the White River basin is provided by Lake Avery and Rio Blanco Lake. Lake Avery and Rio Blanco Lake are owned and operated

by Colorado Parks and Wildlife (CPW) and have decreed water rights for recreation. These two reservoirs currently do not have the storage capacity or decreed water rights to provide water for drought protection, augmentation, agriculture, municipal and industrial uses, or endangered fish flows, and are not considered available to provide for the future water supply needs in the White River basin. A schematic profile of the White River is provided on Figure 1-2. The location of Kenney Reservoir, Lake Avery, Rio Blanco Lake, and the Towns of Meeker and Rangely are provided on both Figures 1-1 and 1-2.

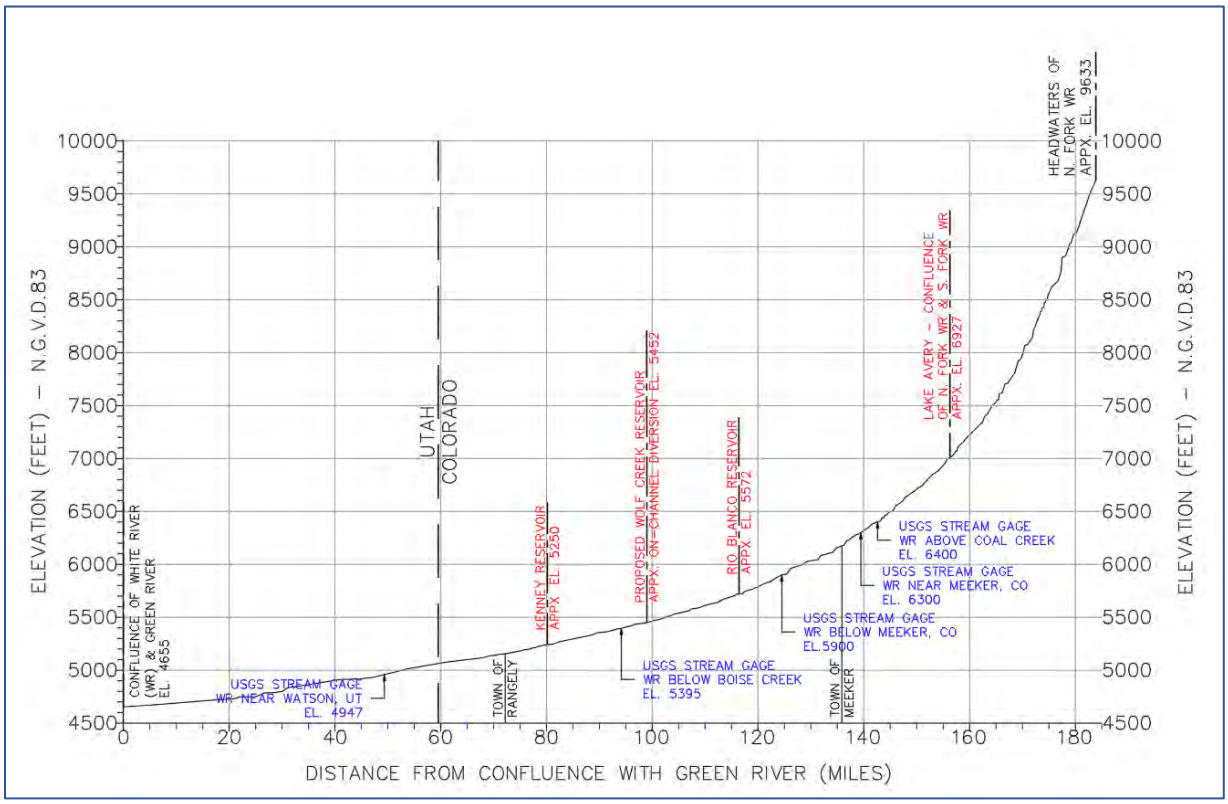


Figure 1-2: White River Schematic Profile

1.1 Report Objective and NEPA Context

After nearly a decade of planning studies and hundreds of stakeholder and public input meetings, the RBWCD is prepared to initiate the federal permitting process required to move forward in meeting the water supply needs of the White River basin documented in this report. As explained in the following paragraphs, obtaining a Right-of-Way from the United States Bureau of Land Management (BLM) to develop an additional water supply would be a Major Federal Action requiring documentation under the National Environmental Policy Act (NEPA). The documentation of the project need, evaluation of reasonable alternatives, and the analysis of potential environmental effects is required by NEPA (NEPA; 42 USC 4321-4347). To comply with NEPA and the Council on Environmental Quality regulations, which implement NEPA (40 CFR 1500-1508), an environmental analysis will be prepared. In this case, an Environmental Impact Statement (EIS) will be required to document NEPA compliance, because potential significant

environmental impacts are anticipated along with the potential for significant benefits and enhancements to the human and aquatic environment.

In the context of NEPA, a Project need describes a water supply challenge, and a Project purpose describes the action(s) that could potentially be taken to address that challenge. This report outlines the RBWCD's purpose and demonstrates the needs which will be met by the proposed action. The initial alternatives are identified and evaluated in a separate report.

1.2 Project Sponsor

The RBWCD was originally formed in 1978 as part of Water Users Association No. 1 under the Colorado River Water Conservation District, and later judicially formed as the RBWCD. The RBWCD is a Water Conservancy District of the State of Colorado, organized for the purpose of conserving and developing land and water resources for the best use of water within the RBWCD boundaries. The RBWCD was authorized by a District Court decree on November 9, 1990. In 1992, all assets of the Water Users Association No. 1 were transferred into the RBWCD. The RBWCD is a political subdivision of the State of Colorado and a body corporation with all the powers of a public or municipal corporation. The organization decree for the RBWCD states that "*The Rio Blanco Water Conservancy District shall be a political subdivision of the State of Colorado and a body corporate with all the powers of a public or municipal corporation*." (90CV26, 1990). Furthermore, under C.R.S. § 37-45-118, the board of a Colorado water conservancy district has the power "*To appropriate and otherwise acquire water and water rights within or without the state; to develop, store, and transport water . . to provide, sell, lease, and deliver water for municipal and domestic purposes, irrigation, power, milling, manufacturing, mining, metallurgical, and any and all other beneficial uses and to derive revenue and benefits therefrom . .*" *Id.* § -118(1)(j).

The RBWCD boundary is shown on Figure 1-3. The RBWCD encompasses the lower White River basin in western Rio Blanco County, in the northwestern part of Colorado. The RBWCD manages approximately 1,200 acres of land, all of which are open for public use with some restrictions. These lands include Kenney Reservoir, a large inventory of wetlands in various stages of succession, rangelands, and agricultural lands. Each plays a unique role within the RBWCD, along with associated management needs and challenges. As shown on Figure 1-3, Rio Blanco County encompasses a majority of the White River basin.

Rio Blanco County, the Town of Rangely, the Yellow Jacket Water Conservancy District (YJWCD), and numerous other local and regional government agencies support the RBWCD's effort to develop additional water supplies in the White River basin. The boundaries for Rio Blanco County, the Town of Rangely, and the YJWCD are shown on Figure 1-3. The following documentation in support of the Project has been executed at the time this report was prepared:

1. On March 17, 2020, the RBWCD and Rio Blanco County executed an intergovernmental agreement for the RBWCD to provide augmentation water to water users within Rio Blanco County (IGA, 2020-1).

2. On April 23, 2020, the Town of Rangely provided a memorandum to the RBWCD indicating that they are committed to contract for at least 2,000 acre-feet of water storage for municipal use (Rangely, 2020).
3. On July 2, 2020, the RBWCD and YJWCD executed an intergovernmental agreement to provide augmentation water in the YJWCD boundaries (IGA, 2020-2).

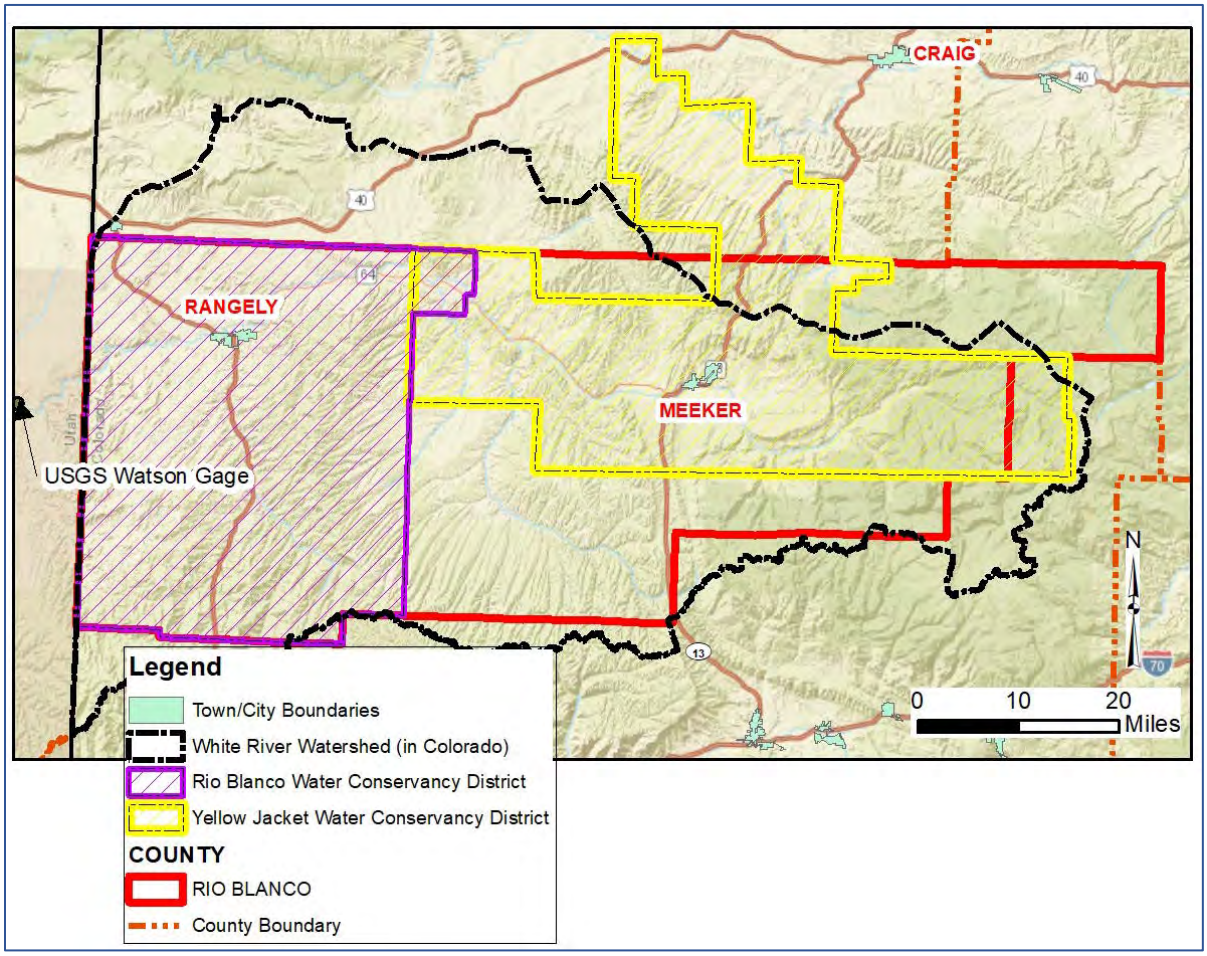


Figure 1-3: Water District Boundary Map

1.3 White River Water Crisis

The lower White River is in a water crisis due to aridification, climate change and Colorado River Compact issues, compounded by its current lack of water storage. Kenney Reservoir is the only significant water storage reservoir on the lower White River, and 75 percent of the reservoir volume now consists of accumulated sediment. It is expected to have only minimal water storage left in the reservoir after the year 2029. At that point, Kenney Reservoir will no longer provide any water storage for flatwater recreation or other beneficial uses. Water storage security for the Town of Rangely that was previously provided at Kenney Reservoir will also be gone.

The RBWCD realized the severity of this water crisis and initiated water supply planning in 2013. The initial planning work focused on the evaluation of regional water needs and alternatives for meeting these needs. In 2014, the RBWCD filed for a conditional water right for water storage.

In addition to the RBWCD's water supply initial planning efforts, a separate entity was studying the White River environment. The planning team working on the White River Management Plan (WRMP) and Programmatic Biological Opinion (PBO) has developed preliminary streamflow targets for the White River to aid in the recovery of endangered and threatened fish species. The PBO has compared these target flows against future water demand scenarios and predicts that, under future scenarios, the flow targets may not be met by existing basin water supplies. This could adversely impact the endangered fish populations if additional water supplies do not become available to supplement the declining White River flows. As discussed in Section 8 of this report, providing water to enhance threatened or endangered fish habitat is an important element of the WRMP.

In addition to the above projected water needs, potential energy development projects may reduce the amount of water available for junior beneficial uses including the Town of Rangely and endangered species. The Rangely oil field is the largest oil-producing field in the Rocky Mountain region. When conditions become favorable, it is anticipated that significant energy development would likely occur in the area. About 640,000 acre-feet of conditional water rights for energy development projects are currently decreed on the White River. If even a small fraction of these water rights are developed and used, it is expected that less water will be available in the White River for other uses including the Town of Rangely and endangered fish flows. Also, if significant energy development occurs, the White River, in its present condition, cannot support the water needs for the projected energy development. The modeling performed by the Yampa/White/Green Basin Roundtable indicates that significant shortages of water for energy development are expected if additional water supplies are not developed in the White River (WWG, 2018).

The Colorado River basin is also presently facing unprecedented drought conditions with the water levels in Lake Powell approaching critical levels. In response, the Drought Response Operations Plan includes the planned release of approximately 500,000 acre-feet of water from Flaming Gorge Dam in 2022 with other reservoir releases possible in upcoming years (USBR, 2022-4). Climate change is expected to reduce annual flow volumes in the Colorado River basin in the future and lower flows have already been documented in recent years. As a result of the current low water level in Lake Powell and the ongoing drought, a Colorado River Compact curtailment is likely in the near future.

Administration of the lower White River is expected in the future. With administration, junior water rights are expected to be curtailed during lower flow periods of the year. Unless additional water supplies become available, there will be some junior water users that will lose some or all of their water and the aquatic habitat in the region will be harmed.

1.4 Kenney Reservoir History

1.4.1 Original Purpose and Description

The RBWCD is responsible for the operation, maintenance and management of Taylor Draw Dam, the Taylor Draw Hydroelectric Facility, and Kenney Reservoir, including associated recreational amenities.

In July of 1980, Water Users Association No. 1 submitted an application to the U.S. Army Corps of Engineers for a permit to develop the Taylor Draw Reservoir Project, pursuant to Section 404 of the Clean Water Act. According to the EIS completed for the project: "The basic purpose of the Taylor Draw Reservoir is to provide a dependable municipal and industrial water supply to water users within the boundaries of Water Users' Association No. 1, including the Town of Rangely, to provide needed flood control, recreation, and a source of hydroelectric power in the future." (USACE, 1982). Chapter 1 of the EIS for Taylor Draw Dam, the Purpose and Need chapter, states the following:

1. Water supply for Rangely: "Population estimates project the present population of the Town of Rangely to increase 1.5 to 3-fold during the twenty-year planning period ending in the year 2000. During the severe drought of 1977, the Town of Rangely experienced a shortage of domestic water. The Town of Rangely hopes to insure a dependable water supply through the construction of a dam and reservoir. The surrounding area is the focus of energy related development, and rapid growth is expected as resources are developed. Development of these resources will require a dependable industrial water supply. Since the Taylor Draw Dam EIS was prepared in the early 1980's the Town of Rangely has experienced a long-term boom and bust population growth that is typical for Northwestern Colorado."

2. Flood control: "Areas along the White River in western Rio Blanco County, including the Town of Rangely, were flooded periodically when ice jams block the flow of the river. Frequency of flooding is once every 7 to 10 years. Large thunderstorms have also resulted in flooding of the downtown area of Rangely. A dam upstream from the town would act to moderate diurnal flows and inhibit ice movement to reduce the flood potential."

3. Recreation: "No water-based recreation facilities exist in the proximity of the Town of Rangely. The closest facility is Rio Blanco Lake, 35 miles (56 km) to the east. The people of Rangely have expressed a desire for water-based recreation closer to town by supporting a bond issue to finance a Taylor Draw Dam."

Taylor Draw Dam was completed in 1983, creating Kenney Reservoir. The Town of Rangely is located about six miles downstream of Kenney Reservoir as shown on Figure 1-4.

Figure 1-4: Location Map of Kenney Reservoir and Taylor Draw Dam

In 1991, Taylor Draw Dam was modified to safely route the Probable Maximum Flood (PMF) as a condition of obtaining the required FERC hydropower license. The hydroelectric facility was constructed and started operating in 1993.

When originally constructed, Kenney Reservoir had a normal storage volume of 13,800 acre-feet of water, a surface area of 650 surface acres, and a planned effective life expectancy of 30 years. Since its construction, on-going reservoir sedimentation has reduced both the storage capacity and the surface area of the Reservoir. Reservoir sedimentation challenges at Kenney Reservoir are discussed further in Section 1.4.3.

1.4.2 History of Project Benefits

Kenney Reservoir provides a wide variety of benefits to the RBWCD; the residents of Rangely and Rio Blanco County; and visitors to northwest Colorado. These benefits include recreational opportunities, hydropower generation, and water supply and storage. Each of these benefits are described below.

Recreation: The RBWCD manages recreational amenities at Kenney Reservoir, including picnic areas, a handicap accessible fishing pier, public restrooms, modern boat ramp, undeveloped boat ramp, campground, primitive camping, two swim areas, numerous floating docks, boat mooring for day use, and wildlife viewing areas.

The RBWCD does not keep records of visitor days but does record fees collected from the sale of boating passes and camping passes. Changes in annual revenues from fees can be used to estimate changes in recreational use and visitor days. Over the past 10 years, fee revenues generated by recreational activities and visitation at Kenney Reservoir have increased by over six percent per year. Increasing visitation to Kenney Reservoir is likely due to a general increase in interest in outdoor recreation, growing regional population bases and lack of alternative water-based recreational amenities in northwest Colorado. That trend in visitation, in combination with decreasing reservoir surface acreage available, has resulted in crowding at Kenney Reservoir. A detailed discussion of recreational activity at Kenney Reservoir is provided in Section 5 of this report.

Hydroelectric power generation: The 2-megawatt (MW) Taylor Draw Hydroelectric Facility was constructed in 1993 and became fully operational in June of that same year. The facility is a run-of-the-river project; the hydroelectric generator is capable of variable power output matching the flows of the White River. The facility is occasionally shut down as a result of low flows in the White River or general maintenance on the facilities. In the future, the RBWCD is likely to place a call on the White River for their decreed 745 cubic feet per section (cfs) direct flow water rights to generate power; however, in the past, during these periods the RBWCD has elected to shut the hydroelectric plant down when the flows are too low instead of forcing upstream junior water users to cease diversions. The Taylor Draw Project's FERC licensing documents include a stated purpose of generating an estimated average 11,225,000 kilowatt hours of energy per year (FERC, 1987). Since becoming operational in 1993, annual production has ranged from about 8.5 million kilowatt hours to about 15.8 million kilowatt hours. The hydroelectric facility provides up to 30 percent of the energy for Rangely.

Water supply storage for Rangely: The design of Taylor Draw Dam included a bifurcation on the outlet works to a 24-inch-diameter blind flange that could be connected to a water supply pipeline for the Town of Rangely. Since that time, Rangely has constructed a diversion from the White River to directly convey White River flows to its water treatment plant located upstream of the Town. Although the water supply pipeline was never constructed, providing water supply storage for the Town of Rangely was always part of the original purpose of Kenney Reservoir. Due to the reservoir sedimentation challenges described in Section 1.4.3 below, water storage for the Town of Rangely is no longer available, with the 2,100 acre-foot dedicated dead pool for recreation (USACE, 1982).

1.4.3 Reservoir Sedimentation

In 1988, a bathymetric survey was performed at Kenney Reservoir to obtain underwater topographic information about the accumulated sediment since its first filling in 1985 (GEI, 1999). According to this survey, the reservoir volume below the spillway decreased from 13,800 acre-feet in 1985 to 9,400 acre-feet in 1999, resulting in an average sediment accumulation rate of 315 acre-feet per year. The 1985 surface area of Kenney Reservoir was approximately 650 acres while the 2018 surface area, obtained from a 2018 aerial photograph in ArcGIS, was reduced to approximately 264 acres. This is almost a 60% reduction in surface area. Due to the ongoing reservoir sedimentation, Kenney Reservoir was estimated to have a 2022 storage capacity of

about 2,145 acre-feet of water, with approximately 194 surface acres[1] available for flatwater recreation. The original two-mile-long reservoir has been reduced to less than one mile of open water. The upper mile of the original reservoir has been transformed into very diverse wetlands, which are no longer available for open flatwater recreation. Figure 1-5 below depicts the surveyed reservoir sedimentation at Kenney Reservoir in 1998, and an estimate of the additional reservoir sediment accumulation from 1998 to 2018.

As discussed further in Section 5.1 of this report, ongoing reservoir sedimentation at Kenney Reservoir will continue to reduce flatwater recreational opportunities for northwest Colorado residents and visitors. As open water storage in Kenney Reservoir continues to be reduced, the ability to store water for the Town of Rangely and other local water uses is also reduced.

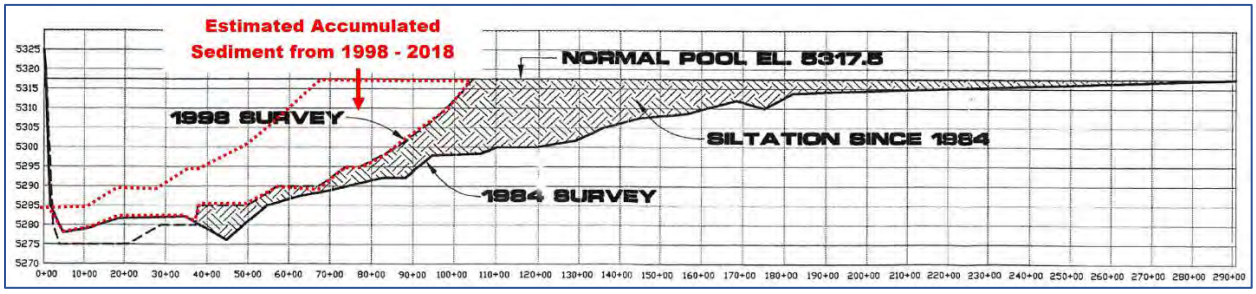


Figure 1-5: Kenney Reservoir Sedimentation Profile (GEI, 1998)

1.4.4 Taylor Draw Water Right

The RBWCD owns the following absolute water rights associated with Taylor Draw Dam (08CW140, 2008):

1. Rangely Power Conduit - a direct flow right in the amount of 620 cfs with an appropriation date of July 3, 1962, for power production in the 2-megawatt Taylor Draw Hydroelectric Generating Facility;
2. Taylor Draw Power Conduit - a direct flow right in the amount of 125 cfs with an appropriation date of October 22, 1982, for hydropower generation in said facility;
3. Taylor Draw Reservoir (a.k.a. Kenney Reservoir) - a storage right in the amount of 13,800 acre-feet, with an appropriation date of July 3, 1962, for power generation in said facility; and
4. Taylor Draw Reservoir, Second Filling - a storage right for 3,550 acre-feet for hydroelectric power generation.

The RBWCD has additional conditional water rights at Taylor Draw Dam for the following beneficial uses: additional hydropower generation, manufacturing, irrigation, domestic, municipal, stock watering, piscatorial, and other.

[1] Estimates are based on application of the average annual rate of sedimentation to the surface area calculated by the 2018 aerial imagery.

1.5 Available Water Supply in the Lower White River

1.5.1 River Flows and Existing Water Supplies

The White River basin in Colorado has limited water storage, resulting in water users being largely dependent on the natural flows in the White River.

The White River flows into the Green River south of Vernal, Utah. As shown on Figure 1-2 above, the USGS has a streamflow gage on the White River near Watson, Utah. As shown on Figure 1-6 below, the annual volume of water measured at the Watson streamflow gage varies significantly, ranging from a minimum annual volume of about 209,000 acre-feet to a maximum of about 1,275,000 acre-feet, with the average annual volume being about 489,000 acre-feet (USGS, 2021).

Based on the information shown on Figure 1-6, the average annual volume of water measured near Watson, Utah has decreased by an average of 123,000 acre-feet when comparing the 20-year average from when the streamflow record began (1924-1943) to the most recent 20-year period (2001-2020). This decrease in water volume is likely attributable to climate change or aridification, which are further explained in Section 9.2.

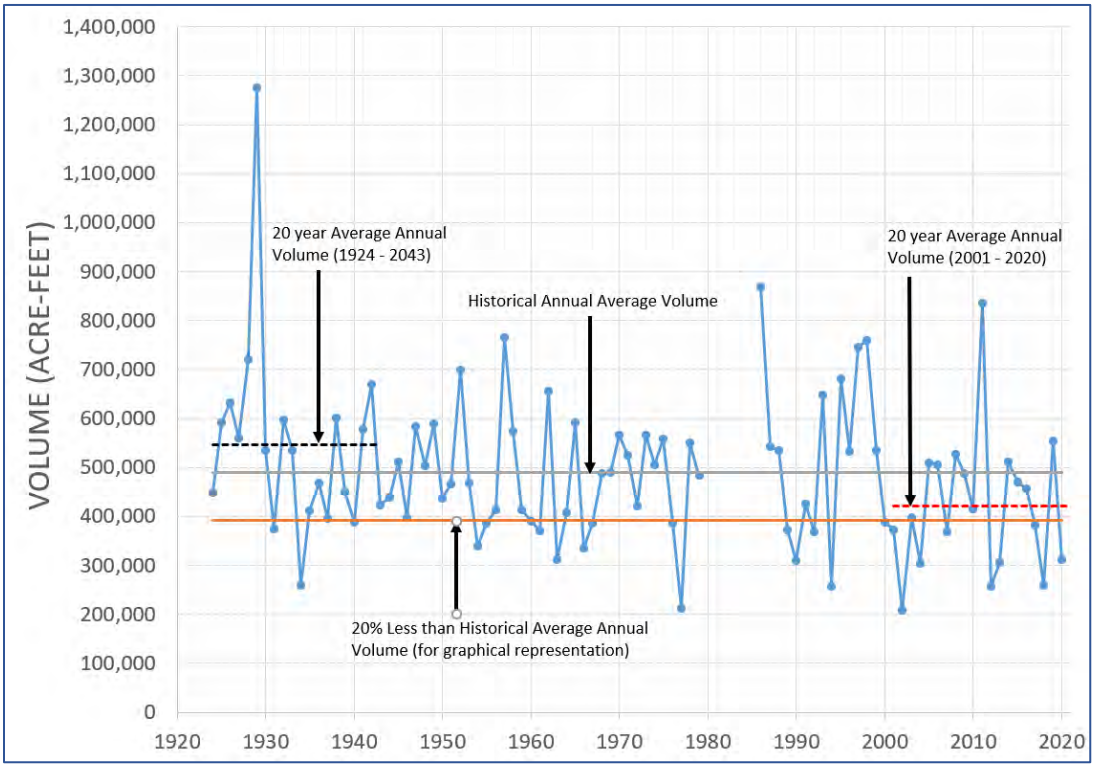
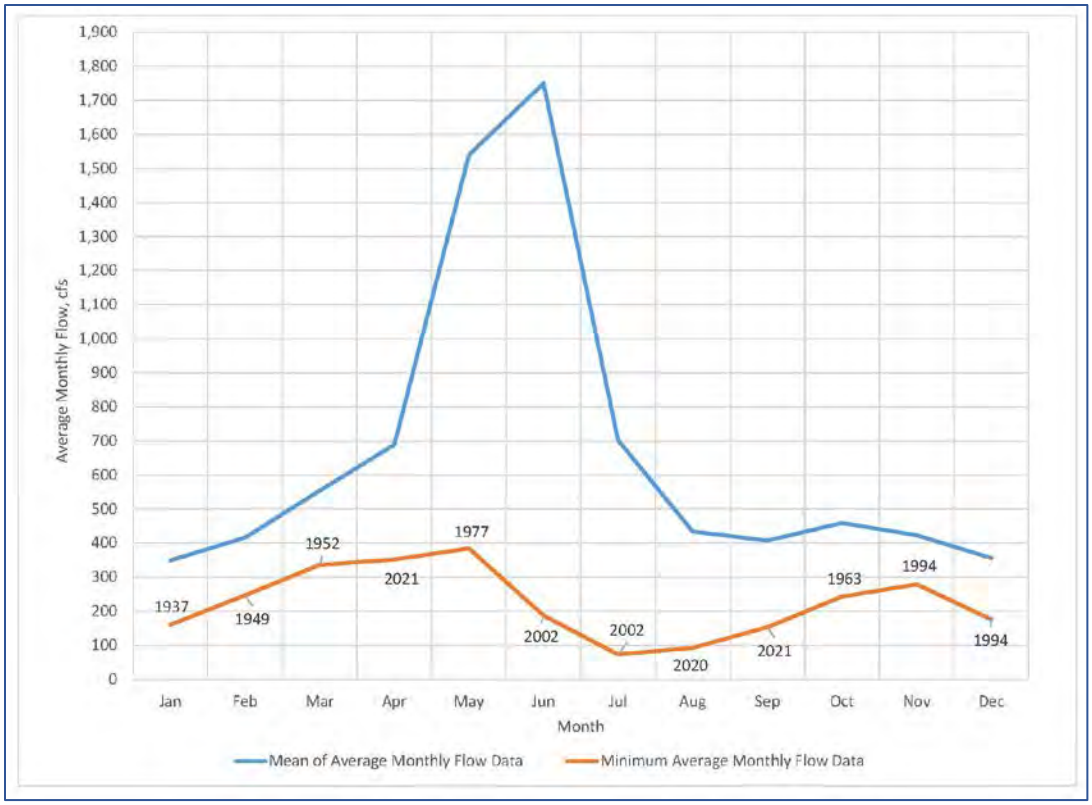


Figure 1-6: Annual Volume of Streamflow Measured in the White River at Watson, Utah

A majority of the White River flows result from snowmelt from April through June. Flows in the White River decrease significantly in the late season irrigation months. Figure 1-7 shows the monthly variability of the White River flows.



Note: Based on streamflow data at the USGS Watson Gage (USGS, 2021) from 1923 – 2021, with the exception of 1979 to 1985 when flow data was missing from the record.

Figure 1-7: Monthly average streamflow measured in the White River at Watson, Utah

1.5.2 Water Rights and Water Availability

Historically, the lower White River has not been administered by the Colorado Division of Water Resources (Colorado DWR) due to a lack of water rights calls, but more extensive White River administration will likely occur in the future. The RBWCD has been water short for seven out of the past 10 years, but has intentionally not exercised a call so that upstream water users can continue diverting. More extensive administration on the White River will result in a greater number of junior water users not being able to use their water when needed unless an augmentation source of water is available for out-of-priority depletions. In March 2020, the Colorado DWR Division 6 Engineer issued a "Notice for Installation of Headgates and Measuring Devices" requiring owners of diversion structures located within the White River basin to install headgates or measuring devices (Sackett, 2020; Colorado DWR, 2020). From 2012 to 2020, there were between eight and 182 days of water calls per year on Piceance Creek, a tributary to the White River. Once a tributary that supplies water to the lower White River is administered, it is only a matter of time before administration begins on the mainstem.

There are more than 1,635 cfs (1,183,686 acre-feet per year) in conditional water rights on the White River not owned by the RBWCD, ranging in amount from 55 cfs to 200 cfs (CWCB/DWR, 2021). The development of a just a few of these water rights will trigger administration of the White River and its tributaries. When this happens, junior water right holders would be unable to divert

water to meet their needs. For simplicity, conditional water rights with flow rates of less than 55 cfs were excluded from this total, but there are numerous additional water rights of less than 55 cfs (CWCB/DWR, 2019).

1.5.3 Existing Water Storage on the White River

Three water storage reservoirs are located in the White River basin: Kenney Reservoir, Lake Avery, and Rio Blanco Reservoir. As described in Section 1.3, no significant water storage is expected to remain in Kenney Reservoir by 2029 due to the ongoing reservoir sedimentation. Rio Blanco Reservoir and Lake Avery, are located further upstream. Both of those reservoirs are owned and managed by Colorado Parks and Wildlife, primarily for recreation, and have limited storage volumes of 1,036 acre-feet at Rio Blanco Reservoir and 7,700 acre-feet at Lake Avery. None of the existing White River storage reservoirs have decreed water rights that can be used for augmenting current supplies.

2.0 PURPOSE AND NEED SUMMARY AND STATEMENT

The purpose of the White River Regional Water Supply Project (WRRWSP) is to meet the different needs of water users in the White River basin with approximately 66,720 acre-feet of a new water supply, coordinated by the Rio Blanco Water Conservancy District (RBWCD). This new water supply will meet a portion of the current and reasonably projected future additional water supply needs in the basin, including the replacement of the uses provided by Kenney Reservoir.

There are six regional water needs in the basin, summarized below in no particular order of importance:

1. **The municipal water supply need** – The Town of Rangely needs a water supply of 3,895 acre-feet. This includes a prudent planning three-year drought water supply of 2,160 acre-feet of new municipal demand by the year 2070 plus the replacement of 1,735 acre-feet of municipal water storage lost to reservoir sedimentation from the Taylor Draw Project (Kenney Reservoir). Refer to Section 3 for additional information.
2. **The hydropower need** – There is a need for up to 142,266 acre-feet of water to satisfy the RBWCD's direct flow water rights of 745 cubic feet per second (cfs) for hydropower generation and to replace water storage lost at Kenney Reservoir. Refer to Section 4 for additional information.
3. **The need for flatwater recreation** – There will be a complete loss of flatwater recreation at Kenney Reservoir by 2029, contributing to a growing need by 2070 for flatwater recreation in the northwestern Colorado of 2,530 surface acres. Refer to Section 5 for additional information.
4. **The Colorado River Compact curtailment need** – There is substantial risk of a Colorado River Compact curtailment that will impact water users with rights junior to 1922. The RBWCD needs a water supply of 35,664 acre-feet to protect these junior water users in the White River basin. Refer to Section 6 for additional information.
5. **The agricultural water supply need** – Basin irrigators have experienced annual shortages on existing irrigated lands averaging about 2,400 acre-feet per year since 1950. In an average year, the projected agricultural gap is expected to increase to about 3,500 acre-feet per year. The annual gap may be as great as 9,150 acre-feet under drought conditions. Refer to Section 7 for additional information.
6. **The need for environmental flows for federally listed fish species** - The White River provides habitat for endangered and threatened fish species. Ongoing basin planning has identified the need for up to 27,778 acre-feet annually for water supply at the White River Watson Gage to provide the environmental flows to benefit and contribute to the recovery of these fish species. Refer to Section 8 for additional information.

3.0 MUNICIPAL WATER NEEDS

3.1 Rio Blanco County Municipal Water Providers

The Towns of Rangely and Meeker are the only incorporated municipal jurisdictions in Rio Blanco County. This section of the report documents the need for water to offset potential future water shortages, maintain water quality, and to replace the Town of Rangely's lost Kenney Reservoir storage. The Town of Rangely relies completely on direct flow surface water rights from the White River. Rangely's current average annual demands amount to 1,031 acre-feet per year (Rangely, 2019).[2] During dry years, demands increase by about 10 percent, reaching 1,134 acre-feet per year.

The Town of Meeker relies on alluvial groundwater supplies which it believes are sufficient to meet the current and future water demands. As a result, Meeker is unlikely to require other future water supplies (Meeker, 2008; Meeker, 2015). However, as described in Section 4, a future Taylor Draw Power call would require some alluvial wells in and around Meeker to stop pumping. Augmentation water could be used to prevent curtailment of this alluvial well water. Augmentation water is described in more detail in Section 4.2 of this report.

3.2 Town of Rangely's Future Water Demands

Harvey Economics (HE) performed water demand projections for the Town of Rangely for this report through the year 2070. Low population growth, 0.3 percent per year, and high population growth, 1.3 percent per year, scenarios were developed based on data provided for Rio Blanco County in the Colorado Water Plan's Technical Update (CWCB 2019).[3] A constant per capita water use rate of 234 gallons per capita per day (GPCD) was applied to population projections under each scenario based on previous evaluations prepared for the town (SGM, 2010). [4] That GPCD rate was calculated using Rangely's average annual water deliveries at the tap between 2005 and 2009 and the Town's 2010 population. This relatively high GPCD rate is at least partially explained by the water used by Colorado Northwestern Community College students and energy industry workers; however, those largely transient groups are not included in the Town's population count.

In addition to population-based water demands, raw water irrigation demands supplied by the Town of Rangely are included in the Town's water demand projections. Future irrigation demands assume outdoor use of 0.16 acre-feet per person between the months of June and September, based on the historical irrigation patterns seen between 2010 and 2013 (WestWater, 2014). The

[2] Annual demands include treated and raw water deliveries.

[3] The low population growth assumption reflects the Business as Usual scenario; the high population growth rate assumption reflects the Adaptive Innovation scenario. Descriptions of each water plan scenario are provided in Appendix A.

[4] GPCD calculation reflects treated water demands only.

following losses were applied to determine demand projections at the diversion point (Rangely, 2010; SGM, 2010)[5]:

1. 11 percent distribution system losses;
2. 2 percent treatment system losses; and
3. 2 percent conveyance losses

Tables 3-1 and 3-2 summarize average water demand projections for the Town of Rangely through 2070 under low and high growth scenarios. Future average year water demands are expected to range from about 1,280 acre-feet under the low growth scenario up to 2,180 acre-feet under the high growth scenario. The mid-point of that range is about 1,730 acre-feet.

Table 3-1: Projected Rangely Low Population Growth Scenario Water Demands (Average Year)

Year	Population	Treated Demands (Tap) (acre-feet)	Treated Demands (Diversion) (acre-feet)	Irrigation Demands (Tap) (acre-feet)	Irrigation Demands (Diversion) (acre-feet)	Total Demands (Tap) (acre-feet)	Total Demands (Diversion) (acre-feet)
2050	2,552	669	783	404	412	1,073	1,195
2070	2,730	716	838	432	441	1,148	1,279

Note: Distribution, treatment and conveyance losses were applied to treated demands at the tap. Conveyance losses only were applied to irrigation demands at the tap.

Table 3-2: Projected Rangely High Population Growth Scenario Water Demands (Dry Year)

Year	Population	Treated Demands (Tap) (acre-feet)	Treated Demands (Diversion) (acre-feet)	Irrigation Demands (Tap) (acre-feet)	Irrigation Demands (Diversion) (acre-feet)	Total Demands (Tap) (acre-feet)	Total Demands (Diversion) (acre-feet)
2050	3,585	940	1,100	568	579	1,508	1,679
2070	4,657	1,121	1,429	737	752	1,858	2,181

Note: Distribution, treatment and conveyance losses were applied to treated demands at the tap. Conveyance losses only were applied to irrigation demands at the tap.

The water demand projections presented in Tables 3-1 and 3-2 are likely to be higher in a dry year, by as much as 10 percent, according to the Town. Thus, year 2070 dry year demands for Rangely are projected to be about 1,400 ace-feet for the low growth scenario to about 2,400 acre-feet for the high growth scenario. The average of this range is 1,900 acre-feet.

In an average year, Rangely's 2070 water demands are projected to be about 1,730 acre-feet (based on the mid-point of the low and high growth projections), an increase of about 660 acre-feet over current average year demands (Table 3-3). In a dry year, the Town's 2070 water

[5] Treatment and distribution losses were not applied to irrigation demands.

demands are projected to be about 1,900 acre-feet, an increase of about 720 acre-feet over current dry year demands.

Table 3-3: Projected Increases in Rangely's Water Demands at the Point of Diversion

	Current Diversion Demands (acre-feet)	2070 Diversion Demands (Mid-Point) (acre-feet)	Increase from Current (acre-feet)	Increase from Current (%)
Average Year	1,072	1,730	660	61.3%
Dry Year	1,181	1,900	720	61.2%

Notes: The mid-point reflects the median projected water demands under the low and high growth scenarios in an average year and in a dry year.

3.2.1 Existing Municipal Water Storage

The loss of water storage in Kenney Reservoir will result in the loss of water storage for the Town of Rangely. At the time of the original Taylor Draw Dam development, Rangely was allocated 1,735 acre-feet of water storage in Kenney Reservoir (USACE, 1982). That storage volume is no longer available considering the estimated storage capacity in Kenney Reservoir is about 2,145 acre-feet in year 2022, with a 2,100 acre-foot dedicated dead pool for recreation (USACE, 1982).

Rangely currently has storage reserves of 2.575 million gallons of treated water but uses more than one million gallons per day in a dry year (Rangely, 2010). Rangely currently cannot divert directly from the White River when it is out of priority. As a result, in a dry year, the Town Rangely could be out of water in less than three days.

3.3 Summary of Municipal Water Needs

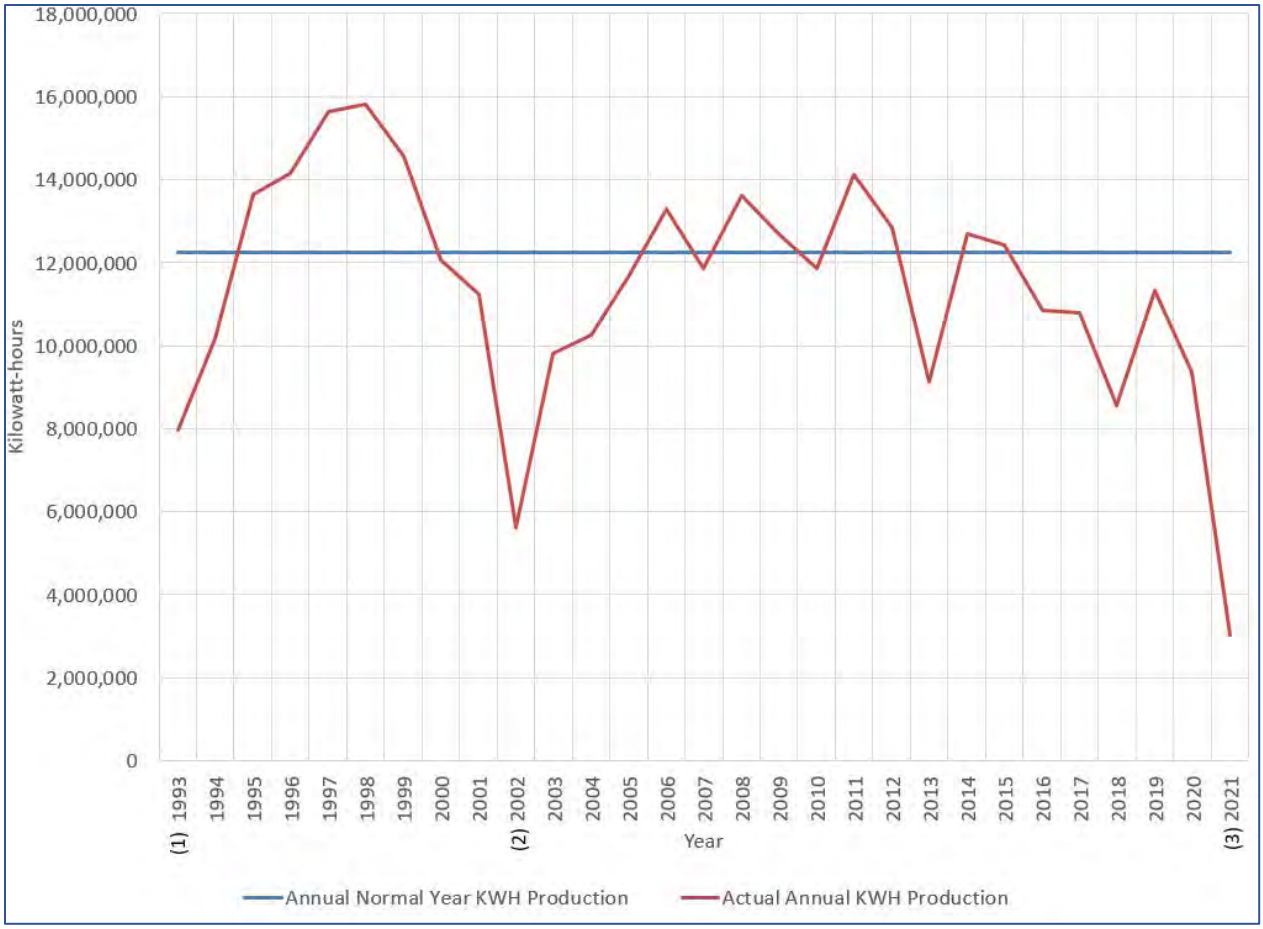
Within the White River basin, the Town of Rangely can be expected to have unmet municipal water needs by 2070. By that year, the Town will need approximately 720 acre-feet of additional supplies to meet new demands in a dry year. Given the lack of adequate storage and increased growth, Rangely needs three years of additional supply, or approximately 2,160 acre-feet of new water supply, to meet increased future demands. Planning for a three-year drought is a standard, prudent planning practice for many municipalities in Colorado. In addition to new supplies, Rangely will also need to replace the 1,735 acre-feet of storage lost to reservoir sedimentation in Kenney Reservoir. As a result, the total municipal water supply need for the Town of Rangely is 3,895 acre-feet.

4.0 TAYLOR DRAW DAM HYDROPOWER NEEDS

The two direct flow rights for hydropower generation at Taylor Draw Dam total 745 cfs, as described in Section 1.4.4. When flows in the White River are less than 745 cfs, the RBWCD has a legal right to place a call for the amount of water needed to fulfill their water rights. The RBWCD water rights also allow for the use of water stored in Kenney Reservoir for hydropower generation. It should be noted that the RBWCD hydropower water rights at Taylor Draw Dam are also referred to as the Rangely Power Conduit, Taylor Draw Power Conduit, and Taylor Draw Reservoir water rights.

The RBWCD has historically operated the Taylor Draw Hydroelectric Project under an informal "good neighbor" policy. Although White River flows have not permitted complete fulfillment of the RBWCD's water rights in most years, the RBWCD has not elected to exercise their Taylor Draw Power water rights because, if they put a water right call on the river, their upstream, junior water rights holder neighbors would be forced to stop diverting water until water rights at Taylor Draw were fulfilled. As documented in Section 1.4.3, water storage in Kenney Reservoir is continually being reduced by reservoir sedimentation, which further limits hydropower production.

The RBWCD documents the electric energy generated and water flow passed through the turbine, spillway, and bypass on a daily, monthly, and annual basis. The normal water year annual production has been estimated to be 12,237,518 kilowatt-hours (KWH) of clean energy (BBC, 1996). As shown on Figure 4-1 below, the annual KWH generated at Taylor Draw has been less than the "normal" annual KWH production since 2016. The RBWCD has produced less energy due to decreased White River flows and because they have not placed a call on the river to exercise their water right.



Notes:

(1) Full production at the facility began in June 1993.

(2) In 2002, the facility shut down between mid-June and November due to drought and necessary repairs.

(3) In 2021, the facility shut down between late April and October for generator repairs.

Figure 4-1: Annual Gross Kilowatt-Hour Production from the Taylor Draw Hydroelectric Facility

The annual water shortage that the RBWCD has experienced over the last several years was calculated. Based on the RBWCD's water rights at Taylor Draw Dam, if there is less than 745 cfs in the White River, the RBWCD can place a river call. Presently the RBWCD operates the hydroelectric plant at a flow of about 705 cfs. For purposes of this analysis 705 cfs was assumed to be the flow rate for which RBWCD would call. A call will result in upstream water users that are junior to the RBWCD's 1962 and 1982 water rights to cease diversions until the RBWCD's direct flow water rights are satisfied. The upstream direct flow water rights in the White River basin that are junior to 1962 total about 229 cfs (CWCB/DWR, 2021; Hydros, 2020). For each day from January 1, 2016 through December 31, 2021, the average daily flow through the turbine was calculated based on the 15-minute flow data provided by the RBWCD. If the average daily flow through the turbine was less than 705 cfs, it was assumed that the RBWCD could call for up to a total of 229 cfs, or the fraction thereof, to meet the 705 cfs daily maximum flow. The flow that could have been called for each day was summed and converted to acre-feet. During periods

when the hydro facility is shut down for maintenance, it is assumed that no water was needed. The total annual shortage of water that the RBWCD experienced from 2016 through 2021 is summarized in Table 4-1. It should be noted that in 2021, the hydro facility was shut down for maintenance from April to October.

The RBWCD has a first fill water right of 13,800 acre-feet and a second fill water right of 3,550 acre-feet, both of which are absolute for hydropower generation; refer to Section 1.4.4 for further information on the water rights. Kenney Reservoir currently has limited water storage available for hydropower generation thus further exacerbating the RBWCD water shortage. The amount of water lost for hydropower generation due to reduced water storage in Kenney Reservoir is not presented in this report, but would increase these expected shortages by as much as 17,350 acre-feet.

Table 4-1: Estimated Shortage of Water at Taylor Draw Power Conduit Intake

Year:	2016	2017	2018	2019	2020	2021
Estimated RBWCD Water Shortage for Taylor Draw Hydroelectric Power Generation (acre-feet)	92,897	118,699	142,266	109,914	128,822	79,885

Based on Figure 4-2 below, the periods that the RBWCD is low in KWH production generally occur in August and September and during the winter months. Those are times when additional water could be used at Taylor Draw to increase the power production. August and September are also the periods when White River flows are the lowest and when junior upstream irrigators have the greatest need. As a result, placing a call on the White River to increase power production at Taylor Draw Dam would result in a shortage of volume for junior water users since an augmentation source is not presently available. For example, YJWCD reported that if the Taylor Draw Dam power conduit water right was exercised, 83 permitted wells and 574 decreed wells within their district could be shut down (Applegate, 2016). The water from these junior wells was not quantified in Table 4-1, but including these in the calculations would increase the documented shortage.

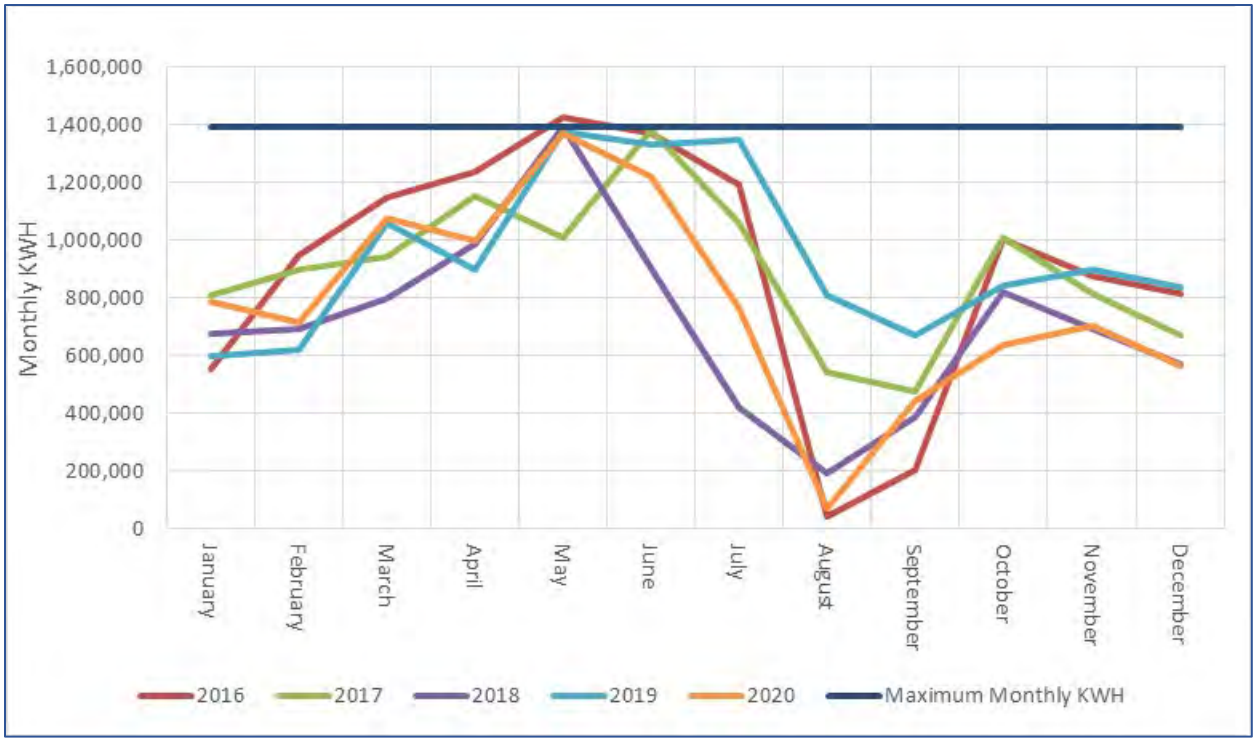


Figure 4-2: Monthly KWH generated at Taylor Draw Power Conduit

4.1 Summary of Taylor Draw Dam Hydropower Needs

In sum, the RBWCD has not, in the past, produced all of the hydroelectric power that it might have due to insufficient water volumes. In the future, the RBWCD intends to produce additional power for sale and has the water rights and facilities to do so. Based on the data provide in Table 4-1, there is a need for up to about 142,266 acre-feet of water to satisfy the RBWCD's direct flow water rights of 745 cfs for hydropower generation. However, the years evaluated, 2016 through 2020, are not as dry as other years, such as 2002 when the volume of water at the Watson Gage was less than 43 percent of average. A persistent drought of several years would show shortages in excess of what is shown for the years of 2016 through 2020. Furthermore, due to the sediment build-up in Kenney Reservoir, the RBWCD is losing storage reserves that could be used to generate power in accordance with their first and second filling absolute water rights.

4.2 Water Augmentation

Water augmentation is the common mechanism for meeting the junior water right needs as well as hydropower needs along with the other unmet needs described later in this report. An explanation of water augmentation follows.

Water rights in Colorado are unique when compared to other states. The use of water is governed by what is known as the Prior Appropriation Doctrine. This system of water allocation controls who uses how much water, the types of uses allowed, and when water can be used. A simplified way to explain this system is often described as "first in time is first in line." Unlike other western

states, a water user in Colorado must obtain a legal water rights decree from a Colorado Water Court to establish the appropriation date, the location of water diversions, types of water uses, and amounts that can be used. These court decrees are used by the Colorado DWR to administer water use in the State, including the White River. If there is not enough water available in the White River for a senior water rights holder to use the amount of water to which they are entitled per decree, a water user can ask the Colorado DWR to place a "call" on the river. When a call is placed, upstream water rights that are junior to the calling water right must stop diverting and using water until the calling water rights user's decreed is satisfied, or the junior right must have what is called an augmentation plan.

One of the decreed uses of water in Colorado is for augmentation, which is commonly referenced as a "substitute water supply." Under Colorado water law, augmentation refers to a detailed program to increase the supply of water available for beneficial use by the development of a substitute or replacement water supply. Junior water users must either curtail their diversion or have decreed augmentation plans that allow them to divert water when they are out of priority by replacing the water from another source of water, such as water stored in a reservoir, so that senior water users are not injured by the junior water right holder's diversions. One of the decreed uses of the RBWCD's water rights is for water augmentation (RBWCD, 2021-3). The RBWCD could provide augmentation water for junior water users in the RBWCD, the YJWCD, and Rio Blanco County based on the previously executed agreements that are documented in Section 1.2.

Many of the water rights in the White River basin are relatively junior and could be in jeopardy in the event of a water rights administrative call by either the Taylor Draw Power Conduit, a more senior water user, or potentially a Colorado River Compact curtailment. A water rights call could occur for numerous reasons including:

1. Increased water demands by more senior water right holders; or
2. Drought, aridification, or climate change resulting in reduced White River flows.

A few examples of how augmentation plans on the White River could operate by using additional water storage within the White River basin to minimize water user impacts include:

1. An existing water user in the Meeker area, within the YJWCD, diverts water for irrigation during the spring, summer, and early fall months. Their water right has an adjudication date of 1963. The Taylor Draw Power Conduit, with an adjudication date of July 3, 1962 places a call on the White River when flows in the White River are low in August. The water user with a 1963 water right would either have to cease diversions and risk losing their crops or they could contract for augmentation water, to provide an equivalent amount of flow in the White River from a decreed water augmentation source that would allow them to continue to divert and not lose their crops for that year.

2. A new water user has identified a need for diversions from the White River and applies for a 2022 water right decree. In the future, there is not enough water in the White River to satisfy a more senior existing water right on the river. A water rights call is placed on the

White River to curtail any diversions from water rights that are junior to 2021. The new water user would either have to cease diversions or have a contract for augmentation water where releases could be made from a substitute supply source to provide an equivalent flow in the White River. This would allow the new user to divert water under their 2022 water right.

3. The state water officials begin administration of un-decreed ponds or junior fishing or stock ponds. An augmentation plan could provide a source of water to allow these pond uses to continue.

It should be noted that water future needs for rural domestic water users and energy development such as oil shale, oil, and natural gas are expected, but are not explicitly identified in this report. There are more than 1,635 cfs (1,183,686 acre-feet per year) in conditional water rights on the White River, with many of these conditional water rights associated with energy development.

A “blanket” augmentation plan can be formulated to apply to a wide range of existing and future users, and the RBWCD believes this is the most desirable mechanism for meeting the variety of water needs and mitigate the effects of a call.

5.0 FLATWATER RECREATION NEEDS

As a provider of flatwater recreation at Kenney Reservoir since 1983, the RBWCD has observed growing demands for flatwater recreational opportunities from residents in the region and beyond. However, all flatwater recreational activities at Kenney Reservoir are expected to be eliminated by 2029 due to reservoir sedimentation, as discussed in Section 1.4.3. This section of the report describes existing flatwater recreational opportunities at Kenney Reservoir, the loss of recreation at Kenny Reservoir, current and future recreational demands, and future needs for flatwater recreation projected in the next 50 years. Appendix B goes into greater detail on each of these topics.

Existing reservoirs in northwest Colorado and other areas of the West Slope currently experience crowding and are at or near capacity.[6] Moreover, Colorado is expected to see continued increases in demand for outdoor recreational experiences and amenities, including water-based recreation. Currently, more than one million people per year participate in water-based recreation in northwest Colorado in the area surrounding Kenney Reservoir; additional outdoor recreational activity in the region focuses on fishing. By 2070, the number of people recreating in that area is expected to increase by about 34 percent.

The State's goals for recreation include providing high quality, sustainable recreational experiences across the State. The combination of increasing user demands and the desire to continue to offer exceptional recreational experiences suggests that amenities need to be developed across the State to support future demand. There are currently few large reservoirs in that area that offer the variety of activities and amenities that current and future recreators are seeking.

Developed water resources are needed to replace recreational opportunities at Kenney Reservoir and to meet anticipated new water-based recreation and fishing demands in the region.

5.1 Projected Kenney Reservoir Recreation Loss

5.1.1 Historic Kenney Reservoir Recreation Opportunities and Activity Levels

Kenney Reservoir is a popular location for recreation, given the amenities offered and its proximity to the Towns of Rangely and Meeker and other northwest Colorado population centers. The reservoir supports a variety of recreational uses including fishing and motorized water sports, such as boating, jet skiing and water skiing. Hiking, wildlife viewing, hunting, and camping occur at various locations along the shoreline. Figure 5-1 illustrates the locations of various recreational amenities at Kenney Reservoir. The reservoir's depth ranges from relatively shallow to about 35 to 40 feet. Kenney Reservoir has historically been stocked with multiple species of fish.

[6] The RBWCD is not aware of any expansions or major reservoir additions being planned in this area of the State at this time.

Figure 5-1: Kenney Reservoir Shoreline Fishing and Recreational Amenities Map

The RBWCD does not collect data regarding participation in specific activities at Kenney Reservoir. However, motorized water sports appear to be the most popular activities at Kenney Reservoir, followed by fishing (Webber, 2014). According to CPW, Kenney Reservoir is popular with anglers and is currently recognized as an excellent channel catfish, black crappie, and common carp fishery (CPW, 2020-3). Due to historical stocking by CPW, the high likelihood of catching fish attracts anglers to the reservoir.

The RBWCD operates and maintains a marina and a campground at the reservoir. The campground includes 16 camping spots. Kenney Reservoir is also one of two official seaplane bases in Colorado. Seaplane activity at the reservoir supports tourism and recreation, provides access to Rangely, and is included as part of Colorado Northwestern Community College's Aviation Technology Flight Program. Kenney Reservoir has historically offered an area of relative solitude for visitors, although crowding has occurred in recent years as increased visitation continues along with decreasing surface area.

The majority of visitors to Kenney Reservoir are residents of Rio Blanco County, but additional usage comes from more populated areas within Colorado, such as Grand Junction, and even from out of state, including Utah (Webber, 2014). The RBWCD does not collect visitation data, but does keep records of fees collected from the sale of boating passes and camping passes. Over the last 10 years (2011 to 2021), recreational activity fees increased by about 79.5 percent, or by about six percent per year.[7] Recreational activity at Kenney Reservoir has remained generally constant, increasing in recent years, even as the water surface area decreased. This is likely due to the lack of regional alternatives to recreation options that are available at Kenney Reservoir.

[7] In 2020 and 2021, RBWCD saw record high fee revenues from recreation at Kenney Reservoir, which may be due, in part, to the effects of the COVID-19 pandemic and increased interest in outdoor activities.

HE estimated boating and camping activity days at Kenney Reservoir based on fee data, interviews, and professional experience. Prior to 2020, boating and camping activity at Kenney Reservoir ranged from an estimated 2,310 to about 4,100 activity days.[8,9] In 2020, the RBWCD saw a dramatic increase in recreational use at Kenney Reservoir, with an estimated 4,700 activity days, an increase of about 57 percent over 2019. Boating and camping activity at the reservoir continued to increase in 2021, reaching 5,160 activity days, an increase of approximately 10 percent. Reduced surface area in combination with increasing visitation can result in a diminished recreational experience, as discussed in Section 5.1.2.

As shown on Figure 5-1, multiple recreational fishing spots are located along the shoreline of Kenney Reservoir which do not require a boating or camping pass, so shoreline fishing activity data is unavailable. Therefore, estimates of boating and camping activity days underestimate the total recreational activity supported by Kenney Reservoir.

Figure 5-2 provides some recent photos of the recreational activities at Kenney Reservoir, including boating, tubing, paddleboarding, scuba diving, and seaplane use.

[8] Estimates of activity days will be conservative if each annual boating pass is associated with a large number of boating activity days.

[9] Recreational activity days at Kenney Reservoir fluctuate from year to year; estimates in some years are known to be low due to theft of fees in those years.

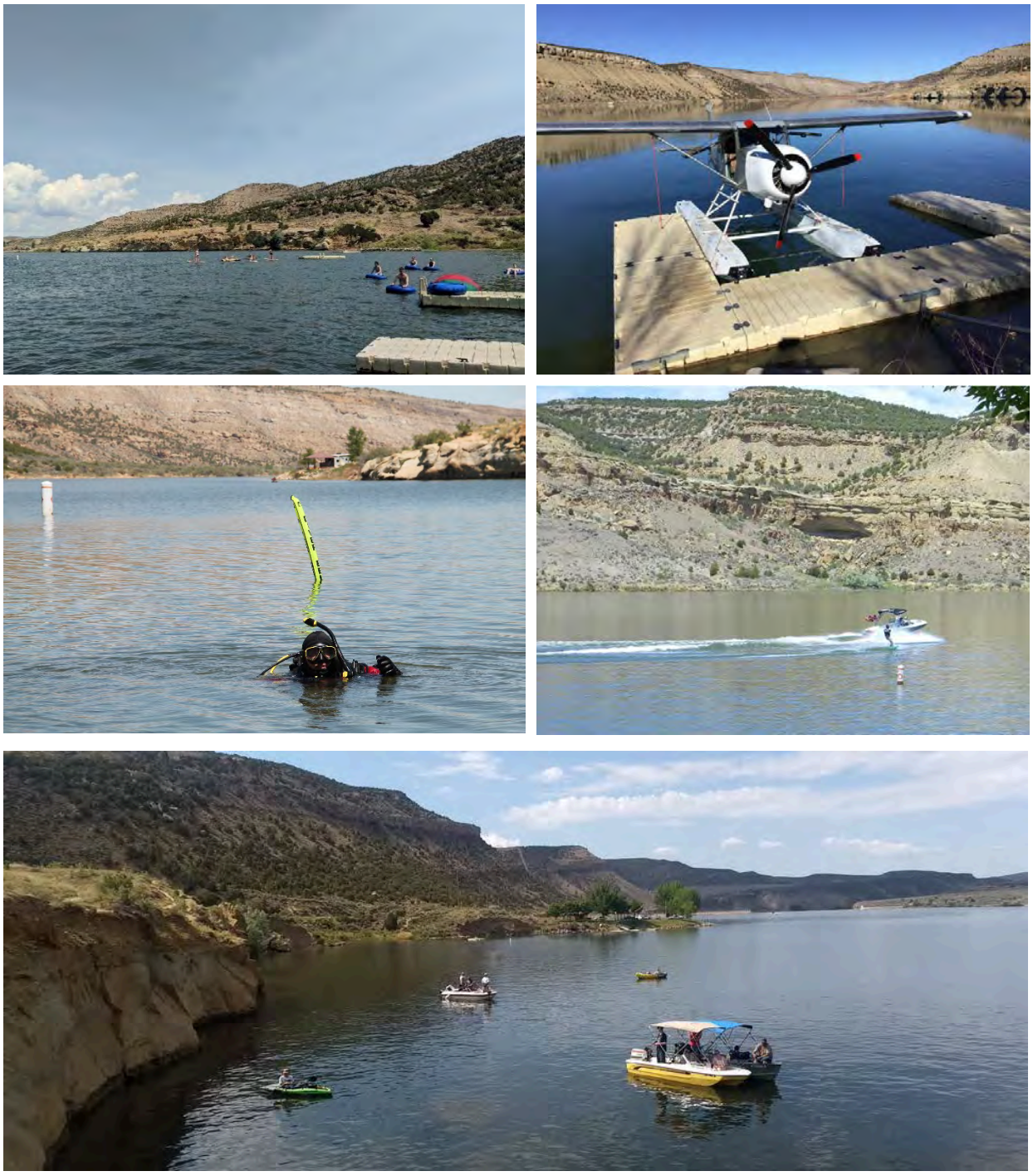


Figure 5-2: Recreational Activities at Kenney Reservoir

5.1.2 Effects of Reservoir Sedimentation on Recreational Opportunities

As described in Section 1.4.3, Kenney Reservoir is experiencing a dramatic reduction in flatwater recreation area due to continued reservoir sedimentation. The surface area available for recreation is currently less than one-third of what it was when Kenney Reservoir was initially filled. The surface area of Kenney Reservoir was approximately 650 acres in 1985 and was estimated

to be only about 194 surface acres as of 2022. Reductions in surface area result in increased crowding for recreational users at Kenney Reservoir over time, affecting both the recreational experience and the types of recreational opportunities that the RBWCD can offer. For example:

- Reductions in surface area available for boating and fishing leads to competition for space among boaters and competition for available fish in the reservoir.
- Crowding results in a diminished quality of recreation experience because of the loss in solitary experience and conflicts among user types. For example, the solitude of fishing is lost due to water-skiing activities.
- Changes in the shoreline, depth, and reservoir volume continues to impact fish habitat, health, and overall fish populations.
- Changes in shoreline may also change the distance and location of water in relation to land-based amenities.

The fact that visitation to Kenney Reservoir has continued to increase in the face of reduced surface acreage attests to the demand for regional water-based recreational amenities and the interest in and demand for flatwater-based activities. Figure 5-3 illustrates changes in Kenney Reservoir's surface area, shoreline, and overall size between 1985 and 2018.

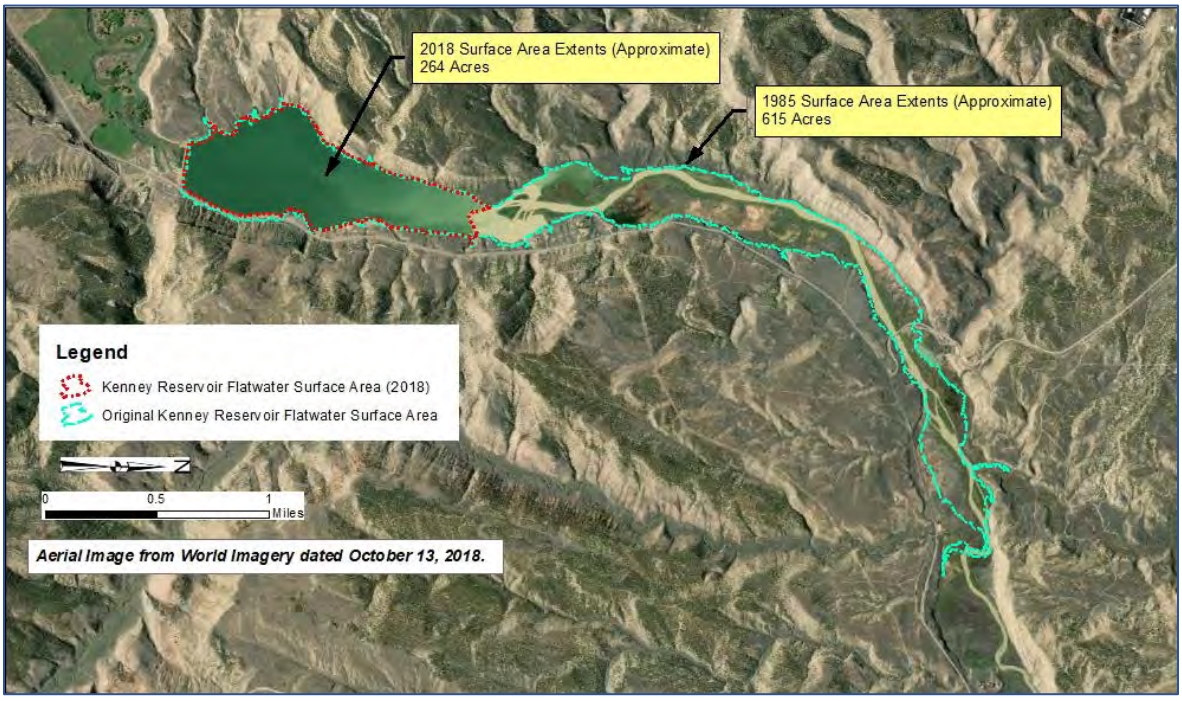


Figure 5-3: Extent of Kenney Reservoir, 1985 and 2018

As shown on Figure 5-3 above, reservoir sedimentation has largely resulted in a reduction of surface area at the northern or upstream end of the reservoir. However, continued reservoir sedimentation will further reduce the Reservoir's surface area in all locations, eventually rendering water-based recreation in Kenney obsolete. By about 2029, activities such as boating, fishing,

and swimming will not be possible at Kenney Reservoir. The RBWCD intends to replace the loss of water-based recreation at Kenney Reservoir, but in doing so, wants to meet the long-term increase in demand for flatwater recreation amenities sought in northwest Colorado.

5.2 Regional Outdoor and Water Based Recreational Activity

5.2.1 Current Outdoor Recreational Activity in Proximity to Kenney Reservoir

According to the 2019 Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP) (CPW, 2019), Coloradans are outdoor enthusiasts, with 82 to 85 percent of residents visiting county, state and federal open space and natural lands every year. In 2018, almost 3.8 million Coloradans participated in some form of outdoor recreation including over 1.7 million Coloradans who participated in water-based recreation, such as swimming, boating, water-skiing, and rafting.[10]

The demand for outdoor recreation is correlated, in part, to travel distances and the population base in the region. A two-hour, one-way drive (four hours round trip) is estimated to be the maximum time that the average person will drive one way for a day trip (Logan Simpson, 2019). National statistics report that about 70 percent of campers (overnight trips) travel 150 miles or less to their destinations, which correlates to a 2.5 to three-hour drive (Center for Western Priorities, 2021). Although most Coloradans recreate close to home, there is an increasing willingness to travel further to engage in outdoor activities (CPW, 2020-1).

Seven counties were identified as being within an approximate 2.5-hour drive from Kenney Reservoir: Mesa, Garfield, Eagle, Routt, Pitkin, Moffat, and Rio Blanco. In this report, those counties are referred to as the Kenney Reservoir Area. An estimated 1.3 million Colorado residents participated in outdoor recreational activities within the Kenney Reservoir Area in 2018.

In addition to Colorado residents, an estimated 20.2 million out-of-state visitors participated in recreational activities in Colorado during 2018, including an estimated 2.8 million visitors recreating within the Kenney Reservoir Area (Dean Runyan, 2021; Longwoods, 2020). Appendix B (Sections B.1.1 and B.1.2) provides a discussion of the approach and methods used to estimate current visitation to the Kenney Reservoir Area.

Table 5-1 provides estimates of the number of Colorado residents and out-of-state visitors participating in outdoor recreation within the seven county Kenney Reservoir Area. Participation in water-based recreation and fishing are highlighted.

[10] Data on Colorado State Parks visitation indicates increasing visitation to those locations in 2019 and 2020; additional anecdotal information suggests that recreational activity increase considerably across the State in 2020 and 2021.

Table 5-1: Estimated Participation in Outdoor Recreation in the Kenney Reservoir Area, 2018

	Colorado Residents			Out of State Visitors
Activity Type	**Kenney Reservoir Area (1) (3)**	**State of Colorado (3)**	**Kenney Reservoir Area % of State**	**Kenney Reservoir Area (1) (3)**
Water-based (2)	325,000	1,758,000	18.5%	689,000
Fishing	251,000	1,000,000	25.1%	532,000
Any Outdoor Activity (4)	**1,318,000**	**3,796,000**	**34.7%**	**2,790,000**

Notes:

(1) The Kenney Reservoir Area includes the following counties (all within a 2.5 hour drive of the existing reservoir): Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(2) Water-based activities include swimming (outdoors), power boating, water/jet skiing, sailing, canoeing/ kayaking, whitewater rafting and stand up paddleboarding.

(3) Data show number of people that participated in outdoor recreation, not the number activity days for each activity.

(4) In addition to water-based recreation and fishing, other outdoor recreation includes activities such as trail activities, winter sports, other wildlife related activities, camping, rock climbing and outdoor sports.

The data indicates that the area surrounding Kenney Reservoir is underserved from the standpoint of water-based recreation. For example, as related to Colorado residents, about 46 percent of outdoor recreators participated in water-based recreation Statewide, whereas water-based recreation accounted for only about 25 percent of outdoor activity participation in the Kenney Reservoir Area. In other words, a disproportionate number of outdoor recreators seek water-based recreation outside that region.

5.2.2 Participation in Outdoor Recreation, Crowding and Recreational Experience

According to the SCORP report, Colorado's public lands are experiencing higher levels of use almost every year and are becoming more crowded. This, in turn, impacts natural resources and diminishes the user experience. For example, a CPW survey of Colorado residents noted that about 45 percent of respondents commented that crowding is a barrier to recreational participation; overcrowding at recreation areas due to population growth and increasing recreation participation presented concerns for many respondents. As a result of increased use, and other identified needs, Colorado has prioritized expanding recreational opportunities, including water-based recreation, fishing, and trails (CPW, 2019).

Several State Parks in western Colorado include reservoirs comparable to the original size of Kenney Reservoir; those include Elkhead Reservoir, Steamboat Lake, Stagecoach, Vega, and Ridgway State Parks. Those Parks have experienced large increases in visitation in recent years, as residents from the Front Range and other areas of Colorado search out less crowded reservoirs and parks. For example, visitation at Vega State Park has increased by 10 to 15 percent per year over the last several years (Masik, 2019). Visitation to Ridgway State Park, located in Ouray County, has more than doubled since 2006 (Copeland, 2019). Park managers at both these

locations indicated that increasingly more people from the Front Range of Colorado are visiting these parks due to crowding at locations closer their homes.[11]

Crowding at recreational areas along the Front Range and at State Parks on the West Slope is evident from increasing camping activity and increasingly full campgrounds (Center for Western Priorities, 2021). Occupancy rates at reservable campgrounds on public lands in the US have increased steadily in recent years (Center for Western Priorities, 2021). Campground occupancy in the western US increased by almost 50 percent between 2014 and 2020, more than for any other area of the country.

5.3 Future Demand for Recreational Amenities in Northwest Colorado

As noted previously, the demand for outdoor recreation is partially related to population levels. Colorado's population is projected to grow by about 1.8 million residents by 2050, reaching 7.6 million people in that year (Colorado DOLA, 2021). Together, the population of the seven county Kenney Reservoir Area is projected to grow by about 130,000 people, an increase of about 39 percent, by 2050 (Colorado DOLA, 2021).[12]

An estimated 1.96 million Coloradans are expected to participate in outdoor recreation of any type in the Kenney Reservoir Area by 2070, including 485,000 people engaging in water-based recreational activities, an increase of about 159,000 people. About 374,000 Colorado residents are projected to participate in fishing activities in that area, an increase of about 123,000 people. Appendix B (Section B.2) describes the approach and methods used to project future visitation to the Kenney Reservoir Area.

Additionally, increasing numbers of out-of-state visitors will also participate in outdoor recreation during their trips, adding additional demands for water-based activities, fishing opportunities and other recreational experiences. Participation in outdoor recreation from out-of-state visitors is projected to increase by about 5.3 million people across Colorado by 2070, including an additional 732,000 visitors potentially recreating within the Kenney Reservoir Area.

Table 5-2 offers projections of participation in outdoor recreation within the Kenney Reservoir Area in 2070, and the change in participation between 2018 and 2070. Water-based recreation and fishing are identified as sub-sets of total outdoor recreation.

[11] Appendix B (Section B.1.3) provides data on the increasing visitation seen at all Colorado State Parks since 2001.

[12] Appendix B (Section B.2) offers current and projected population data for the Kenney Reservoir Area, by individual county.

Table 5-2: Projected Participation in Outdoor Recreation in the Kenney Reservoir Area by 2070

	Colorado Residents		Out of State Visitors		Total Participants
Activity Type	**Kenney Reservoir Area** (1) (3)	**Increase from 2018**	**Kenney Reservoir Area** (1) (3)	**Increase from 2018**	**Total New Recreational Demands**(5)
Water-based (2)	485,000	159,000	870,000	181,000	340,000
Fishing	374,000	123,000	672,000	140,000	263,000
Any Outdoor Activity (4)	**1,962,000**	**644,000**	**3,522,000**	**732,000**	**471,000**

Notes:

(1) The Kenney Reservoir Area includes the following counties within a 2.5 hour drive of the existing reservoir: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(2) Water-based activities include swimming (outdoors), power boating, water/jet skiing, sailing, canoeing/ kayaking, whitewater rafting and stand up paddleboarding.

(3) Data show number of people projected to participate in outdoor recreation, not the number activity days projected for each activity.

(4) In addition to water-based recreation and fishing, other outdoor recreation includes activities such as trail activities, winter sports, other wildlife related activities, camping, rock climbing and outdoor sports.

(5) A portion of new anglers are also assumed to participate in other water-based recreation.

Accounting for both Colorado residents and out-of-state visitors, at least 340,000 additional people are projected to recreate in the Kenney Reservoir Area by 2070, as compared to 2018 levels. That assumes that all anglers are also participants in other water-based recreational activities. If anglers and people participating in other water-based recreational activities are unique groups of people, new recreational demand in the Kenney Reservoir Area would amount to about 603,000 visitors. HE assumes that half of all new anglers also participate in other water-based recreation, resulting in approximately 471,000 new recreational visitors to the area (see Table 5-2 above).

5.3.1 Ability of Existing Recreational Amenities to Meet Future Recreational Demands

In addition to Kenney Reservoir, flatwater recreational opportunities are offered at other lakes and reservoirs in the region, including Rio Blanco Lake and Lake Avery (also known as Big Beaver Reservoir) in Rio Blanco County; Elkhead Reservoir and Freeman Reservoir in Moffat County and Sweetwater Lake and Trapper's Lake in Garfield County. Each of those water bodies has different physical characteristics, offering water and land based recreational opportunities. However, each of those reservoirs also have certain limitations related to water-based recreation, mainly related to size (surface acreage) or prohibitions on motorized water sports. Detailed descriptions of each of those locations, allowed recreational uses, and limitations are provided in Appendix B (Section B.3).

There are very few water-based recreation areas of comparable size to the original Kenney Reservoir and located in northwest Colorado. State parks on the West Slope that include reservoirs of comparable size include Elkhead Reservoir State Park (Moffat / Routt Counties), Steamboat Lake State Park (Routt County), Stagecoach State Park (Routt County) and Vega

State Park (Mesa County) (CPW, 2020-2). Elkhead Reservoir State Park is the closest location to Kenney Reservoir, distance-wise. However, that park is more than an hour and a half's drive from Rangely and almost three hours from Grand Junction. Other locations require even longer drives from Rio Blanco County or other larger population bases.

Fishing opportunities are limited in the Rio Blanco and Moffat counties, outside of the reservoirs listed above.[13] Much of the land adjacent to the White River is privately owned and public access to the river does not exist in many locations. Residents of Rio Blanco County are also interested in new fishing experiences, including fishing for larger species, which are generally only available in larger, deeper lakes or reservoirs (Webber, 2014).

In summary, there are limited opportunities in the Kenney Reservoir Area to accommodate future demands for water-based recreation. The existing water reservoirs in the White River basin have physical limitations and are already experiencing over-crowding. Existing reservoirs simply cannot meet the future demands for flatwater recreation.

5.4 Criteria for Flatwater Recreation

Recreational visitors look for certain amenities when they choose a location or destination in which to recreate and spend time. Recreational users displaced from Kenney Reservoir, as well as future recreators from within and outside Colorado, will be looking for and expecting quality fishing and boating experiences, often supported by other amenities, such as campsites. To provide those experiences, a water-based recreational amenity must have the following characteristics or specific physical attributes (CPW, 2014).

5.4.1 Surface Size and Shoreline Configuration

- A minimum of 700 to 1,500 acres of surface area to provide space for multiple recreational activities to occur simultaneously, including both fishing and motorboat activities. A reservoir of this size tends to avoid a feeling of crowdedness on the water, as well as along the shoreline.
- An elongated shape is necessary to support and enhance motorboating, jet-skiing and other motorized activities.
- Interesting and variable lakeside topography. The creation of fingerlets, scenic areas, and small nooks along the lakeshore are desired amenities for many recreators.

5.4.2 Depth and Bottom

- A depth of at least 50 feet in some areas of the reservoir. A variety of depths across the reservoir would provide varied habitat for a number of fish species and would provide the cooler temperatures required by species such as Rainbow Trout.
- Variable bottom shelving, including shelves of different depths and riffle areas, and a variety of different depth pockets around the lake and in coves will support a variety of fish

[13] The Yampa River and Brown's Park State Wildlife Area in Moffat County also offer fishing opportunities.

habitats and species in a large area. The greater the reservoir complexity, in terms of nooks and crannies and geography, the better it is at supporting fish and fish habitat.

5.4.3 Access

- Safe and reliable regional access from major roads. Accessibility is a key characteristic for a new recreational amenity. At a minimum, this will require that state and county highways and access roads have the ability to safely accommodate cars, trucks, RVs, trailers and boats.
- Easy access to specific recreational amenities. Once at the reservoir, large vehicles must also be able to access campgrounds, marinas, trailheads and other amenities. Roads surrounding the reservoir must be able to accommodate motor vehicles and other types of recreational equipment.

Development of a reservoir with these characteristics, along with supporting features such as campgrounds, will offer the recreational amenities that current and future recreators are looking for and support quality recreational experiences.[14] Without these features, a new reservoir will not meet the increasing recreational demands projected for northwest Colorado.

5.5 Surface Area and Water Storage Required to Support Flatwater Recreation

5.5.1 Surface Area Required to Meet Future Flatwater Recreation Demands

Previous sections of this report have documented estimates of future recreational demands, including the demand for flatwater recreation and fishing in Colorado and the Kenney Reservoir Area. There does not appear to be any existing or planned reservoir enlargements in northwest Colorado that can offer the activities, amenities and conditions desired by future recreators.

Simply replacing Kenney Reservoir, at its original size would result in a new reservoir with a surface area of about 650 acres. However, as shown in Table 5-2, an estimated additional 340,000 people are projected to participate in water-based recreation and an additional 263,000 people are projected to participate in fishing activities within the seven-county Kenney Reservoir Area by 2070.[15] It is clear that the existing reservoirs on the West Slope of Colorado are currently at or will soon reach maximum capacity; those locations will be unable to meet the additional flatwater recreation demands projected by 2070.

Based on the average visitation per surface acre for the four West Slope State Parks with reservoirs comparable to Kenney Reservoir (250 visitors per surface acre), new recreational demands within the Kenney Reservoir Area would require a flatwater recreational amenity of at

[14] Respondents to a recent CPW public survey indicated the desire for increased fish stocking and higher quality fishing opportunities.

[15] The extent to which the same people participate in water-based recreation and in fishing is unknown. Harvey Economics assumes some overlap between those groups.

least 1,880 surface acres.[16] This assumes that water-based recreation participants and fishing participants partially overlap.[17] In order to support recreation displaced from Kenney Reservoir plus the additional projected recreational demand, a flatwater recreation facility of at least 2,530 surface acres is required for the Kenney Reservoir Area. Table 5-3 summarizes the required surface area to replace Kenney Reservoir.

Table 5-3: Reservoir Surface Area Required to Replace Kenney Reservoir and Meet Future Flatwater Recreation Demands in 2070

Calculation Variables	2070 Projections
Total New Recreational Demands, 2070 Visitation, Resident and Out-of-State Water-based Recreation/ Fishing Demand	471,000 visits
Assumed Visitation per Surface Acre (1)	250 visits per acre
Surface Acreage Required to Meet New Recreational Demands	1,880 acres
Replacement of Kenney Reservoir (surface acres)	650 acres
Total Flat water Surface Acres Required to Meet Future Demands in the Kenney Reservoir Area	**2,530 acres**

Note: (1) Assumed visitation per surface acre is based on data for Elkhead Reservoir, Steamboat Lake, Stagecoach, and Vega State Parks. Data for those Parks is provided in Appendix B (Section B.3).

Several areas of uncertainty may influence the projections of flatwater recreation and fishing demands and the associated calculation of required reservoir water surface area. The preceding analyses have incorporated existing reports, studies, and data related to recreational trends, visitation levels and other inputs; however, some assumptions were developed when specific information was unavailable.

- Data showing the number or percentage of out-of-state visitors who participate in specific outdoor recreational activities is not available. Therefore, the percent of people participating in various recreational activities reported by Colorado residents, as provided in the SCORP document, were applied to out-of-state visitors. It is possible that a larger percentage of Colorado residents participate in water-based recreation or fishing than out-of-state visitors. If that is the case, then estimates and projections of the number of out-of-state visitors participating in those activities may be high.
- The overlap between anglers and people participating in other water-based recreation is unknown. It is common for outdoor enthusiasts to participate in multiple types of recreational activities during a multi-day visit. Some overlap would be expected for some visitors. The projections of required surface acreage assume some overlap in anglers and other water-based recreation participation. However, if there were zero

[16] Appendix B (Section B.3.3) provides the data on water surface acres and annual visitation for Elkhead Reservoir, Steamboat Lake, Stagecoach, and Vega State Parks.

[17] As noted previously, it is assumed that half of all new anglers also participate in other water-based recreational activities.

overlap, the required surface acreage to meet the 2070 recreation demands plus the replacement of Kenney Reservoir would be a minimum increase of 3,050 acres.

In sum, the calculation of required surface area acreage necessary to meet future recreational demands is reasonable. To support that conclusion, HE used a second approach to check the results of the above analysis, using information provided in the recently completed Northern Integrated Supply Project (NISP) EIS (USACE, 2018). Application of the statistical equation used to estimate annual visitation at Glade Reservoir in that EIS resulted in a required surface area of 1,845 acres, as compared to the 1,880 surface acres included in Table 5-3 above.[18] The difference between the two approaches amounts to about 35 surface acres, or less than two percent. This tends to validate the surface area requirements.

5.5.2 Flatwater Surface Area to Storage Volume Relationship

The volume of water storage required to create 2,530 surface acres available for recreation will vary, depending on location.[19] For example, the RBWCD recently acquired a conditional water rights decree associated with a Wolf Creek location in Case No. 14CW3043. At the off-channel Wolf Creek location, 2,530 surface acres would require a recreational pool of 91,468 acre-feet.

5.6 Summary of Regional Water Based Recreational Needs

Water-based recreation accounts for almost half of the outdoor recreation activities undertaken by Colorado residents. Currently, about 325,000 Colorado residents participate in water-based recreation in the Kenney Reservoir Area and about 250,000 Coloradans fish in the area. Out-of-state visitors add more than 700,000 additional recreators to the region for those activities. Even so, this region is underserved from a water-based recreation standpoint, as compared to other areas of the state.

Future demand for water-based recreation in the Kenney Reservoir Area will be a function of increased interest in water-based recreation and fishing; population growth across the State and in northwest Colorado; and increased visitation from out-of-state residents. The counties within a 2.5-hour drive of Kenney Reservoir are the primary area from which new recreational visitors are expected. Year 2020 population for this area is estimated to be about 335,000; projections indicate an increase of about 164,000 people, or almost 49 percent, within the primary draw area by 2070. Out-of-state visitation is expected to increase by more than 26 percent by 2070.

A total of 2,530 surface acres of flatwater recreation is projected to be needed in the Kenney Reservoir Area by 2070. This amount includes 650 acres for replacement of Kenney Reservoir and 1,880 acres attributable to new demand.

[18] The analysis completed for the NISP EIS suggests a direct, linear relationship between surface acres and reservoir visitation.

[19] Topography plays a large role in determining the storage volume required to develop water surface acres.

6.0 COLORADO RIVER COMPACT CURTAILMENT NEEDS

The Colorado River Compact of 1922 (Compact) is an Agreement between seven states that allocates water between the Upper and Lower Basin of the Colorado River. The Compact, together with the 1944 Mexican Water Treaty, allocates a total of 17.5 million acre-feet (MAF) as follows: 7.5 MAF of water to the Upper Basin and 7.5 MAF (plus an additional 1.0 MAF) to the Lower Basin and 1.5 MAF to Mexico.

The Upper Basin has always been in compliance with the Compact but there is a concern amongst water users that declining streamflows could result in litigation amongst the basins and the respective Upper Division States (Colorado, New Mexico, Utah, and Wyoming) and Lower Division States (California, Arizona, and Nevada) about compact compliance. Some water users are concerned that if the Upper Basin fails to comply with its obligations under Article III of the 1922 Compact that the Lower Division States could assert a "Compact curtailment" requesting that the Upper Basin States curtail consumptive uses. A map of the Colorado River region and the location of Lee's Ferry, which is the flow measurement location used to determine the volumes provided to the Lower Basin, is shown on Figure 6-1.

The Colorado River basin has been in a drought since 2000 (USBR, 2018). Due to this drought, average river basin annual flows during the period 2000-2017 were approximately 12.6 MAF, or 4.9 MAF less than would be needed to meet the full Compact and Mexican Treaty allocations (Hydros, 2019). A repeat of the particularly dry 2001-2006 period could reduce the ten-year Lee's Ferry average below a level that would be more likely to trigger interstate litigation regarding Compact compliance (Hydros, 2019). The most recent ten-year period (2012 – 2021), indicates an average annual flow at Lee's Ferry of about 11.8 MAF, as shown on Figure 6-2 (Colorado River District, 2022), so the conditions maybe more extreme than what was presented by Hydros in 2019.

The current target elevation used in the U. S. Bureau of Reclamation's (Reclamation's) Drought Contingency Plan (DCP) for Lake Powell is 3525 feet. This elevation is significant because at this elevation there is only about 2.0 MAF of water above the minimum power pool in Lake Powell of Elevation 3490 feet (Hydros, 2019). There is a concern that when the Lake Powell water surface is less than Elevation 3525, power generation may be impacted (Hydros, 2019). The Draft Annual Operating Plan for Colorado Reservoirs 2022 documented that Reclamation and the Upper Colorado River Commission began the development of a Drought Response Operations Plan in May 2021 in response to projections that Lake Powell could fall below Elevation 3525 by March 2022, (USBR, 2021). A preliminary working draft of the 2022 Drought Response Operations Plan was released in January 2022 (USBR, 2022-1), which was followed in the initial months of 2022, then a revised 2022 Drought Response Operations Plan was released in April 2022 (USBR, 2022-4).

From January through April 2022, an adjusted monthly release volume pattern from Lake Powell was enacted to hold back a total of 0.350 MAF to protect the target elevation at Lake Powell of 3525 feet (USBR, 2022-2). The April 2022 Drought Response Operations Plan included an operational release of approximately 500,000 acre-feet from Flaming Gorge in 2022, with possible

operational releases from Blue Mesa Reservoir and Navajo Reservoir in the fall of 2022 and winter of 2022/2023 (USBR, 2022-4). As of May 2022, Lake Powell was only 24 percent full, with a water elevation of 3523.1 feet (1.9 feet below the target elevation), and Lake Mead was 30 percent full, with a water elevation of 1052.9 feet (USBR, 2022-3).

The RBWCD is concerned that potential future disputes and litigations regarding a Colorado River Compact curtailment would adversely affect post-Compact water users if they are required to reduce or eliminate their diversions. The Colorado River Water Conservation District (Colorado River District) initiated an investigation to determine those risks, and those risks were further evaluated in a study for the RBWCD (Hydros, 2020).

Figure 6-1: Map of the Colorado River Basin (Wikipedia, 2022)

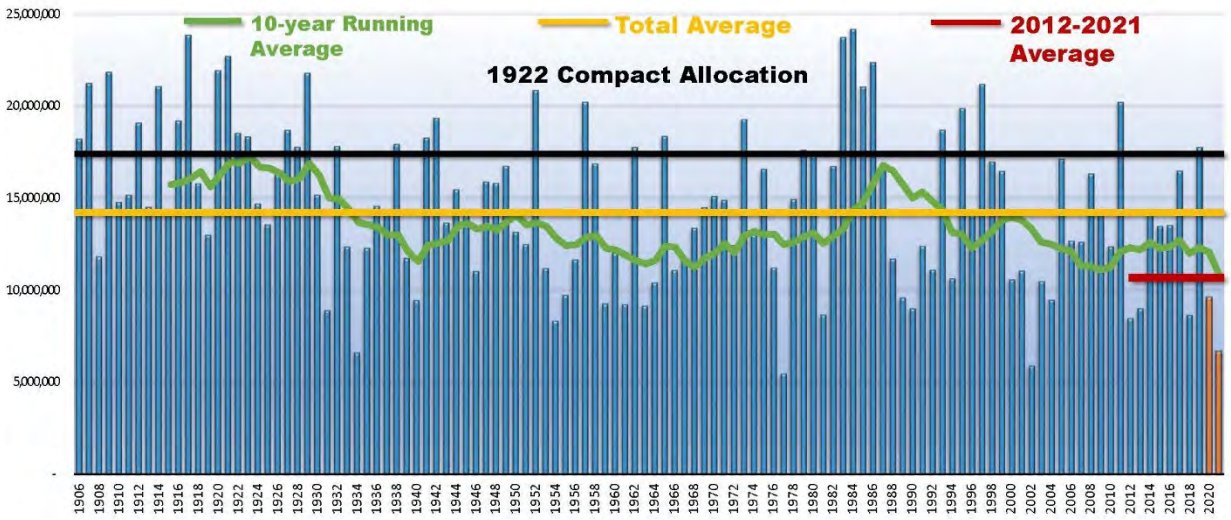


Figure 6-2: Provisional Natural Flows for the Colorado River at Lee's Ferry for Water Years 1906 – 2021 in acre-feet per year (Colorado River District, 2022)

6.1 Colorado River Risk Study – Compact Call Potential

The Colorado River District and other project sponsors have conducted three phases of analysis related to identifying the risks associated with shortages in river flow within the Colorado River basin (Hydros, 2016; Hydros, 2018; Hydros, 2019). The Colorado River Risk Assessment includes projections of the probability of shortages in the 10-year Lee's Ferry running average, which could trigger litigation or potentially result in curtailment of diversions and beneficial uses by water users in Colorado. As shown on Figure 6-3, Hydros documented that releasing sufficient water from Lake Powell to maintain the 10-year Lee's Ferry running average would be difficult if drought conditions were to continue.

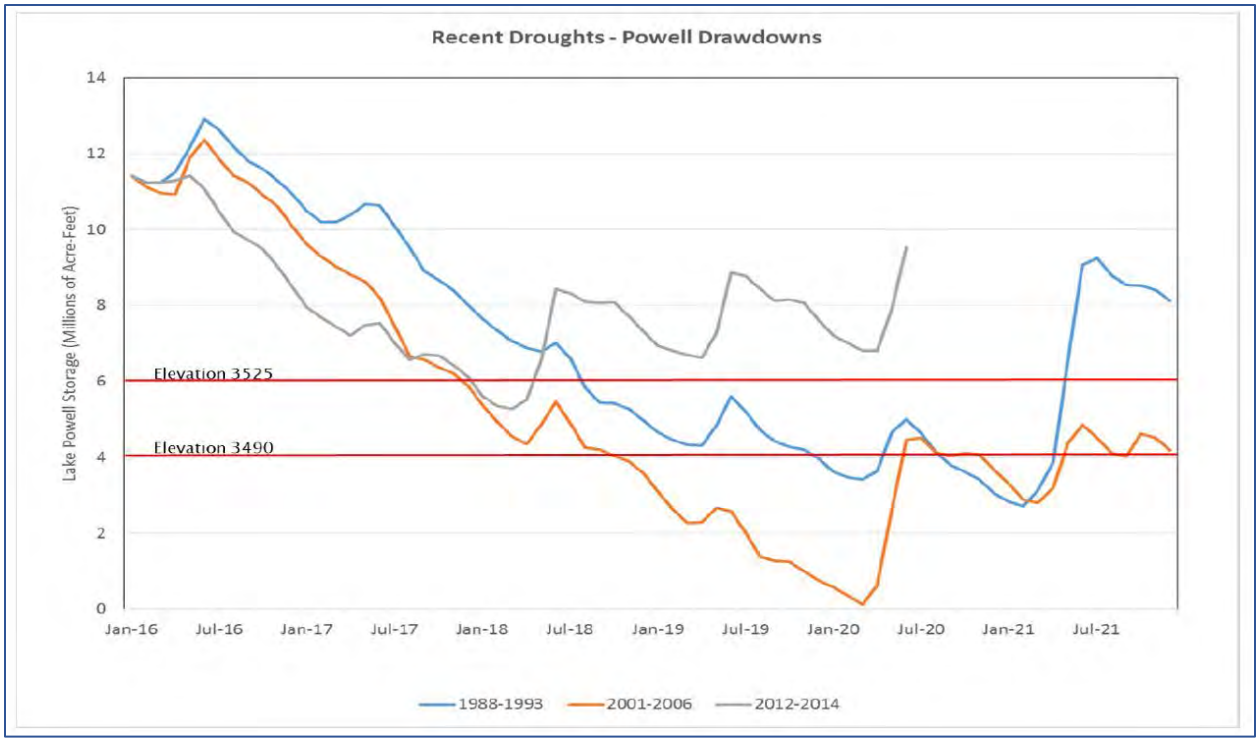


Figure 6-3: Past Lake Powell Drawdowns Superimposed on Current Conditions (Hydros, 2016)

Results of the Phase I study indicate that "…under certain drought sequences, as seen in the early part of this century, significant volumes of water could be needed to maintain Lake Powell at or above Elevation 3525 (Hydros, 2016). Such volumes would be required even after taking into account the release of water stored in Colorado River Storage Project reservoirs." The Phase I study report noted that the delivery requirements would likely exceed any feasible amounts that could be provided under a voluntary program.

The Phase II study refined the analysis from Phase I, and further examined demand management, shepherding of water deliveries, and water banking options within Colorado, using the State of Colorado's Decision Support Systems (StateMod) tools (Hydros, 2018). An additional objective of the Phase II study was to better understand the variability in yields across the sub-basins in Colorado under different hydrologic conditions and other factors, but the Phase II analysis was generally limited to system-wide risks in the Colorado River Basin.

The Phase III study was sponsored by the Colorado River District and two of the basin roundtables (Hydros, 2019). The Phase III analysis built on the Phase I and II analyses to further address current and future risks, but the updated analysis also included calculations of pre-Compact depletions. The specific "pre-compact" date is an unresolved issue, but for conservative purposes, the Hydros study selected the earliest date of November 24, 1922, so that post-Compact depletions were deemed to be those junior to 1922, within the Yampa, White, Colorado, and Gunnison River basins, and other southwest sub-basins in Colorado. In Phase III, Hydros further evaluated the risks of declining storage at Lake Powell and flow at Lee's Ferry for the following

scenarios:

Scenario 1 – Current demands baseline; no mitigation actions taken.
Scenario 2 – Future demands baseline; no mitigation actions taken.
Scenario 3 – Current demands with implementation of the Drought Contingency Plan.
Scenario 4 – Future demands with the implementation of the Drought Contingency Plan.

The Drought Contingency Plan modeling for Scenarios 3 and 4 include the drought operations of the Colorado River Storage Project initial unit reservoirs (Powell, Flaming Gorge, Aspinall, and Navajo) but does not model demand management. For the modeling, Hydros used 28 different "traces" which basically are 28 different future hydrologic "scenarios" that were simulated using historical data from 1988 through 2015, with various start years and sequencing of those years for a total evaluation period of 25 years.

Figures 6-4 and 6-5 illustrate the risk associated with Lake Powell decreasing below its target elevation of 3525, or below its minimum elevation to generate power, Elevation 3490. For example, assuming Scenario 3, there is approximately a 43 percent likelihood of Lake Powell dropping below Elevation 3525, and a 28 percent likelihood of Lake Powell dropping below Elevation 3490 in the next 25 years. The other scenarios without the Drought Contingency Plan and future demands only make the risk that much greater. As noted previously in this section, the elevation of Lake Powell, as of May 2022, is 3523.1, 1.9 feet below the target elevation, and Reclamation held back water in Lake Powell from January through April 2022 as a strategy to maintain Lake Powell above its target (USBR, 2022-3). However, despite these efforts, Lake Powell dropped below its target elevation and storage is being released from Flaming Gorge in 2022 (USBR, 2022-4). Based on this information, the threat of Lake Powell dropping to critical levels within the next 25 years is very likely.

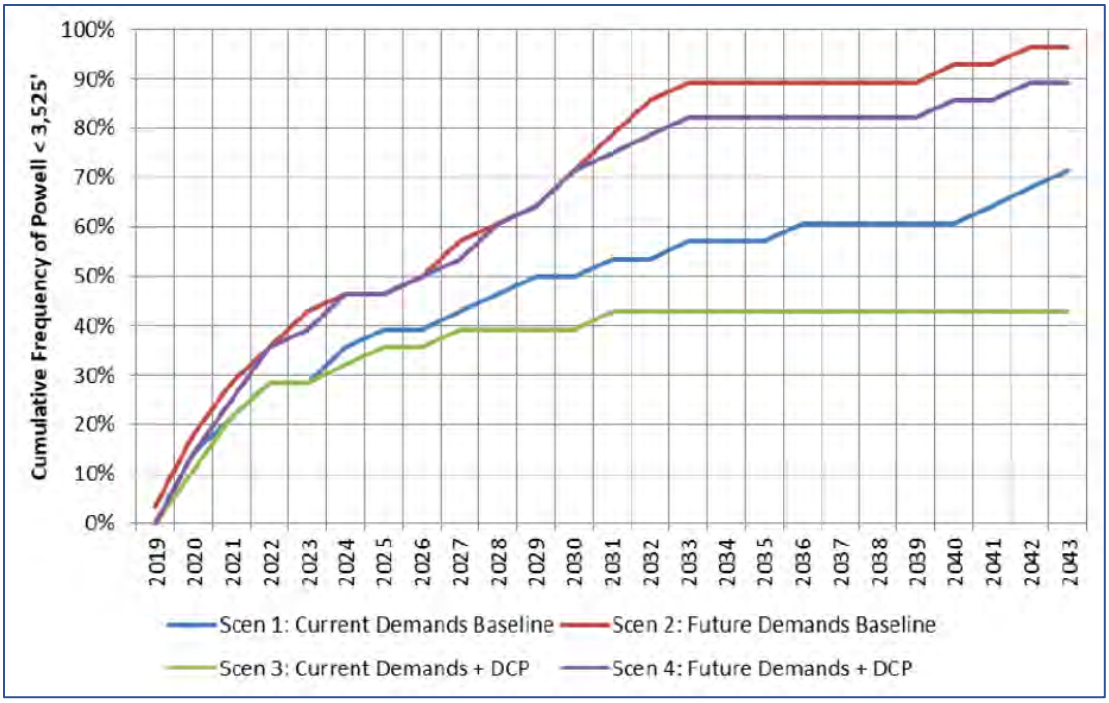


Figure 6-4: Risk Profile for Lake Powell to Drop Below Elevation 3525 Feet (Hydros, 2019)

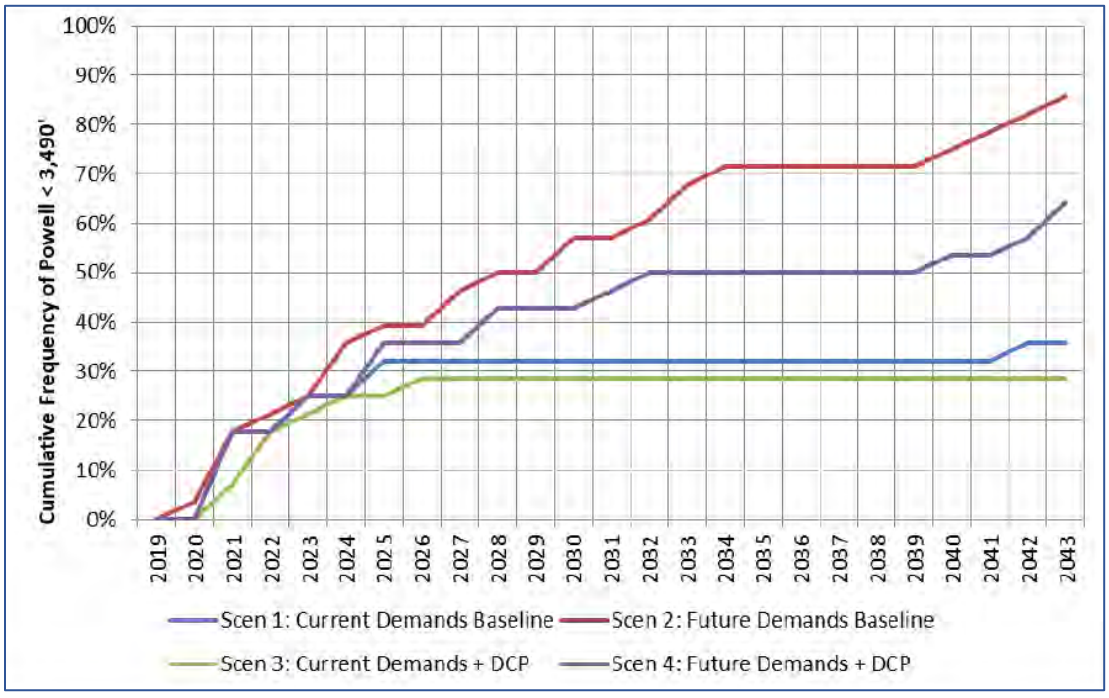


Figure 6-5: Risk Profile for Lake Powell to Drop Below Elevation 3490 Feet (Hydros, 2019)

Figure 6-6 shows the risk associated with the 10-year average flows at Lee's Ferry dropping below 82.5 MAF, a level that could trigger heightened interbasin conflict and potential litigation. The percent chance that the flows at Lee's Ferry drop below 82.5 MAF for a 10-year period at least once in the next 25 years ranges from about 29 to 86 percent. Interestingly, the model indicates that the likelihood of a Lee's Ferry deficit increases when the Drought Contingency Plans are implemented. This is due to the way the plans are designed to increase lake levels in both Powell and Mead, resulting in smaller releases from Powell to try to maintain reservoir target elevations (Hydros, 2019).

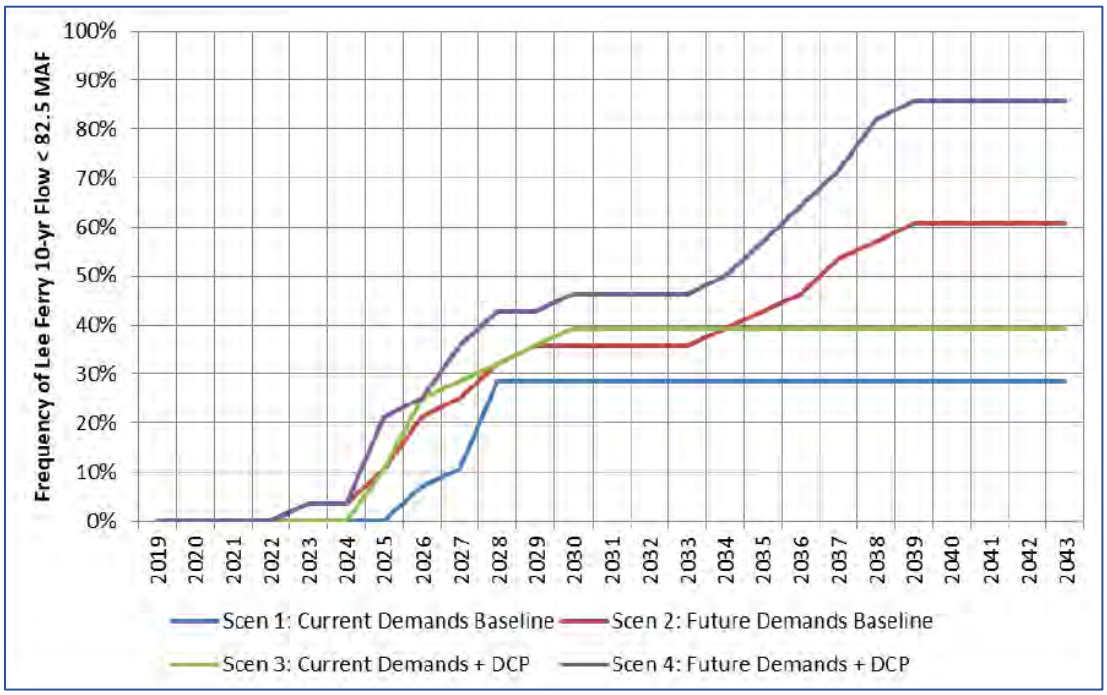


Figure 6-6: Cumulative Frequency of Lee's Ferry Flows Dropping Below 82.5 MAF in 10 Years (Hydros, 2019)

Hydros evaluated the effects on the potential for Lee's Ferry flows to drop below 82.5 MAF in 10 years if a 500,000 acre-foot account was available for Compact compliance use. The Drought Contingency Plan allows for such an account to be created, and presumes that the pool in Lake Powell above Elevation 3490 could be used (Hydros, 2019). These potential sources of water were evaluated with each scenario and are summarized in Table 6-1.

After reviewing the Phase I, II, and III reports, it is the opinion of the RBWCD that the risk of a Colorado River Compact curtailment is imminent, and it is the RBWCD's responsibility to plan for such a situation. Under any reasonable future growth scenario, which has to be reasonably assumed as a water provider, the risk of a Colorado River Compact curtailment occurring in the next 25 years is greater than 18 percent. Additional resources such as utilizing the water in Lake Powell above the minimum hydropower elevation of 3490 or the use of an available upstream water source of 500,000 acre-feet was considered speculative because: 1) Reclamation has not approved the use of Lake Powell at these levels and the location; and 2) a source for the 500,000

acre-foot pool was not identified at the time the Hydros report was prepared (Hydros, 2019). Reclamation is presently releasing 500,000 acre-feet from Flaming Gorge (USBR, 2022-4).

Table 6-1: Percent Chance That Flows at Lee's Ferry Drop Below 82.5 MAF at Least Once in a 10-Year Period Over the Next 25 Years Considering Additional Resources (Hydros, 2019)

	Under current conditions (maintaining Lake Powell above 3525 feet)	With the 500K acre-feet account	With the 500K acre-feet account and drawdown of Lake Powell to Elevation 3490 feet
Scenario 1 – Current demands baseline	29%	18%	4%
Scenario 2 – Future demands baseline	61%	50%	18%
Scenario 3 – Current Demands with implementation of the Drought Contingency Plan	39%	39%	0%
Scenario 4 – Future Demands with the implementation of the Drought Contingency Plan	86%	71%	18%

Even though the Colorado River flows from 1988-2015 were lower than average, they might be optimistically high (Kuhn, 2016). Other historical periods could produce lower averages, as could future periods. In addition, climate change is expected to cause higher temperatures and increased evaporation, which will further decrease the 10-year Lee's Ferry average flow (Udall, 2019). A recent report published by USGS researchers estimated that by 2050, Colorado River flows could drop by 19 to 31 percent (Milly and Dunne, 2020). This sentiment is shared by other climate research scientists, who estimate that by 2050 there could be a 20 percent reduction in Colorado River flow and as much as a 35 percent reduction by the end of the century (Castle and Fleck, 2019).

6.2 Potential Compact Curtailment Effects in Rio Blanco County

For the White River basin in Colorado, the Phase III analysis found that approximately 50,173 acre-feet per year of depletions are attributable to pre-Compact water rights, but an additional 11,887 acre-feet per year are attributable to post-Compact water rights. The post-Compact water rights in the White River basin in Colorado could be shut-down for the duration of a Colorado River Compact curtailment.

The RBWCD and Colorado River District commissioned Hydros to further evaluate the curtailment risk analysis for the White River, breaking down the risk into segments that include the RBWCD, YJWCD, and the remaining areas of Rio Blanco County (Hydros, 2020). As previously documented in Section 1.2, the RBWCD has existing agreements in place with the YJWCD and

Rio Blanco County to provide augmentation water for water users within their boundaries.

The Hydros analysis further calculated that full curtailment of water rights junior to November 1922 within RBWCD would result in a reduction of 3,817 acre-feet per year of consumptive use, including evaporation and incidental non-beneficial consumptive losses. Such curtailment would amount to 45 percent of all existing consumptive use within the RBWCD.

Table 6-2 summarizes the conclusions for Rio Blanco County included in the 2020 Hydros report. Based on the information summarized in Table 6-2, up to 45 percent of the current consumptive uses within the RBWCD are subject to potential Colorado River Compact curtailment. This information shows that water users in the RBWCD would bear a much greater proportional burden of current consumptive uses in the event of a Colorado River Compact curtailment than the remainder of Rio Blanco County within the White River Basin. Further, as summarized from the Phase III report, the maximum risk of curtailment of existing consumptive uses in the other Colorado River sub-basins in Colorado is 36 percent; therefore, the RBWCD would suffer the greatest percentage impact to existing consumptive uses associated with a curtailment compared to any other area within Colorado. A potential 45 percent curtailment of consumptive uses within the RBWCD would be harmful to the area-wide economy without a viable augmentation water supply. The additional curtailment of 7,481 acre-feet per year in the YJWCD and 590 acre-feet in the remaining portions of Rio Blanco County would also be harmful. This highlights the critical need for a reliable and resilient augmentation water source to protect existing uses in the event of a Compact curtailment.

Table 6-2: Potential Colorado River Compact Curtailment Effects Within Rio Blanco County

	Within RBWCD	Incremental Additional in YJWCD (1)	Incremental in Remaining Portions of Rio Blanco County (2)	Totals
Baseline Average Annual Consumptive Use per Current Water Uses (acre-feet)	8,456	44,790	9,449	62,695
Reduction in Annual Consumptive Use under Curtailment of Water Rights Junior to November 1922 (acre-feet)	3,817	7,481	590	11,888
Percent Reduction	45%	17%	6%	19%

Notes:

(1) The northern portion of the YJWCD that includes users from the Yampa Basin were not included in these totals.

(2) Although RBWCD and a majority of the YJWCD are within Rio Blanco County, the information reported for Rio Blanco County only considers the areas that are not in the respective districts.

6.3 Multi-Year Curtailment Risk

The drought of the early 2000s is an example of how drought can impact Colorado River Compact curtailment. Due to the very dry 2000-2004 period, subsequent heavy run-off years were needed to make up for the below average period early on (USBR, 2020). For the years 2001-2010, the

10-year flow of the Colorado River at Lee's Ferry was 84.8 MAF; accounting for the Mexico Treaty (USBR, 2011-1), this is only 2.3 MAF above a possible curtailment threshold.

The most recent 10-year average flow from 2012 to 2021 is the lowest it has been on historical record, refer to Figure 6-2. If the 10-year Lee's Ferry flows drop to levels close to 8.25 MAF per year, then it is especially critical that a prolonged drought does not occur in the last three years of the rolling average, which further supports the need for three years of drought storage. Although the Upper Basin has always been in Compact compliance (including throughout the 2000-2004 drought), hoping for higher than normal precipitation in the final year of a 10-year rolling average is not a prudent long-term water supply strategy.

6.4 Summary of Need for Compact Curtailment Water Storage

The RBWCD has considered the risks of Colorado River Compact curtailment and has concluded that, as a prudent water provider, it must take steps to reduce those risks by providing long-term storage for additional augmentation water supplies. The RBWCD has determined that 35,664 acre-feet would cover the effects of three consecutive years of potential Colorado River Compact curtailment at 11,888 acre-feet per year.

7.0 AGRICULTURAL WATER NEEDS

7.1 Existing White River Agricultural Water Diversions

As of 2017, Rio Blanco County encompassed approximately 411,000 acres of farmland, or about 20 percent of the total county acreage. About 27,120 farmland acres were irrigated, which is 6.6 percent of total farmland acres (USDA, 2017). Crop production is mostly hay, including alfalfa, grass silage, and green chop. Hay production supports county livestock operations, primarily cattle and sheep. Table 7-1 offers a description of agricultural operations in Rio Blanco County since 2007 (USDA, 2007; USDA, 2012, USDA, 2017).

Table 7-1: Summary of Agricultural Operations in Rio Blanco County

Year	Acres of Farmland	Irrigated Acres (1)	Cattle / Calf Inventory	Sheep / Lamb Inventory	Hay Production (tons, dry)
2007	386,600	23,000	23,700	22,300	40,800
2012	507,300	25,600	24,600	20,800	38,100
2017	410,900	27,100	25,300	7,900	44,500

Note: (1) Irrigated acres are included in Acres of Farmland

Irrigated agriculture in Rio Blanco County has been generally stable for many years, although fluctuations are evident from year to year due to market conditions, water availability and other factors.

As shown on Figure 7-1, approximately 60 percent of irrigated acres in the White River basin are concentrated along the White River near the Town of Meeker (CWCB, 2019; CWCB, 2022). The remaining irrigated acreage is located along tributaries and along the lower main stem of the White River. The predominant agricultural practice in the Yampa-White-Green basins is flood irrigation; flood irrigation increases soil moisture and generates lagged return flows to the river (CWCB, 2022).

According to the Colorado Water Plan, the White River basin experiences about 243,000 acre-feet in agricultural diversions and about 46,400 acre-feet per year in Irrigation Water Requirements (IWR) in an average year.[20,21] The per acre IWR in the White River basin is 1.65 acre-feet. Table 7-2 describes baseline agricultural water use for irrigated acreage in the White River basin.[22]

[20] Agricultural diversions are defined as the amount of water that needs to be diverted or pumped to meet the full crop irrigation water requirement.

[21] Irrigation Water Requirement (IWR) is defined as the amount of water that must be applied to crops to meet the full crop consumptive use, also referred to as the crop demand or the consumptive irrigation requirement. IWR provides an estimate of the maximum amount of applied water the crops could consume if it was physically and legally available.

[22] Baseline refers to the year 2015.

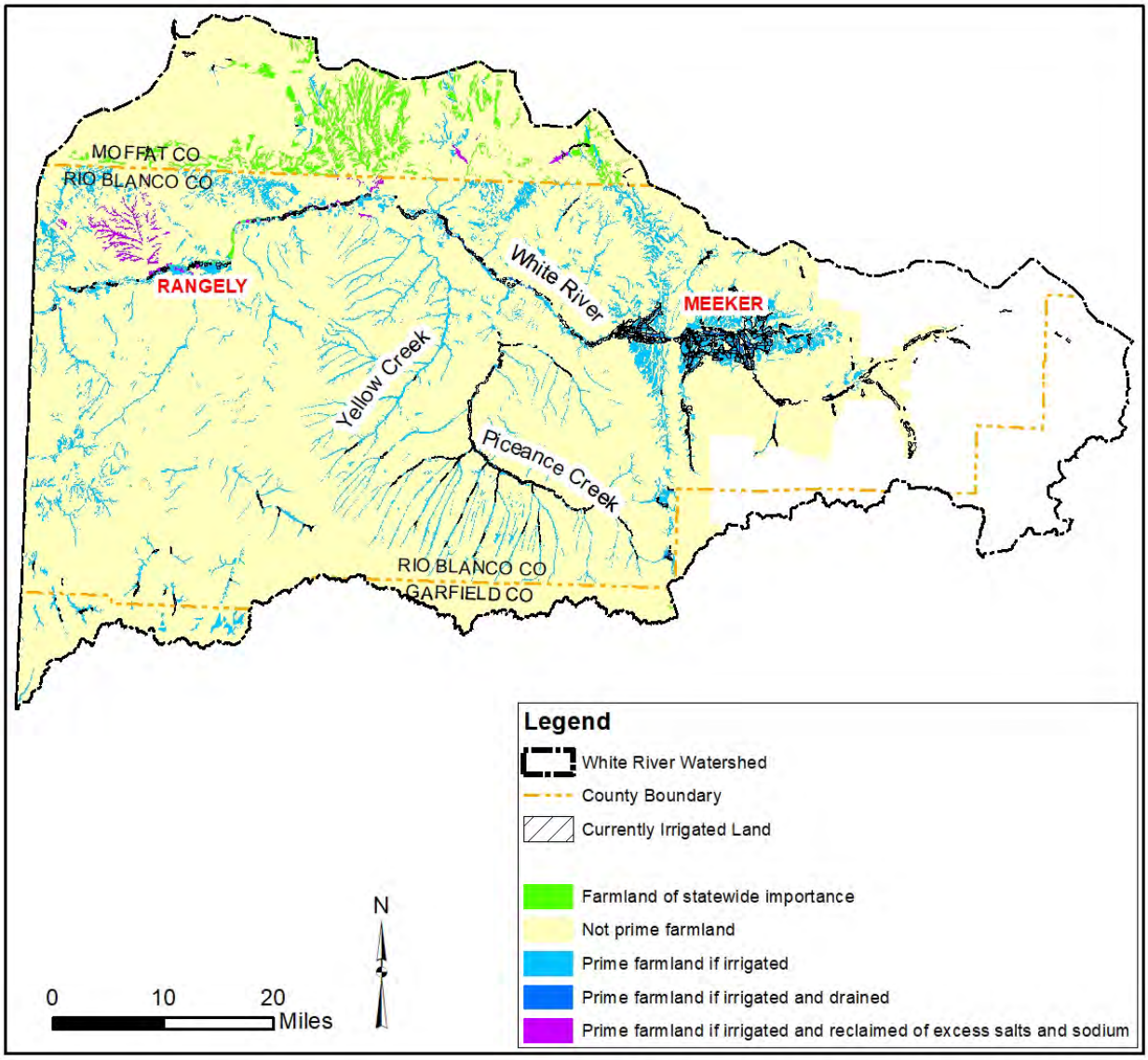


Figure 7-1: White River Farmland Classification Map

Table 7-2: Existing White River Basin Irrigation Requirements and Water Diversions

Baseline / Current (2015)					
Irrigated Acreage	**Average IWR (acre-feet)**	**Per Acre IWR (acre-feet)**	**Wet Year Diversions (acre-feet)**	**Average Year Diversions (acre-feet)**	**Dry Year Diversions (acre-feet)**
28,100	46,400	1.65	250,000	243,000	242,000

Note: Baseline agricultural demands were estimated using a model that used 2015 irrigated acreage and cropping patterns and incorporated historical weather patterns.

7.2 Projected White River Agricultural Water Diversions

The Colorado Water Plan's Technical Update (CWCB, 2019) projects small decreases in the number of irrigated acres in the White River basin by 2050 under all five of its future planning scenarios; a reduction of about 400 acres for four of the five scenarios, and a reduction of about 100 acres for the fifth scenario. The full description of each planning scenario is provided in Appendix A of this report.[23] The reductions in irrigated acres are, according to the Colorado Water Plan, attributable to urbanization of lands around the Town of Meeker. HE believes the likelihood of urbanizing irrigated lands in the Meeker vicinity is highly uncertain; a more realistic assumption might be no change in irrigated acres.

Work performed for the Yampa-White-Green Basin Roundtable indicates that there are additional irrigable acres that could be developed into irrigated property (CWCB, 2022). Additionally, a recent study completed for the RBWCD identified approximately 22,000 acres of additional irrigable land within the RBWCD's boundaries, mainly located along the White River (WestWater, 2022). Some of that acreage has been irrigated in the past and has water rights attached; however, because of the inconsistent availability of water supplies from year to year, operators cannot reliably plan on irrigating that land at the current time.

The Colorado Water Plan also projects agricultural diversion demands for the White River basin in 2050 under each future planning scenario (see Table A-1 in Appendix A of this report).[24] In an average year, projected diversion demands range from 180,000 acre-feet up to 324,000 acre-feet, with a mid-point diversion demand of 252,000 acre-feet (see Table 7-3 below).[25] Projections of wet year and dry year diversions result in mid-point demands of 265,000 acre-feet and 239,500 acre-feet, respectively. For an average year, projected 2050 diversion demands are expected to be about 9,000 acre-feet greater than current demands.

[23] The Colorado Water Plan's planning scenarios offer different views of the future based on differing assumptions related to population growth, economic conditions, technological innovation, climate change and other conditions. These planning scenarios are described as each having an equal likelihood of occurring.

[24] The Colorado Water Plan does not provide projections of agricultural water demands past the year 2050.

[25] The mid-point calculation reflects the mid-point between the scenario with the lowest projected diversion demand and the scenario with the highest projected diversion demand.

Table 7-3: White River Basin Projected Agricultural Diversion Demands, Year 2050

2050 Projections [1] [3]	Diversions (acre-feet)
Average Year Mid-Point	252,000
Wet Year Mid-Point [2]	265,000
Dry Year Mid-Point	239,500

Notes:

(1) The mid-point calculation reflects the median between the Colorado Water Plan scenario with the lowest projected diversion demand and the scenario with the highest projected diversion demand.

(2) As noted in the Colorado Water Plan, "diversion demands can be higher in wet years because system efficiency decreases due to the relative abundance of supply."

(3) The Colorado Water Plan does not provide projections of agricultural water demands past the year 2050.

7.3 Agricultural Water Shortages in the White River Basin

Agricultural operators in the White River basin have historically experienced water shortages throughout their irrigation season, with increased shortages occurring in the late irrigation season after runoff (CWCB, 2015). That pattern continues today, given current operations in the basin. Through 2013, basin operators have experienced annual shortages of about 2,400 acre-feet on average since 1950; see Table 7-4. As shown on Figure 7-2 below, in drier years, shortages have reached more than 6,500 acre-feet.

Table 7-4: Average Annual Shortages in Irrigation Water Requirements in the White River Basin, 1950 through 2013

Average Irrigated Acres	Irrigation Water Requirement (acre-feet)	Supply Limited Consumptive Use (acre-feet)	Percent Short	Shortage (acre-feet)
26,021	43,319	40,887	5%	2,432

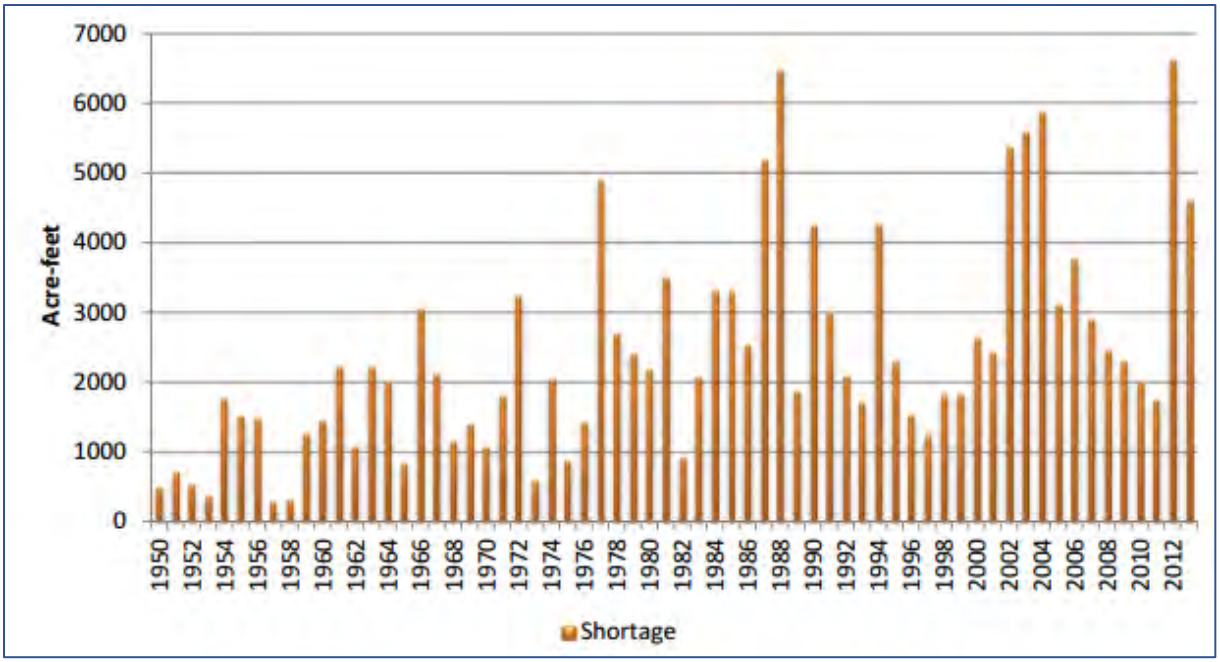


Figure 7-2: Annual Agricultural Water Shortages in the White River Basin, 1950 to 2013

Water shortages increase in the later portion of the irrigation season, as shown in Table 7-5. For example, on average in June, irrigators are able to apply about 97 percent of the water required to meet crop needs; by September, that drops to only about 91 percent. Over the course of a growing season, the practice of deficit irrigation results in decreased crop growth and reduced yields on a per acre basis.

Table 7-5: Average Irrigation Shortages by Month, 1950 through 2013

April	May	June	July	August	September	October
10.0%	4.5%	3.4%	4.9%	6.7%	9.3%	10.9%

In addition to projections of future diversion demands and supplies, the Colorado Water Plan and the Draft Yampa-White-Green Basin Implementation Plan (BIP) also evaluated water supply gaps. Agricultural demands were compared to the available water supply modeled for current (baseline) conditions and the five planning scenarios. Gaps were calculated when water supply was insufficient to meet demands.[26] Agricultural shortages are projected to continue or increase under all future planning scenarios.[27] Table 7-6 presents the projected average annual agricultural gap and maximum agricultural gap in the White River Basin in 2050, presented as the mid-points

[26] As noted in the Colorado Water Plan, "the Technical Update used water allocation models that reflects a strict application of water administration. In the Yampa-White-Green basin, some water users refrain from placing a call to share the benefit of available supplies."

[27] Table A-2 of Appendix A provides the projected agricultural water gaps for each Colorado Water Plan planning scenario.

between the scenarios with the lowest and highest projected gaps.[28] In an average year, the projected agricultural gap is expected to increase to about 3,500 acer-feet per year. In certain years, the gap may be as great as 9,150 acre-feet.

Table 7-6: Projected Agricultural Water Gaps in the White River Basin, Year 2050

2050 Projections (1)	Water Gap (acre-feet)
Average Annual Gap (Mid-Point)	3,550
Gap in the Maximum Gap Year (2)	9,150

Notes:
(1) The mid-point calculation reflects the median between the Colorado Water Plan scenario with the lowest projected gap and the scenario with the highest projected gap.
(2) As defined in the Colorado Water Plan, the "maximum gap year" is the year in which the agricultural gap is the largest, which might not be the year with the highest agricultural demands.
(3) The Colorado Water Plan does not provide projections of agricultural water gaps past the year 2050. Year 2050 gap projections are assumed to be conservative estimates of the agricultural water gaps anticipated in 2070.

The Colorado Water Plan does not project agricultural water gaps past the year 2050. Past the year 2050, those gaps could be further exacerbated due to future regional development, climate change, or other factors. Therefore, HE assumes that the agricultural water gaps presented in Table 7-6 for the year 2050 provide conservative estimates of the gaps that could be expected by 2070.

The Draft Yampa-White Green BIP also states: "Agriculture currently experiences gaps in the late irrigation season that are anticipated to increase under a warmer climate and be exacerbated by increased crop irrigation requirements" (CWCB, 2022).

7.4 Agricultural Water Conservation

Water conservation, in the context of NEPA, is commonly used as a reducer of water demands. For that reason, we have evaluated the prospect for agricultural water conservation is examined below.

More than 90 percent of irrigation in the White River basin is flood irrigation with the remainder irrigation by sprinklers (CWCB, 2022). Drip irrigation and sub-surface irrigation account for an unknown, but presumably small portion of total irrigation practices in the lower White River basin. Water diversions are currently estimated to be about 8.7 acre-feet per acre. Flood irrigation in this area is generally considered to be approximately 50 percent efficient, compared to about 75 percent efficiency with sprinkler irrigation (Gates, 2016). Based on those irrigation efficiencies, 2.1 acre-feet per irrigated acre could be saved by converting to sprinkler irrigation. If 20 percent

[28] The BIP (CWCB, 2022) includes slightly different gap amounts for several planning scenarios; those differences are due to refinements of the Technical Update modeling.

of all flood irrigated acres were converted to sprinkler irrigation, agricultural diversions could be reduced by about 11,800 acre-feet.

Whereas this level of agricultural conservation is theoretically possible, it is considered to be impractical and counter-productive for the following reasons:

1. The U.S. Department of Agriculture (USDA) runs the Environmental Quality Incentives Program (EQIP) which will pay half the up-front cost of conservation equipment to agricultural producers who seek it, but ranchers presumably would need to pay for the other half. The total net income for all Rio Blanco County agricultural producers in 2017 was less than three million dollars (USDA, 2017). The local agricultural sector is in a very weak financial position to make this investment.
2. If the RBWCD made the investment for the ranchers, the RBWCD would not be entitled to the saved water, which would belong to the ranchers if they could use it. There would be no incentive for ranchers to convert to sprinklers unless they benefited, perhaps with additional water supply to use for more irrigation or for other agricultural purposes.
3. There are almost 22,000 acres in the RBWCD and an additional 69,000 acres in the rest of Rio Blanco County that are irrigable but not presently under irrigation (Westwater, 2020). If ranchers were to save water from converting to sprinklers or lining ditches, they might use that water to irrigate additional lands rather than reducing total water needs.
4. If the ranchers reduce water diversions due to conservation but are unable to use that water elsewhere on their property, they risk losing their full right or having it reduced. This would threaten a potentially important asset for those ranchers.
5. Flood irrigation results in considerable return flows, up to 21 percent of total flows in the White River basin (Gates, 2016). Return flows replenish the alluvium and the groundwater table, which allow return flows to be used multiple times by multiple downstream irrigators. Domestic and irrigation wells rely on a productive alluvium. The impacts of a reduction in return flows and groundwater recharge are important concerns with conversion from flood irrigation.

The financial feasibility, motivation, and potential for agricultural water conservation is highly uncertain in the White River basin. As a result, agricultural water conservation was not considered as a viable mechanism to reduce agriculture water needs in this report.

7.5 Summary of Agricultural Water Needs

The White River Basin currently includes about 28,000 irrigated acres and agricultural diversions amount to approximately 243,000 acre-feet in an average year. Historically, basin irrigators have experienced average annual water shortages on agricultural lands of about 2,400 acre-feet; however, irrigation shortages have ranged from less than 500 acre-feet to more than 6,500 acre-feet in individual years. By 2050, in an average year, agricultural diversions are projected to reach 252,000 acre-feet and the projected agricultural water gap (the difference between available supplies and agricultural demands) is expected to increase to about 3,500 acre-feet. However,

the annual gap may be as great as 9,150 acre-feet in very dry years. The estimated 2050 water gaps are assumed to be conservative estimates of year 2070 agricultural gaps; by that year, it is likely that agricultural water supplies will face additional limitations.

8.0 WATER NEEDED FOR ENDANGERED FISH

This section of the report documents the need for additional water storage in the White River to augment river flows to protect and assist in the recovery of federally-listed threatened or endangered fish. Augmentation of White River flows will also help sustain several state fish species of concern. Section 8.1 summarizes the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) purpose, history, and the federally listed threatened and endangered fish that the Recovery Program is working to recover. The current work to complete the White River Management Plan (WRMP) to recover threatened and endangered fish is summarized in Section 8.2. Section 8.3 summarizes the identified flow needs for the recovery of the federally-listed fish, and Section 8.4 summarizes the volume of water needed to meet the identified target flows.

The White River is listed as critical habitat for two federally-listed endangered native fish species, the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*), and is part of the native range of two additional federally-listed species, the humpback chub (*Gila cypha*) and the bonytail chub (*Gila elegans*). Past evaluations of several tributary streams in the upper Colorado River basin (UCRB) for recovering endangered fishes ranked the White River highly for its contributions in maintaining a natural hydrograph, supplementing the input of sediment to the Green River, and for providing high-quality shelter, forage, and breeding habitat to federally-listed and other native fish (Anderson et al., 2019).

Native fish reproduction in the White River and its tributaries has been observed to depend on flow conditions, including spring runoff conditions and the natural basin hydrograph. High spring flows, including overbank flows, over an extended duration in 2011 preceded record-high catch rates of juvenile native fish in fall recruitment surveys, while the lowest fall recruitment levels on record were observed following low runoff volumes and short peak flow durations in 2012 and 2013. Spawning adult native fish have also been observed preferentially migrating into tributaries of the White River with a more natural hydrograph compared to similar tributary basins with greater impacts from irrigation depletions (Anderson et al., 2019).

Recognizing that the White River plays an essential role in the recovery of the federally endangered Colorado pikeminnow and razorback sucker, the Recovery Program developed flow recommendations for the White River that could aid in the recovery of the federally-listed fish. These flow recommendations are described further in Section 8.3 (Anderson et al., 2019). The Recovery Program is currently completing the development of the WRMP, which is a plan to protect and recover the federally listed fish while allowing continued water development in the White River basin. The U.S. Fish & Wildlife Service (USF&WS) will also prepare a Programmatic Biologic Opinion (PBO) for the WRMP. The Recovery Program identified current depletions in the basin as well as a specified amount of anticipated future water depletions through 2050. These depletions are further described in Section 8.2.

The WRMP also evaluated the anticipated impacts of the existing and future depletions to the federally-listed fish life stages and habitat and identified actions that could be implemented by the

Recovery Program to promote recovery of the federally listed fish and offset the effects of the identified depletions (ERO, 2022). USF&WS fisheries biologists with the Recovery Program evaluated the existing and future White River target flows as the WRMP developed and, realized that features do not exist in the basin to substantially augment flows in the White River for the benefit of the federally listed fish. As a result, a phased approach of the White River Management Plan was initiated. This phased approach is described in more detail in Section 8.2. Key elements of the WRMP include the following:

- flow protection;
- habitat protection, assessments, and improvements;
- non-native fish control;
- research and monitoring; and
- propagation and stocking.

This section of the Purpose and Need Report focuses only on the water-based flow protection management action strategies that are currently being evaluated by the Recovery Program for implementation in Colorado. The WRMP and PBO have also identified future depletions and management actions in the State of Utah. Although this section focuses only on future depletions and supplemental flows in Colorado, flow protection measures in Colorado will also benefit White River fisheries habitat in Utah.

8.1 Recovery Program and Threatened and Endangered Fish Status

8.1.1 Threatened & Endangered Fish Status in the White River Basin

The USF&WS listed four fish species native to the Colorado River basin as endangered under the Endangered Species Act (ESA):

- humpback chub (*Gila cypha*) in 1974,
- bonytail chub (*Gila elegans*) in 1980,
- Colorado pikeminnow (*Ptychocheilus lucius*) in 1967, (prior to the ESA) and
- razorback sucker (*Xyrauchen texanus*) in 1991.

Degradation and loss of habitat, as well as introduction of competitive and predatory nonnative fish species, contributed to further population decline for all four species throughout their historic range through the late 1980s. Recovery and management actions have had varying degrees of success in reversing the population decline, including the reclassification of the humpback chub from endangered to threatened on November 17, 2021, due to substantial improvements in the species' overall status since its original listing (Federal Register, 86 FR 57588, 2021).

The White River is listed as critical habitat for Colorado pikeminnow for 150 river miles upstream of its confluence with the Green River. Overall Colorado pikeminnow abundance has declined since 2000, but the White River has consistently had the highest catch rates in the UCRB for Colorado pikeminnow since regular population sampling began in 1991 (Anderson et al., 2019). The White River has been found to host all age classes of the Colorado pikeminnow, indicating

that it provides quality habitat for juvenile and adult fish. Adult fish which spend a majority of the year in the White River have been documented migrating outside the White River to spawn in other tributaries of the Upper Colorado River since the early 1980s, indicating that spawning habitat in the White River may be limited under current conditions (Anderson et al., 2019).

The White River is listed as critical habitat for the razorback sucker for 18 river miles upstream of its confluence with the Green River. Razorback sucker populations upstream of Lake Powell were being supplemented with stocked fish as of 2019. None of the stocking efforts in the UCRB to date have been in the White River. There was no documented razorback sucker population in the White River as recently as 1998, but sampling events since that time have documented an increasing population, with captures progressing further upstream year-to-year, including the documentation of razorback sucker spawning in the White River for the first time in 2011, a high-flow year (Anderson et al., 2019). This data indicates the ongoing colonization of the lower White River by razorback suckers from other portions of the UCRB.

8.1.2 The Recovery Program

In the 1970s, the USF&WS determined that any depletion of water in the UCRB would result in an adverse impact to endangered fish. In 1983, the USF&WS proposed minimum stream flows for all reaches of the UCRB that were occupied by endangered fish with a requirement that any water project causing water depletions below these minimum stream flows be required to replace the depletions. This requirement would have curtailed water development in the UCRB, put limits on the use of existing water supplies, and conflicted with existing federal and state water laws. This was a controversial issue that was likely to result in lawsuits, conflicts in the enforcement of the ESA, or amendments or exemptions from compliance with the ESA.

In 1985, the Colorado water users proposed a Recovery Program be commenced to recover and de-list the endangered fish species in the UCRB, so these fish no longer required ESA protection and to address conflicts between the ESA and water development (USBR, 2003). The general framework of the Recovery Program was complete in late 1987 and the Recovery Program was established in 1988.

The Recovery Program is a partnership of state governments, federal agencies, water and power interests, and environmental groups responsible for fish recovery planning and implementation. The goals of this partnership are to work together to recover listed fish in the UCRB and to allow continued development and management of water consistent with apportionments of water by interstate compacts and state water law in compliance with the ESA. The Recovery Program is operated under the Program Directors Office (PDO) and is staffed by the USF&WS.

The Recovery Program has the following goal: “The Recovery Program relies on recovery goals to develop and implement management actions and measure success. The recovery goals provide objective, measurable criteria for down-listing to “threatened” and delisting, removal from Endangered Species Act protection.” The goal of the Recovery Program is not to maintain status quo of the threatened and endangered fish populations in the UCRB, but to eventually have sustainable, thriving species that can be delisted. Also, the goal of the Recovery Program is to

identify reasonable future depletions and develop a management plan that can allow these future depletions to occur without sustaining impacts to the endangered fish populations.

The Recovery Program has undertaken several activities to protect and recover these species in several UCRBs, including the Colorado River, the Yampa River, and the Gunnison River. Table 8-1 documents the amount of future annual river basin depletions that are covered in the Colorado River PBO (USF&WS, 1999), the Gunnison River PBO (USF&WS, 2009) and the Yampa River PBO (USF&WS, 2005). The percentage of annual water released from storage to enhance federally-listed fish habitat ranges from 13 to 55 percent of the new annual depletions that are covered by the specific PBOs in those basins.

The intent of the White River PBO is that it be similar in scope and function to other PBOs developed for a 15-Mile Reach of the Colorado River, the Yampa River, and the Gunnison River (CWCB, 2020).

Table 8-1: Endangered Fish Water Storage in Other Upper Colorado River Basin PBOs

River Basin	New Depletions Covered by PBO (acre-feet)	Endangered Fish Water Released from Storage (acre-feet/year)	Percentage of Annual Storage to New Depletions
Colorado River (15-mile Reach)	120,000	66,000	55%
Gunnison	37,900	17,200	45%
Yampa	53,500	7,000	13%

8.2 White River Management Plan (WRMP) and the Programmatic Biological Opinion (PBO)

It was recommended that a PBO be developed for the White River in a 2002 Recovery Program Project 114 Annual Report, Tributary Basin Management Plans (Recovery Program, 2013). The focus area of the White River PBO and Management Plan is shown on Figure 8-1. Designated critical habitat for federally-listed fish in the White River is shown on Figure 8-2.

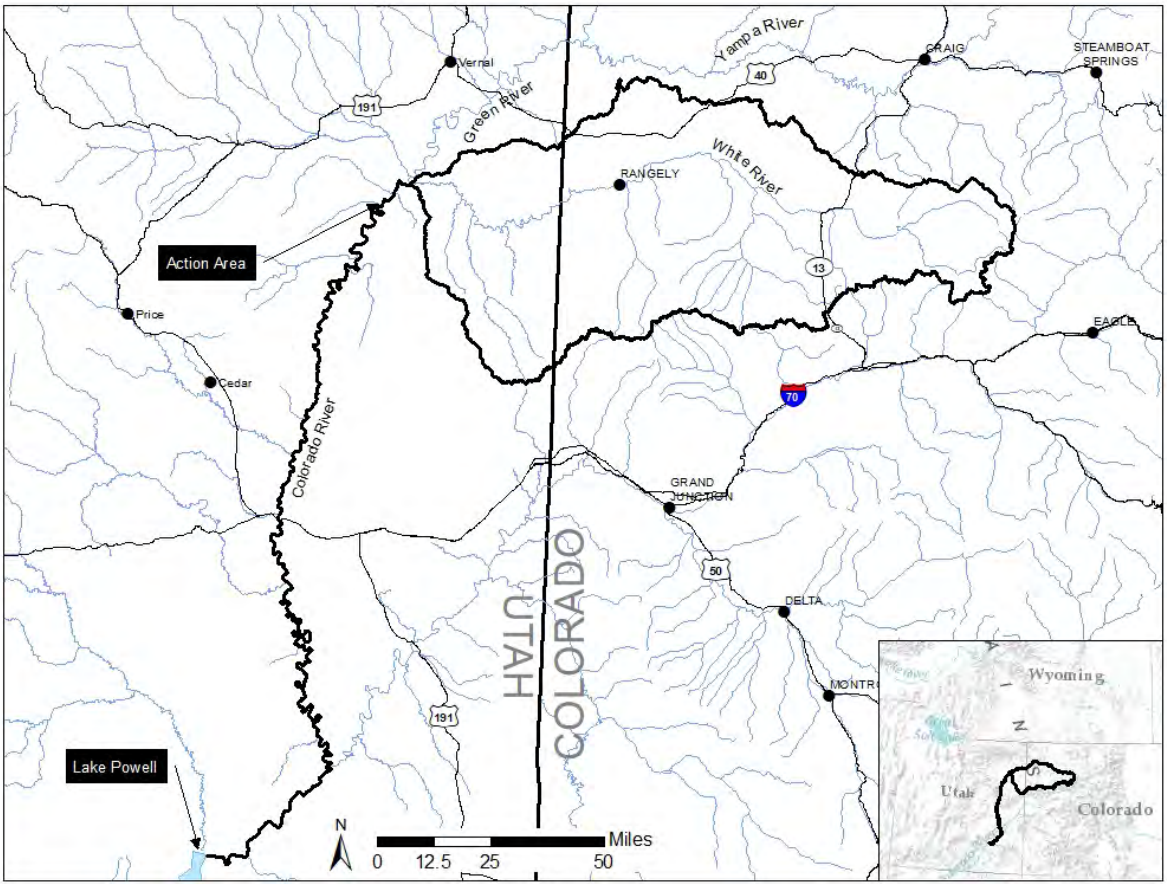


Figure 8-1: White River Basin Action Area for the WRMP

A Planning Team consisting of representatives from the UCRB water users, the Recovery Program, Colorado Water Conservation Board (CWCB), Utah Division of Water Resources, The Nature Conservancy (TNC), the Ute Indian Tribe, and the RBWCD has been meeting since 2016 to help guide the process of developing preliminary endangered fish flow targets for the White River and testing those against future demand scenarios. Some of this work was done in conjunction with work performed by the Yampa/White/Green Basin Roundtable, using a modified version of the StateMod model (WWG, 2018). The WRMP and PBO for the White River basin are based on the draft endangered fish flows recommendations; a volume of future water demands; and recovery actions that could offset depletion effects on endangered fish species associated with the demands.

In 2020, the CWCB, in cooperation with the Recovery Program, solicited proposals for a third-party contractor to assist with drafting the WRMP, conducting NEPA compliance, and preparing NEPA documentation. The WRMP is scheduled to be finalized in 2022. Once a cooperative agreement to implement the WRMP is established, likely signatories include the USF&WS, the states of Colorado and Utah, and perhaps other parties such as the RBWCD and the Ute Indian Tribe of the Uintah and Ouray Reservations, as appropriate. The signing of the cooperative agreement by the USF&WS will be a federal agency action that "may affect listed species or critical habitat," triggering formal consultation under Section 7 of the ESA, 50 C.F.R. § 402.14(a).

Formal Section 7 consultation will generate a PBO for the White River to provide ESA compliance for existing depletions and a specified amount of projected future depletions through 2050 in the basin.

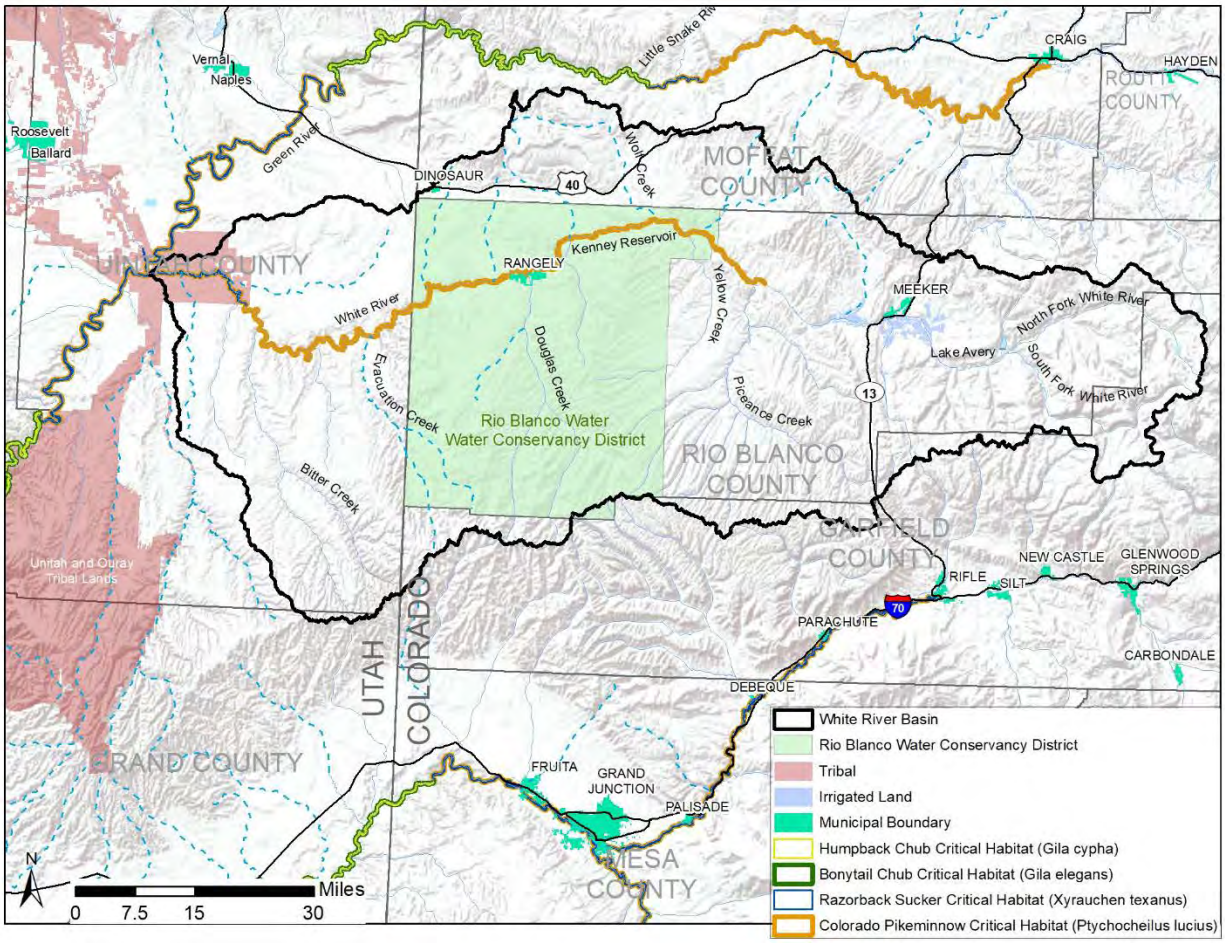


Figure 8-2: White River Basin and Designated Critical Habitat for the WRMP

The draft endangered fish flows recommendations developed by the USF&WS include a range of target flows, based on the hydrologic year type, such as wet, dry, etc., to meet peak flows, shoulder peak flows, baseflows during the irrigation season, and baseflows during the non-irrigation season. These flow targets are intended to maintain satisfactory channel conditions and to protect flows vital for fish passage, forage, and shelter for native and endangered fish. The suite of flow targets is further described in Section 8.3 of this report and in Anderson et al., 2019.

The Recovery Program identified current and future depletions in the White River and determined which of these would be covered by the PBO. These future depletions were specified through 2050. Later in the process, it was identified that mechanisms do not exist in the basin to substantially augment flows in the White River for the benefit of the federally-listed fish. This resulted in a new phased approach to the WRMP and the future depletions being segregated into a specified amount of reasonably foreseeable future water depletions for an initial approximately

10-year period through 2032 (Phase 1), and projected depletions through 2050 (Phase 2). The phased approach is further described in Section 8.2.1.

8.2.1 Phased Approach for the WRMP and PBO

As the Recovery Program planning team was working through the evaluation of the recommended recovery actions to benefit endangered fish in the White River, USF&WS biologists recognized that "Reliable mechanisms to substantially augment flows in the White River to benefit endangered fish are not available for implementation at this time." A phased approach was developed for the PBO implementation as a result of the uncertainty associated with future water development in the White River basin, the timing and nature of future mechanisms to protect and augment White River flows, and the potential impacts of climate change on the basin hydrology.

Phase 1 of the PBO is intended to provide immediate ESA compliance for existing depletions and new depletions to address White River demands through 2032 through the implementation of specified management actions by the Recovery Program. The USF&WS will only consult on Phase 1 during the current PBO consultation due to the uncertainties of future conditions in the White River basin.

Phase 2 will begin when the PBO is modified to incorporate additional management actions to augment flows in the White River and is anticipated to cover depletions through year 2050. Phase 2 will require additional Section 7 consultation from the USF&WS. Phase 2 is planned to be initiated automatically after 10 years or when any of the following occurs:

- The entirety of Phase 1 depletions identified in the WRMP and PBO have been consulted on in either Utah or Colorado;
- New basin storage becomes operational and available to provide flow augmentation benefits for the listed fish pursuant to the Section 7 consultation on the project; or
- Other mechanisms become available to substantially augment flows in the White River for the benefit of the listed fish.

8.3 Summary of Flow Targets for Fish Recovery

As discussed above, population surveys of federally-listed and other native fish in the White River indicate that the current flow regime provides favorable habitat for juvenile and adult Colorado pikeminnow and razorback sucker, but habitat for spawning and for larval fish nurseries seems to be limited. The USF&WS identified "adequate magnitude, duration, and frequency of annual spring high flows, and adequate base flows during the annual low-flow period" as "important characteristics of the White River's natural flow regime that, in the USF&WS's opinion, should be preserved to the greatest extent practicable to help conserve and recover endangered fish in the UCRB system" (Anderson et al., 2019).

In order to quantify these characteristics of the White River's natural flow regime, the USF&WS collaborated with Wilson Water Group (WWG) and other entities invested in the White River basin in 2018 to adapt the monthly water allocation and accounting model StateMod to generate a daily

flow model for the White River. WWG characterized a current (circa 2015) “Baseline Condition” for basin water demands and depletions. This simulated baseline condition was then used to account for irrigation demands, lagged return flows, municipal demands, and oil and gas development demands over a period of record spanning 40 years, from April 1, 1975 to March 31, 2015 (Anderson et al., 2019). To preserve the hydrologic influence of spring and summer high flow months on subsequent fall and winter base flow months, historic gage data was grouped by “forecast year” (April 1 through March 30) rather than by “water year” (October 1 through September 30).

In 2019, Anderson et al. prepared a review of past studies on fish populations and flow regimes of the White River for the USF&WS and, using WWG’s work, the review authors and USF&WS jointly prepared seasonal flow recommendations to preserve critical future White River flow regime characteristics (Anderson et al, 2019). To account for interannual variability in White River flows, five hydrologic year types were defined by grouping runoff volume exceedances over the 40-year period of record, with the following categories:

- Wet (0-10 percent exceedance),
- Moderately Wet (10-30 percent exceedance),
- Average (30 to 70 percent exceedance),
- Moderately Dry (70 to 90 percent exceedance), and
- Dry (90 to 100 percent exceedance).

Seasonal flow recommendations were provided for each category for the:

- spring runoff median annual one-day peak,
- the shoulder peak magnitude,
- the shoulder peak duration,
- the base flow during irrigation season, and
- the base flow during non-irrigation season.

The median annual one-day peak flow recommendations were taken from the peak flow that occurred in fifty percent of the years in each category. Shoulder peak magnitude recommendations were based on a previous study into the geomorphologic functions of high flows in the White River. Flow recommendations were calculated to ensure functions such as bed scour, sediment transport, and gravel entrainment would occur in varying but significant degrees for all year types except Dry. Shoulder peak flow duration recommendations were based on the number of days per year in each category which exceeded the recommended shoulder peak magnitude for that year type (Anderson et al., 2019). These spring peak and shoulder flow recommendations are presented in Table 8-2.

Tables 8-3 and 8-4 summarize base flow recommendations outside of spring runoff season that were separated into irrigation season (varying start dates through October 31) and non-irrigation season (November 1 through March 31), with irrigation season beginning earlier in the year during drier year types and later in the year during wetter year types. Anderson et al. found, in comparing historic gage data with simulated developed and natural flow regimes, that irrigation-related

diversions seem to exacerbate low flows prior to November 1st, during the period when the White River tends to be at its lowest annual flow, while irrigation-related lagged return flows seem to augment post-irrigation season flows. The USF&WS considered that this warranted separate recommendations to protect irrigation-season base flows as a higher priority in comparison to post-irrigation season flows, as irrigation season coincides with multiple other seasonally heightened threats to ESA-listed fish (Anderson et al. 2019).

The USF&WS irrigation season and non-irrigation season base flow recommendations and exceedance value targets for each hydrologic year type were primarily based on the corresponding simulated WWG Baseline Condition. However, this methodology resulted in seven excessively low irrigation-season flow targets. Previous studies of White River fish habitat under varying flow conditions identified specific flow thresholds that significantly reduced useable habitat area for adult Colorado pikeminnow, and so the USF&WS raised the unsatisfactory targets to protect the fish habitat to the extent reasonable, while considering the limited water available in the Whiter River basin to augment flows. The USF&WS acknowledged that flows higher than their recommendations would likely benefit endangered fish, but there was no way provide those flows under current basin conditions (Anderson et al., 2019). Recommended irrigation-season baseflows are presented in Table 8-3 and recommended non-irrigation-season baseflows are presented in Table 8-4.

The RBWCD independently commissioned a detailed, independent review of the flow targets as they pertain to the recovery of the endangered species. An Expert Technical Report was prepared by Dr. William Miller, a senior aquatic ecologist with over 30 years of experience (Miller, 2020). Dr. Miller reviewed the objectives of the Recovery Program, the hydrology of the White River, multiple studies of endangered fish in the White River and in the UCRB generally, the White River flow recommendations prepared by Anderson et al. and the USF&WS, and the projected water demands and proposed storage project in the Whiter River basin. His report focused on the interplay of fish behavior and habitat and river flow regimes, specifically the importance of seasonal habitat availability and opportunities for migration.

Dr. Miller agreed that the USF&WS flow recommendations for peak and shoulder flows seemed “appropriate to maintain and benefit the endangered fish in the White River”, and he concurred with the separate baseflow recommendations for irrigation and non-irrigation seasons, given the different ways endangered fishes utilize their habitats during the summer and the winter (Miller, 2020). Regarding irrigation-season base flows, however, it was his opinion that “the minimum flow in the White River to benefit endangered fishes should be 150 cfs.” He noted that, as flows in the White River drop below 150 cfs, the number of riffles passable by adult Colorado pikeminnow drops drastically, trapping fish in shorter reaches of river or in pools, which in summer may result in greater vulnerability to predators, sun exposure, and high water temperatures. Furthermore, riffle habitats become less productive below 150 cfs for food resources which both Colorado pikeminnow and Razorback sucker consume. Dr. Miller acknowledged that this baseflow would require augmentation in drier years to meet the recommended flows for maintenance and recovery of endangered fishes (Miller, 2020). The changes in flow recommendations as

recommended by Dr. Miller are incorporated into Table 8-3. Dr. Miller's report is provided in Appendix C.

Table 8-2: Recommended Spring Peak and Shoulder Flows by Hydrologic Year Type (Anderson et al., 2019)

	Hydrologic Year Type				
	Wet (10%)	**Mod. Wet (10-30%)**	**Ave (30-70%)**	**Mod Dry (70-90%)**	**Dry (90%)**
Median annual peak (1-day)	5,250 cfs	4,100 cfs	3,300 cfs	1,700 cfs	1,000 cfs
Shoulder peak magnitude	3,700 cfs	2,900 cfs	1,700 cfs	1,400 cfs	700 cfs
Shoulder peak duration in 50% of years (and range)	>30 days (25 to 35 days)	>20 days (15 to 40 days)	>30 days (20 to 45 days)	>10 days (1 to 30 days)	>15 days (5 to 40 days)

Table 8-3: Recommended Irrigation-Season Base Flows, by Hydrologic Year Type with Recommended Flows from Miller Included (Anderson et al., 2019)

Percent of days specified target met:	**Hydrologic Year Type**				
	Wet (10%)	**Mod. Wet (10-30%)**	**Ave. (30-70%)**	**Mod Dry (70-90%)**	**Dry (90%)**
	Dates of Applicability				
	Aug 15 – Oct 31 (78 days)	**Aug 1 – Oct 31 (92 days)**	**Jul 15 – Oct 31 (109 days)**	**Jul 1 – Oct 31 (123 days)**	**Jun 15 – Oct 31 (139 days)**
50%	500 cfs (39 days)	490 cfs (46 days)	390 cfs (55 days)	280 cfs (62 days)	150 cfs (1) (70 days)
90%	430 cfs (70 days)	305 cfs (83 days)	200 cfs (98 days)	150 cfs (1) (111 days)	70 cfs (1) ***Miller=150 cfs*** (125 days)
100%	230 cfs (78 days)	200 cfs (1) (92 days)	120 cfs (1) ***Miller=150 cfs*** (109 days)	100 cfs (1) ***Miller=150 cfs*** (123 days)	30 cfs (1) ***Miller=150 cfs*** (139 days)

Note: (1) USF&WS base flow recommendation higher than WWG Baseline Condition.

Table 8-4: Recommended Non-Irrigation Season Baseflows, by Hydrologic Year Type (Anderson et al., 2019)

Percent of days specified target was met	Hydrologic Year Type				
	Wet (10%)	Mod. Wet (10-30%)	Ave. (30-70%)	Mod Dry (70-90%)	Dry (90%)
	Dates of Applicability: Nov 1 through Mar 31 (151 days)				
50%	500 cfs (76 days)	425 cfs (76 days)	390 cfs (76 days)	340 cfs (76 days)	300 cfs (76 days)
90%	360 cfs (136 days)	295 cfs (136 days)	265 cfs (136 days)	230 cfs (136 days)	165 cfs (136 days)
100%	220 cfs (151 days)	200 cfs (151 days)	145 cfs (151 days)	135 cfs (151 days)	105 cfs (151 days)

8.4 Volume of water to meet identified flow objectives for species recovery

W. W. Wheeler & Associates, Inc. (Wheeler) developed a model to evaluate existing daily flows in the White River in comparison to the interim endangered fish target flow recommendations at the Watson gage based on the (Anderson et al., 2019) report. The model uses flow data from the USGS gage on the White River near Watson, Utah (09306500) for the period of record which includes 56 years of stream flow data from 1962 to 2021. Data and results from forecast year 2016 were excluded because data was not available from December 2016 to February 2017.

Wheeler evaluated two scenarios:

1) Water needed to meet the flow targets at the Watson gage under present conditions based on historical streamflow data.
2) Water needed to meet the flow targets at the Watson gage under future conditions assuming a reduced streamflow to meet the projected future demands. Under this scenario, daily flows at the Watson gage were reduced by the expected future water depletions identified by the Recovery Program.

Wheeler's model calculated the volume of water at the Watson gage needed to meet the target flows for the specified durations identified by Anderson et al., 2019 including peak flows, shoulder peak flows, baseflows during the irrigation season, and baseflows during the non-irrigation season. The model used a "forecast year", April 1 to March 31, in the analysis in lieu of a calendar or water year assessment to preserve the hydrologic influence between spring and summer high flow months and the subsequent fall and winter base flow months. A similar modeling approach was adopted by the WWG for the Recovery Program planning team (WWG, 2018). Each forecast year was categorized into a hydrologic year category based on the flow volume from April 1 to July 31, consistent with Anderson et al., 2019.

An example of the target flows, existing flows, and existing flows with future depletions for the irrigation season, non-irrigation season, and peak shoulder flows for forecast year 2017 are summarized on Figures 8-3, 8-4, and 8-5, respectively. Forecast year 2017 was classified as an "average" hydrologic year. This year was selected as an example because it provides a good overview of when the flows are short of target flows during their respective periods. Wheeler's model identifies the minimum amount of water required to meet the target flows for the specified duration. On Figures 8-3, 8-4, and 8-5, the areas where the "existing flow" or the "existing flow (with depletions)" is below the "flow target" line indicates times during the period that the recommended flow targets are not met.

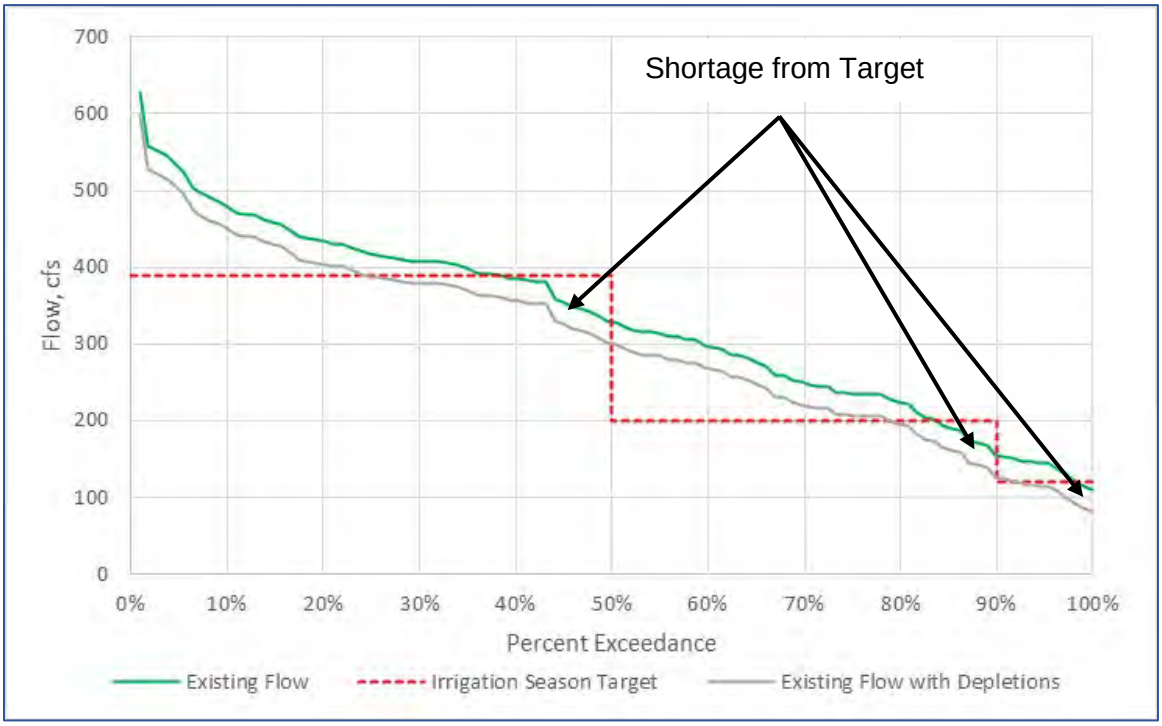


Figure 8-3: Flow Duration Curve for Forecast Year 2017 Irrigation Season (Average Hydrologic Year)

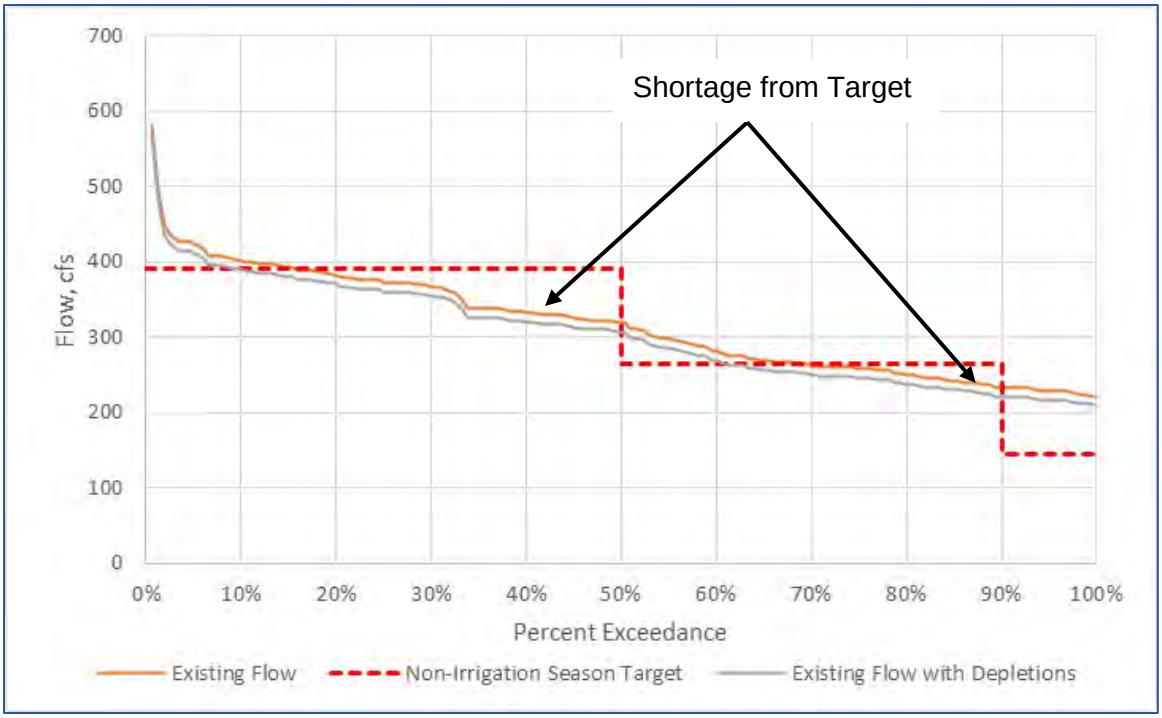


Figure 8-4: Flow Duration Curve for Forecast Year 2017 Non-Irrigation Season (Average Hydrologic Year)

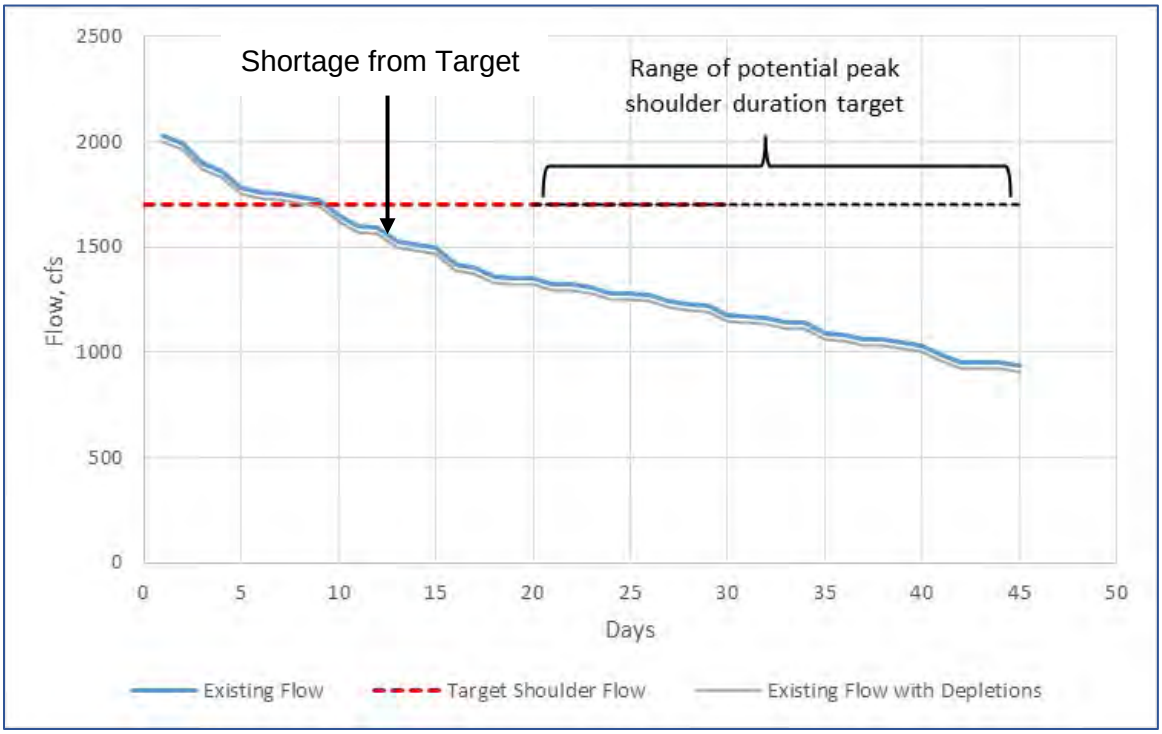


Figure 8-5: Shoulder Flow Magnitudes and Durations for Forecast Year 2017 (Average Hydrologic Year)

The shortage calculations for the peak shoulder flows are based on the average duration listed in Table 8-2. For example, as shown on Figure 8-5 for 2017, the volume of water that is needed is based on the 30-day shoulder flow duration whereas the range extends from 20 to 45 days.

Figure 8-6 summarizes the water volume shortage relative to endangered fish flow targets for each forecast year with no demands, and also with the future demands identified by the Recovery Program.

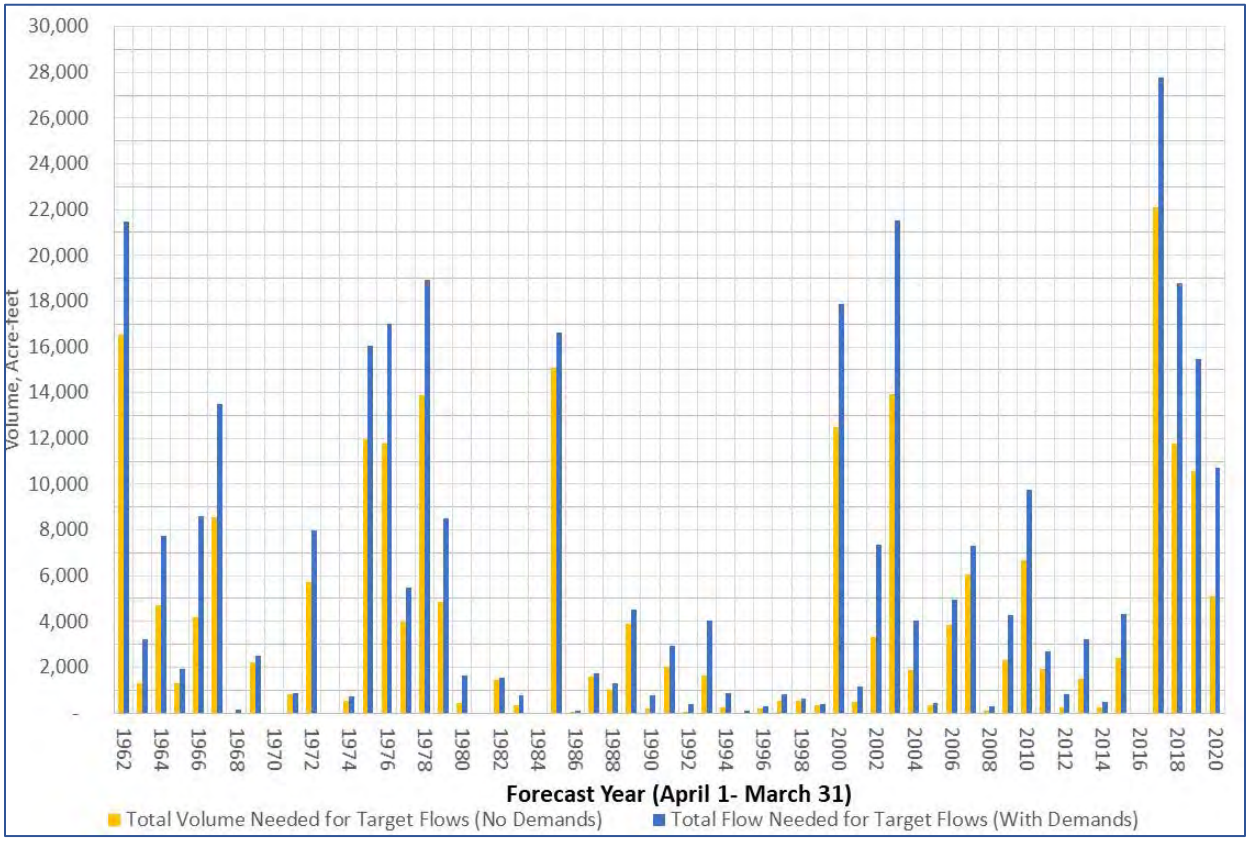


Figure 8-6: Supplemental Water Volume Needed to Meet Endangered Fish 2019 Interim Flow Targets with Demands Identified by the Recovery Program

8.5 Summary of Supplemental Water Needed for Endangered Fish

The data on Figure 8-6 indicates that to achieve the flow targets established by Anderson et al. in 2019, 22,084 acre-feet of water could be needed in a forecast year without any additional depletions occurring to the White River, and over 27,778 acre-feet of water could be needed in a forecast year with projected future depletions. This volume includes the water needed to meet the flow targets identified in the respective forecast year for peak flows, shoulder peak flows, baseflows during the irrigation season, and baseflows during the non-irrigation season. It should be noted that neither the WRMP nor the PBO has been finalized as of this report date. As a result, the volume of water needed to recover the endangered species in the White River has not been finalized by the Recovery Program.

It is important to note that the annual projected volumes of water needed to meet the flow targets do not account for climate change, additional volumes needed to account for transit losses if the supplemental flows are provided from an upstream water source, or the potential for multi-year drought conditions. Also, the RBWCD's commissioned study of the endangered fish population needs on the White River identified that irrigation season baseflows should be a minimum of 150 cfs to assist in the recovery of the endangered species (Miller, 2020). As a result, it could be very possible that additional flow is necessary, beyond what has been identified by the Recovery Program flow targets, to achieve the Recovery Program's goals of achieving species recovery resulting in a de-listing of endangered fish populations (Miller, 2020).

It should also be noted that the depletions that were used to determine the volume of water needed for endangered fish are solely based on the depletions identified by the Recovery Program.

9.0 SUMMARY

This section of the report summarizes the identified current and reasonably projected future water supply needs in the White River Basin in Colorado. The RBWCD's proposed WRRWSP would meet a portion of the identified water supply needs.

9.1 Summary of Each Need

This Purpose and Need Report documents multiple current and reasonably projected future water supply needs in the White River Basin. The volume of each type of water needs is summarized in Table 9-1.

Table 9-1: Summary of Water Supply Needs in the White River Basin

Water Use Sector	Water Supply Needs (acre-feet)
Municipal	3,895 (1)
Taylor Draw Dam Hydropower	142,266 (2)
Flatwater Recreation	91,468 (3)
Colorado River Compact curtailment	35,664 (4)
Agricultural	9,150 (5)
Water for Endangered Fish	27,778 (6)

Notes:

(1) Includes future municipal dry year water demands and lost storage volume in Kenney Reservoir.
(2) Based on upstream junior water rights that could be called out if the RBWCD's direct flow hydropower water rights are not satisfied.
(3) Amount of water storage required to meet a minimum of 2,530 surface acres. The water volume associated with this surface area is dependent on the water storage site but was approximated using a site that the RBWCD owns a water right for (RBWCD, 2021-3).
(4) Based on 11,888 acre-feet per year assuming a three-year curtailment. This amount accounts for the absolute decreed water rights as of 2020.
(5) Based on mid-point water gap in 2050.
(6) Based on 27,778 acre-feet of water needed in a forecast year.

Each of these identified water volumes summarize the needs of each identified water use sector. These water needs include consumptive as well as non-consumptive uses. It is probable that a portion of these needs can be met through conjunctive use management once additional supplies are developed. This will be further examined in subsequent NEPA documents.

It should be noted, especially for the multi-non-consumptive needs, if supplemental water supplies are provided to meet one water need, other needs can also be met by the same water. For example, if additional water is needed in the White River to meet obligations of the Colorado River Compact, the additional water in the White River and UCRB will also benefit the endangered fish, requiring less releases to meet specified flow targets. This water could also be used at Taylor Draw Dam to generate power and reduce the potential for or magnitude of Taylor Draw power

water calls. Similarly, if Taylor Draw Dam needs supplemental water for hydroelectric generation, that water could also benefit the endangered fish, requiring less or no releases to meet specified flow targets.

The RBWCD plans to meet a portion of the basin's current and reasonably projected future additional water supply needs, which include the replacement of the uses provided by Kenney Reservoir, by providing approximately 66,720 acre-feet of new water supply with the WRRWSP. The WRRWSP is intended to meet a portion of the identified needs identified in Table 9-1.

It should be noted that water future needs for rural domestic water users and energy development such as oil shale, oil, and natural gas are expected, but are not explicitly identified in this report. There are more than 1,635 cfs (1,183,686 acre-feet per year) in conditional water rights on the White River, with many of these conditional water rights associated with energy development. An augmentation plan is a useful mechanism for responding to multiple water needs in the White River basin.

9.2 Potential Climate Change Impacts

The need for significant supplemental water supplies in the White River documented in this report should be considered as a lower end estimate. The effects of climate change are expected to further reduce future flows in the White River and other tributaries of the Colorado River. With lower flows in the White River, water demand deficits for agriculture, municipal, hydropower production at Taylor Draw Dam, and for providing supplemental flows for endangered fish are expected to be greater than what is summarized in Table 9-1. In addition, the probability that a Colorado River Compact curtailment call will be implemented in the White River will increase due to climate change. Supplemental water supplies to mitigate the effects of a Colorado River Compact curtailment provides a reliable insurance policy for both humans and the numerous fish and wildlife species that rely on the lower White River for survival.

The "Hot and Dry" and "between" climate scenarios were reviewed by the Yampa/White/Green Basin Roundtable and these climate scenarios were projected on the existing White River flow data and included on Figures 9-1 and 9-2 (WWG, 2018). As observed in the figures, the climate change scenarios generally show less available water in the future and have a shift in the hydrograph with runoff occurring earlier and more sustained shortages in the late fall months, when flows are already low.

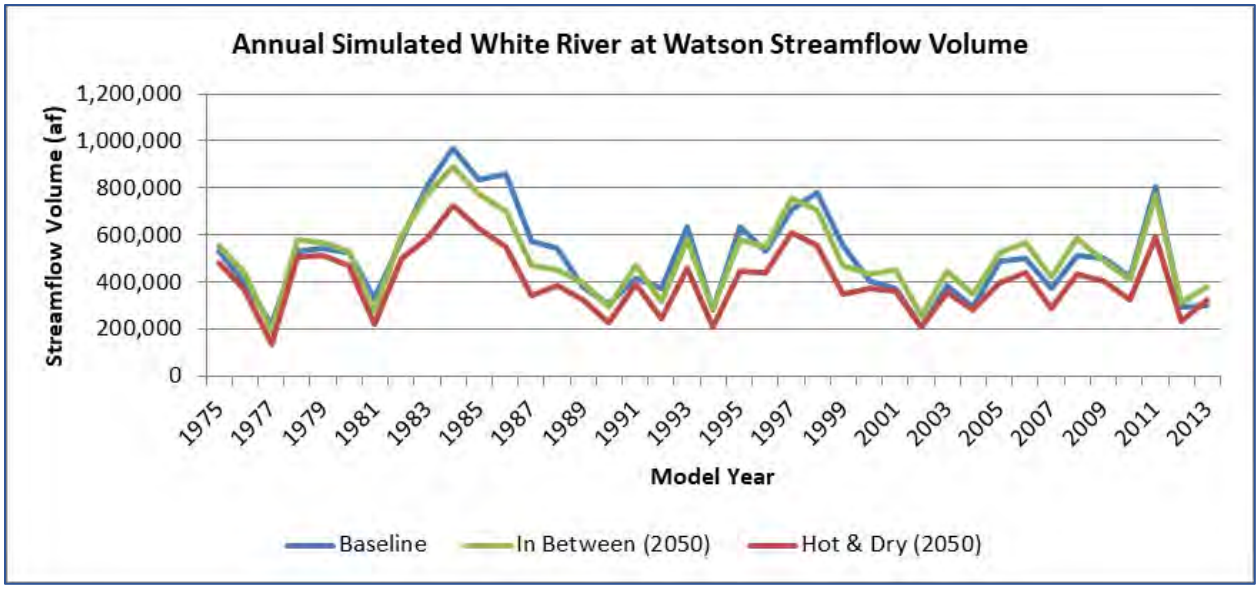


Figure 9-1: Projected Annual Changes in White River Flows Due to Climate Change

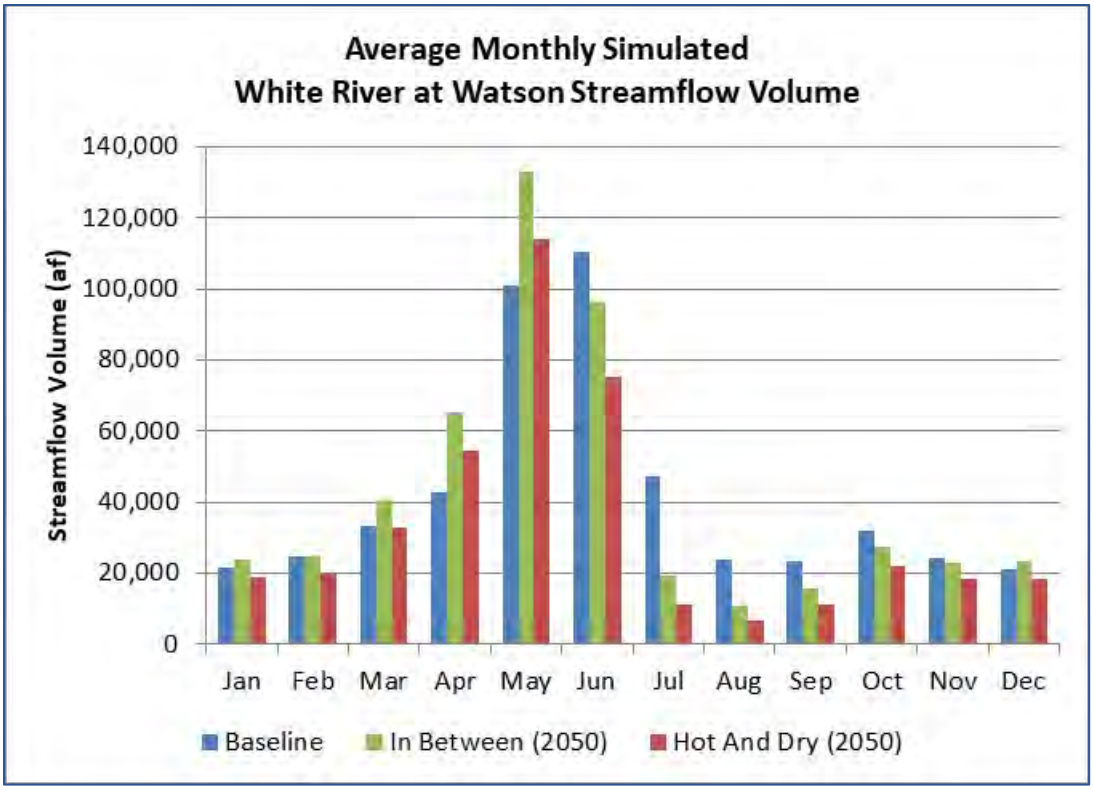


Figure 9-2: Projected Average Monthly Changes in White River Flows Due to Climate Change

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APPENDIX A

SUMMARY OF COLORADO WATER PLAN FUTURE PLANNING SCENARIOS

APPENDIX A
Colorado Water Plan Future Planning Scenarios

The scenarios referred to in the Purpose and Need Report are described in this section. Further information and data from the Colorado Water Plan relied upon in this report are available in the Analysis and Technical Update to the Water Plan (2019) and on the Colorado Water Plan website, https://cwcb.colorado.gov/colorado-water-plan.

A.1 Planning Scenario Descriptions

The Colorado Water Plan includes the following descriptions of the five future planning scenarios:

Business as Usual. Recent trends continue into the future. Few unanticipated events occur. The economy goes through regular economic cycles but grows over time. By 2050, Colorado's population is close to 9 million people. Single family homes dominate, but there is a slow increase of denser developments in large urban areas. Social values and regulations remain the same, but streamflow and water supplies show increased stress. Regulations are not well coordinated and create increasing uncertainty for local planners and water managers. Willingness to pay for social and environmental mitigation of new water development slowly increases. Municipal water conservation efforts slowly increase. Oil-shale development continues to be researched as an option. Large portions of agricultural land around cities are developed by 2050. Transfer of water from agriculture to urban uses continues. Efforts to mitigate the effects of the transfers slowly increase. Agricultural economies continue to be viable, but agricultural water use continues to decline. The climate is similar to the observed conditions of the 20th century.

Weak Economy. The world's economy struggles, and the state's economy is slow to improve. Population growth is lower than currently projected, which is slowing the conversion of agricultural land to housing. The maintenance of infrastructure, including water facilities, becomes difficult to fund. Many sectors of the State's economy, including most water users and water-dependent businesses, begin to struggle financially. There is little change in social values, levels of water conservation, urban land use patterns, and environmental regulations. Regulations are not well coordinated and create increasing uncertainty for local planners and water managers. Willingness to pay for social and environmental mitigation decreases due to economic concerns. Greenhouse gas emissions do not grow as much as projected, and the climate is similar to the observed conditions of the 20th century.

Cooperative Growth. Environmental stewardship becomes the norm. Broad alliances form to provide for more integrated and efficient planning and development. Population growth is consistent with current forecasts. Mass transportation planning concentrates more development in urban centers and mountain resort communities, thereby slowing the loss of agricultural land and reducing the strain on natural resources compared to traditional development. Coloradans embrace water and energy conservation. New water-saving technologies emerge. Ecotourism thrives. Water-development controls are more restrictive and require both high water-use efficiency and environmental and recreation benefits. Environmental regulations are more

protective and include efforts to reoperate water supply projects to reduce effects. Demand for more water-efficient foods reduces water use. There is a moderate warming of the climate, which results in increased water use in all sectors and in turn, affects streamflow and supplies. This dynamic reinforces the social value of widespread water efficiency and increased environmental protection.

Adaptive Innovation. A much warmer climate causes major environmental problems globally and locally. Social attitudes shift to a shared responsibility to address problems. Technological innovation becomes the dominant solution. Strong investments in research lead to breakthrough efficiencies in the use of natural resources, including water. Renewable and clean energy become dominant. Colorado is a research hub and has a strong economy. The relatively cooler weather in Colorado (due to its higher elevation) and the high-tech job market cause population to grow faster than currently projected. The warmer climate increases demand for irrigation water in agriculture and municipal uses, but innovative technology mitigates the increased demand. The warmer climate reduces global food production, which increases the market for local agriculture and food imports to Colorado. More food is bought locally, which increases local food prices and reduces the loss of agricultural land to urban development. Higher water efficiency helps maintain streamflow, even as water supplies decline. The regulations are well defined, and permitting outcomes are predictable and expedited. The environment declines and shifts to becoming habitat for warmer-weather species. Droughts and floods become more extreme. More compact urban development occurs through innovations in mass transit.

Hot Growth. A vibrant economy fuels population growth and development throughout the state. Regulations are relaxed in favor of flexibility to promote and pursue business development. A much warmer global climate brings more people to Colorado with its relatively cooler climate. Families prefer low-density housing, and many seek rural properties, ranchettes, and mountain living. Agricultural and other open lands are rapidly developed. A hotter climate decreases global food production. Worldwide demand for agricultural products rises, which increases food prices. Hot and dry conditions lead to a decline in streamflow and water supplies. The environment degrades and shifts to becoming habitat for species adapted to warmer waters and climate. Droughts and floods become more extreme. Communities struggle to provide services needed to accommodate rapid business and population growth. Fossil fuel, the dominant energy source, is supplemented by production of oil shale, coal, natural gas, and oil in the state.

Figure A-1 (presented in the Water Plan) provides a visual description of each of the Water Plan's five future planning scenarios.

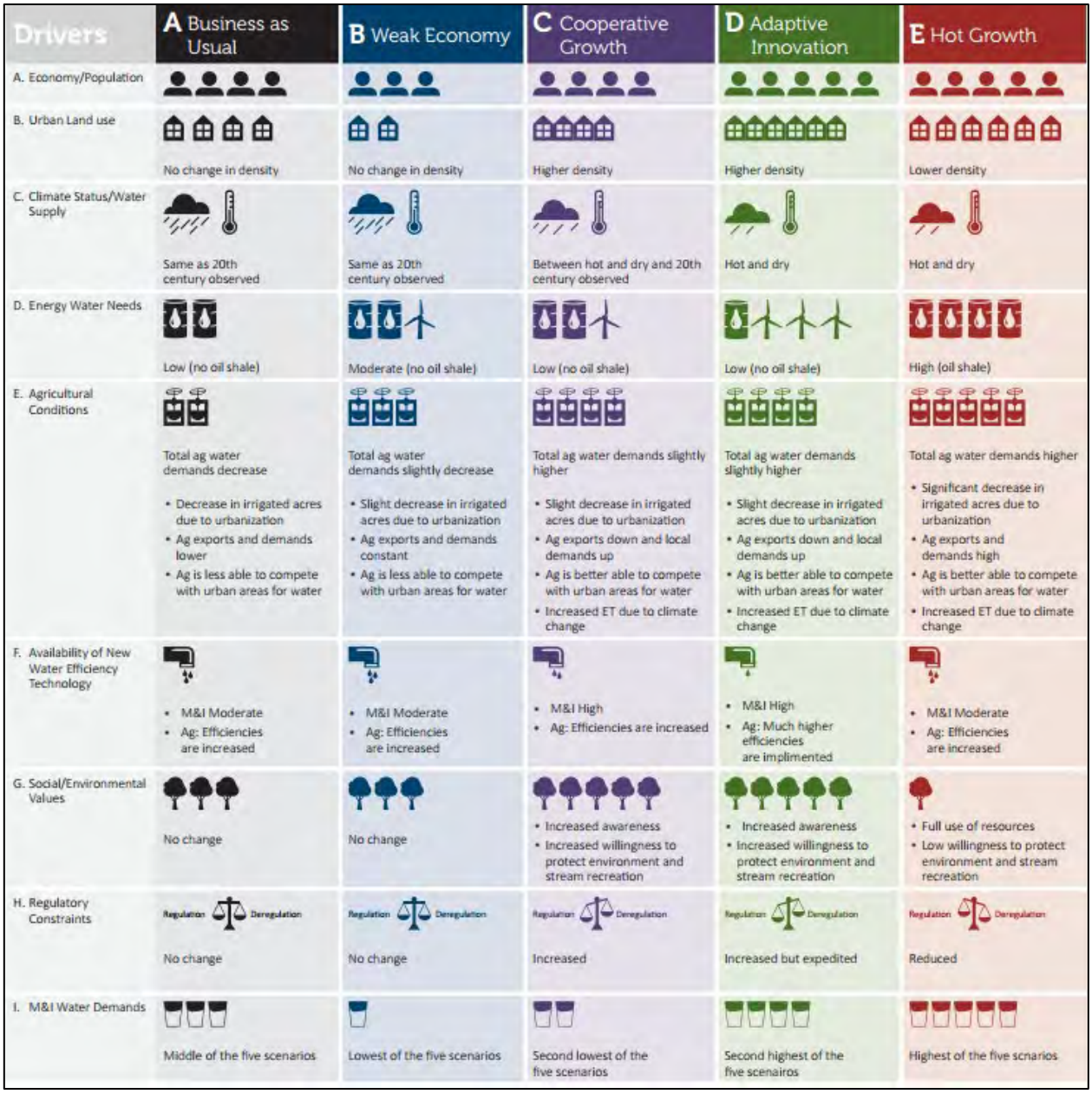

Figure A-1 Illustration of Drivers Associated with Planning Scenarios

A.2 Projections of Agricultural Diversion Demands and Agricultural Water Gaps Under Each Planning Scenario

The Colorado Water Plan's Analysis and Technical Update documentation includes the following data for the White River Basin, as related to agricultural demands and shortages:

Table A-2: White River Basin Projected Agricultural Diversion Demands (2050) for the Colorado Water Plans' Five Future Planning Scenarios

	Surface Water Diversion Demands				
Planning Scenario	**Acreage**	**Average IWR (acre-feet)**	**Wet Year (acre-feet)**	**Average Year (acre-feet)**	**Dry Year (acre-feet)**
Baseline (2015)	28,100	46,400	250,000	243,000	242,000
Business as Usual	27,700	45,800	246,000	239,000	238,000
Weak Economy	28,000	46,400	250,000	243,000	242,000
Cooperative Growth	27,700	55,700	305,000	293,000	278,000
Adaptive Innovation	27,700	55,900	186,000	180,000	173,000
Hot Growth	27,700	62,100	344,000	324,000	306,000

Table A-2: White River Basin Projected Agricultural Water Gaps (2050) for the Colorado Water Plan's Five Future Planning Scenarios

		Planning Scenario				
	Baseline (2015)	**Business as Usual**	**Weak Economy**	**Cooperative Growth**	**Adaptive Innovation**	**Hot Growth**
Avg. Annual Gap (acre-feet) (1)	1,200	1,200	1,200	3,200	3,400	5,800
Avg. Annual CU Gap (acre-feet)	700	700	700	1,700	2,200	3,200
Demand in Max. Gap Year (acre-feet) (2)	242,300	238,500	242,300	281,400	174,300	307,600
Gap in Max. Gap Year (acre-feet) (1,3)	6,000	6,000	6,000	9,500	8,500	12,300

Notes:

(1) The 2022 Yampa-White-Green Basin Implementation Plan presents minor differences in gap amounts for several planning scenarios; those differences are due to refinements of the Technical Update modeling.

(2) The demand in the maximum gap year is the demand that occurred in the year with the largest gap; that may or may not be the year with the highest amount of demand.

(3) The gap in the maximum gap year is the amount of water shortage in the year with the largest gap.

A.3 Projections of Municipal and Industrial Water Demands and Municipal and Industrial Water Gaps Under Each Planning Scenario

The most current data for municipal and industrial demands and associated shortages are provided in the 2022 Yampa-White-Green Basin Implementation Plan (BIP). The data in the BIP reflects certain refinements to the Technical Update modeling, including the addition of sand and gravel, mining, and golf course demands. The BIP can be found at https://yampawhitegreen.com/basin-implementation-plan/.

Table A-3: White River Basin Projected Municipal and Industrial Demands (2050) for the Colorado Water Plan's Five Future Planning Scenarios

	Business as Usual	**Weak Economy**	**Cooperative Growth**	**Adaptive Innovation**	**Hot Growth**
Avg. Annual Municipal Demands (acre-feet)	3,500	2,600	3,400	4,100	5,200
Avg. Annual Industrial Demands (acre-feet)	8,300	5,300	5,300	5,300	37,600

Note: Municipal and Industrial demands are diversion demands. The Hot Growth scenario includes oil shale development.

Source: Yampa-White-Green Basin Implementation Plan, 2022.

Table A-4: White River Basin Projected Municipal and Industrial Water Gaps (2050) for the Colorado Water Plan's Five Future Planning Scenarios

	Planning Scenario				
	Business as Usual	**Weak Economy**	**Cooperative Growth**	**Adaptive Innovation**	**Hot Growth**
Avg. Annual Gap (acre-feet)	2,900	570	610	680	27,400
Max. Annual Gap (acre-feet)	3,800	740	800	1,200	33,400

Note: Neither the Colorado Water Plan nor the Yampa-White-Green Basin Implementation Plan provide separate gap analyses for the municipal and industrial sectors. The Hot Growth scenario includes oil shale development.

Source: Yampa-White-Green Basin Implementation Plan, 2022.

APPENDIX B

SUPPLEMENTAL INFORMATION IN SUPPORT OF FLATWATER RECREATION NEEDS

APPENDIX B
SUPPLEMENTAL INFORMATION IN SUPPORT OF FLATWATER RECREATION NEEDS

This Appendix provides background data and information in support of the need for additional flatwater recreational amenities in northwest Colorado.

B.1 Outdoor and Water Based Recreational Activities and Amenities in Northwest Colorado

B.1.1 Current Resident Outdoor Recreation Across Colorado and in Northwest Colorado

According to the 2019 Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP) (CPW, 2019), almost 3.8 million Coloradan's participated in some form of outdoor recreational activities across the State of Colorado in 2018. The SCORP report provides additional recreational data by region; those regions are defined by the Colorado Tourism Office as areas where tourism and tourism spending are concentrated, and visitation characteristics are similar. The Northwest region is comprised of a 10-county area, including Rio Blanco and Moffat counties.[1] According to the report, more than two million residents from across the State participated in recreational activities in Northwest Colorado. The number of participants is summarized in Table B-1.

As shown in Table B-1, over 1.7 million Colorado outdoor recreators participated in water-based recreation such as swimming, boating, water-skiing, and rafting in 2018. The majority of the water-based recreation was related to flatwater recreation that can be provided by water storage reservoirs. More than 506,000 Coloradans participated in those activities in Northwest Colorado. Additionally, about 860,000 Coloradans participated in wildlife-related recreation such as hunting and fishing in Northwest Colorado that year. Of the total number of wildlife-related participants, an estimated 391,000 Coloradans participated in fishing activities in Northwest Colorado.[2] The SCORP data do not reflect the total number of activity days of recreation because people may participate in multiple days of recreational activity. The SCORP data does not account for the many visitors to Colorado or to the Northwest Colorado region traveling from out of state.

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1 Northwest Colorado includes the following counties: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, Eagle, Jackson, Grand and Summit.

2 Fishing participation was estimated by Harvey Economics, based on data provided in SCORP appendices.

Table B-1: Colorado Resident Participation in Outdoor Recreation in 2018

Activity Type	Northwest Colorado (1) (5)	State of Colorado (5)	NW Colorado % of State
Trail / Road	1,603,000	3,628,000	44.2%
Water-based (2)	506,000	1,758,000	28.8%
Winter	983,000	1,747,000	56.3%
Wildlife-related (3)	860,000	2,201,000	39.1%
Other Outdoor (4)	1,117,000	3,070,000	36.4%
Any Outdoor Activity (5) (6)	**2,049,000**	**3,796,000**	**54.0%**

Notes:

(1) Northwest Colorado includes the following counties: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, Eagle, Jackson, Grand and Summit

(2) Water-based activities include swimming (outdoors), power boating, water/jet skiing, sailing, canoeing/ kayaking, whitewater rafting and stand up paddleboarding.

(3) Wildlife-related activities include hunting, fishing, ice fishing, bird watching and other wildlife viewing.

(4) Other outdoor activities include developed/ RV camping, tent camping, picnicking, target or skeet shooting, rock climbing, team or individual sports (outdoor), and playground activities.

(5) Data show number of Colorado residents that participated in outdoor recreation, not the number activity days for each activity.

(6) Participation in any outdoor activity is not the sum of participation of all outdoor activities. One person may have participated in two or more different activities.

The SCORP data (CPW, 2019) indicates that Northwest Colorado is underserved from the standpoint of water-based recreation. Whereas about 46 percent of outdoor recreators participated in water-based recreation Statewide, water-based recreation accounted for only 25 percent of outdoor activity participation in Northwest Colorado. Northwest Colorado was the destination for 54 percent of Colorado outdoor recreators, but that region accounted for only 28 percent of destinations for water-based recreation.

SCORP surveys report that fishing is the fifth most popular outdoor recreation activity in the State, with the number of fishing license holders increasing steadily since 2001 (CPW, 2020a). In 2017, 941,000 people held Colorado fishing licenses, up from 630,000 in 2001, which represents an average annual increase of about 2.5 percent per year. In more recent years, the number of licenses sold has increased at an even faster rate of about 6.3 percent per year from 2013 through 2017. Each Colorado angler participated in fishing activity for an average of 17 days per year (CPW, 2019).

Boating is also a popular recreational activity in Colorado. In 2020, 94,385 individual watercraft were registered in Colorado, representing an 11 percent increase over 2019 registrations (USCG, 2020).[3] Prior to 2020, the number of registered watercraft had remained relatively stable for many years, at between 84,000 and 85,000 vessels.

[3] Registrations include all watercraft powered by motor or sail; sailboards are exempt.

The demand for recreation is correlated, in part, to travel distances and the population base in the region. A two-hour, one-way drive (four hours round trip) is estimated to be the maximum time that the average person will drive one way for a day trip (Logan Simpson, 2019). National statistics report that about 70 percent of campers travel 150 miles or less to their destinations, which correlates to a 2.5 to 3-hour drive (Center for Western Priorities, 2021). In 2020, a larger percentage of campers traveled between 50 and 150 miles for camping than in previous years, indicating a likeliness to travel further than in the past. Most Coloradans recreate close to home; however, there is an increasing willingness among Coloradans to travel further to engage in outdoor activities (CPW, 2020a).

Seven counties in Northwest Colorado were identified as being approximately within a 2.5-hour drive from Kenney Reservoir: Mesa County, Garfield County, Eagle County, Routt County, Pitkin County, Moffat County and Rio Blanco County. Table B-2 provides estimates of the number of Colorado residents participating in outdoor recreation within the seven county Kenney Reservoir Area (CPW, 2019; Dean Runyan, 2021).

Further underscoring the underserved aspect of the region surrounding Kenney Reservoir, only about 18 percent of Colorado residents participate in water-based recreation within the Kenney Reservoir Area. In other words, a disproportionate number of outdoor recreators seek water-based recreation outside that region.

Table B-2: Estimated Participation in Outdoor Recreation by Kenney Reservoir Area and Colorado Residents, 2018

Activity Type	Kenney Reservoir Area (1) (5)	State of Colorado (5)	Kenney Reservoir Area % of State
Trail / Road	1,031,000	3,628,000	28.4%
Water-based (2)	325,000	1,758,000	18.5%
Winter	632,000	1,747,000	36.2%
Fishing	251,000	1,000,000	25.1%
Other Wildlife-related (3)	302,000	1,201,000	25.1%
Other Outdoor (4)	718,000	3,070,000	23.4%
Any Outdoor Activity (5) (6)	**1,318,000**	**3,796,000**	**34.7%**

Notes:

(1) The Kenney Reservoir Area includes the following counties (all within a 2.5 hour drive of the existing reservoir): Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(2) Water-based activities include swimming (outdoors), power boating, water/jet skiing, sailing, canoeing/ kayaking, whitewater rafting and stand up paddleboarding.

(3) Other wildlife-related activities include hunting, bird watching and other wildlife viewing.

(4) Other outdoor activities include developed/ RV camping, tent camping, picnicking, target or skeet shooting, rock climbing, team or individual sports (outdoor) and playground activities.

(5) Data show number of Colorado residents participating in outdoor recreation, not the number of activity days for each activity.

(6) Participation in any outdoor activity is not the sum of participation of all outdoor activities. One person may have participated in two or more different activities.

B.1.2 Outdoor Recreation from Out of State Visitors

Visitation to Colorado from out-of-state residents appears to be increasing as non-resident visitors often participate in recreational activities during their visit. According to reports prepared for the Colorado Tourism Office, travel to and within the State has increased steadily for over two decades, with the exception of 2020 in which travel declined due to the COVID-19 pandemic (Dean Runyan, 2021).

- In 2019, Colorado saw 35.2 million overnight person-trips, one trip by one person, specifically for leisure purposes. Between 2000 and 2019, overnight leisure trips increased by about 3.1 percent per year (Longwoods, 2020).

- The number of overnight trips specifically for outdoor purposes increased from 1.7 million in 2000 to 4.5 million in 2019, an increase of over 2.5 times the 2000 level. About 66 percent of overnight outdoors visitors are non-residents (Longwoods, 2020).[4]

[4] Outdoor purposes are defined as “outdoors trip(s) to enjoy activities such as camping, hunting, fishing, hiking and boating” as the main purpose of the trip.

- About 64 percent of overnight leisure travelers participated in outdoor recreational activities during their trip, regardless of trip purpose (Longwoods, 2020).

- Day trips to and within Colorado more than doubled between 2008 and 2019, reaching a level of 47.9 million trips in 2019; about 45 percent of those trips were made by non-residents (Longwoods, 2020).

- About 14 percent of day trips were specifically for the purpose of outdoor recreation; however, 50 percent of day travelers participated in outdoor recreational activities, regardless of trip purpose.

- Travel spending by overnight visitors within a defined "Northwest District" increased by an average of about 5.6 percent per year between 2011 and 2019 (Dean Runyan, 2021).[5]

Based on the information above, about 20.2 million out-of-state visitors participated in recreational activities in Colorado during 2018, as shown in Table B-3. Based on travel spending patterns of Colorado visitors, about 4.3 million out-of-state visitors may recreate in Northwest Colorado, including about 2.8 million visitors recreating within the smaller Kenney Reservoir Area (Dean Runyan, 2021). Non-resident recreators add a considerable amount of visitation to the estimates of resident recreational activity.[6]

[5] This report defined the Northwest District as including Eagle, Garfield, Grand, Jackson, Moffat, Rio Blanco and Routt Counties. Spending estimates include both Colorado residents and non-residents.

[6] Each out-of-state visitor may participate in more than one recreational activity during their trip. Therefore, it is likely that a portion of the almost 690,000 out-of-state visitors to the Kenney Reservoir area participating in water-based recreation are also participating in fishing activity in the area.

Table B-3: Estimated Out-of-State Recreational Visitors, Colorado, Northwest Colorado and Kenney Reservoir Area, 2018

Activity Type	State of Colorado [6]	Northwest Colorado [1] [6]	Kenney Reservoir Area [2] [6]
All Outdoor Recreation [3]	20,204,000	4,338,000	2,790,000
Water-based Recreation [4] [5]	9,357,000	1,071,000	689,000
Fishing [4] [5]	3,853,000	827,000	532,000

Notes:

(1) Northwest Colorado includes the following counties: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, Eagle, Jackson, Grand and Summit.

(2) The Kenney Reservoir Area includes the following counties within a 2.5 hour drive of the existing reservoir: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(3) All outdoor recreation includes a wide range of outdoor activities, including, but not limited to, hiking / backpacking, camping, boating, fishing, swimming, wildlife viewing, skiing / snowboarding, snowmobiling, and hunting.

(4) Water-based recreation and fishing are sub-sets of All Outdoor Recreation. Because one person may participate in more than one recreational activity during a trip, visitor data for water-based recreation and fishing are not additive.

(5) Participation in water-based activities and in fishing activities assumes the same percentage of out-of-state visitors participate in these activities as do Colorado residents.

(6) Data show number of people that participated in outdoor recreation, not the number activity days for each activity.

B.1.3 Colorado State Parks Visitor Data

Many Colorado State Parks, including those in western Colorado, offer a variety of water-based recreational amenities and experiences. As shown on Figure B-1 below, visitation to Colorado's State Parks has increased substantially over the last several decades, from about 10.8 million visitors in 2001 to over 17 million visitors by 2020. (CPW, 2020a). Colorado Parks and Wildlife (CPW) visitation data accounts for all visitors to State Parks, including both Colorado residents and visitors from out of state.

Total State Parks visitation is the sum of visitation to individual Parks; one person may visit multiple State Parks over the course of a year or may visit one State Park on multiple occasions. Therefore, the visitation data illustrated on Figure B-1 is not comparable to the data shown previously in Table B-2.

Although the record high visitation seen in 2020 may be due, in part, to the desire to be outdoors during the COVID-19 pandemic, the trend of increasing visitation to State Parks is clear. These trends are expected to continue because the State's population, as well as the popularity of outdoor recreation activities, is increasing (CPW, 2020a).

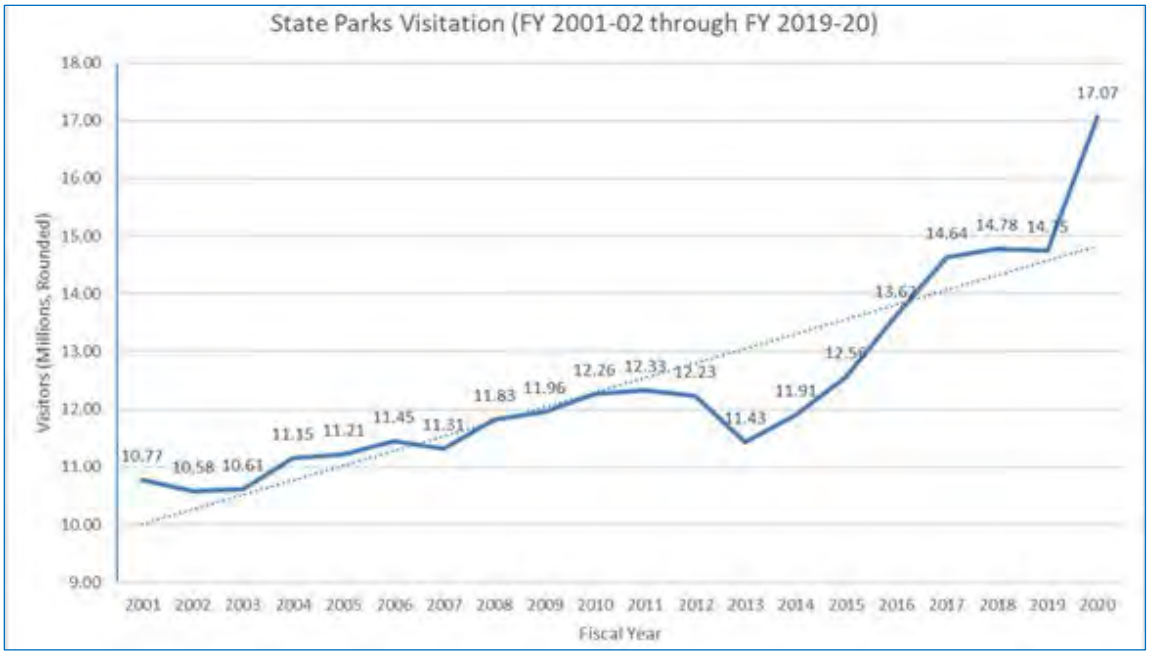

Figure B-1. Colorado State Parks Visitation 2001 – 2020

B.1.4 State Parks and Reservoirs in Western Colorado

Several State Parks in western Colorado include reservoirs comparable to the original size of Kenney Reservoir; those include Elkhead Reservoir, Steamboat Lake, Stagecoach, Vega and Ridgway State Parks. Those Parks have experienced large increases in visitation in recent years, as residents from the Front Range and other areas of Colorado search out less crowded reservoirs and parks. For example, visitation at Vega State Park has increased by 10 to 15 percent per year over the last several years (Masik, 2019). Visitation to Ridgway State Park, located in Ouray County, has more than doubled since 2006 (Copeland, 2019). Park managers at both these locations indicated that increasingly more people from the Front Range of Colorado are visiting these parks due to crowding at locations closer their homes.[7] Additional comments regarding use of these parks and amenities follows:

- *Elkhead Reservoir State Park:* Parking areas are at capacity on some weekends and most holidays. The swim beach is at capacity almost every weekend. Due to increasing demands, the Park recently constructed additional campsites, which tripled the camping capacity at this Park and increased accommodation for larger RVs and boat trailers. Day use at the Park is mainly from local residents; campers staying overnight tend to be from the western slope of Colorado, or other areas along Interstate-70 (Leahy, 2019).
- *Ridgway State Park:* This Park's 275 campsites are fully booked almost every weekend in the summer. During the spring and fall shoulder seasons, more local residents visit the Park, including those from the Grand Junction area.

[7] Both Vega and Ridgway State Parks offer water-based recreational activities, as do many other popular State Parks on the West Slope.

- *Vega State Park:* Most visitors to this Park are from the Grand Junction area and other West Slope communities; however, there is increasing visitation from Front Range residents. The Park has relatively poor access and therefore does not see a lot of day use.

Visitation to individual State Parks varies widely due to factors such as distance from major population centers and the extent of amenities offered at each location. The number and type of campsites available is a driver of annual visitation, especially in more remote locations. Other offerings, including lakes, boat ramps, marinas, swim beaches and trails, also influence visitation.

Crowding at recreational areas along the Front Range and State Parks on the West Slope reaching capacity at certain times is evident from increasing camping activity and increasingly full campgrounds (Center for Western Priorities, 2021). Occupancy rates at reservable campgrounds on public lands in the US have increased steadily in recent years, reaching an all-time high of 54 percent during the summer and 60 percent for summer weekends in 2020 (Center for Western Priorities, 2021). Campground occupancy in the western US increased by almost 50 percent between 2014 and 2020, more than for any other area of the country. National Parks have always been a draw to visitors and campers. Campgrounds managed by other federal agencies, including the Bureau of Land Management (BLM), Bureau of Reclamation (BOR), U.S. Forest Service (USFS), and the U.S. Army Corps of Engineers (USACE) are also experiencing high rates of occupancy.

B.1.5 State of Colorado Outdoor Recreation Plan Priorities and Concerns

The SCORP document reports that Coloradans are outdoor enthusiasts, with 82 to 85 percent of residents visiting county, state and federal open space and natural lands every year (CPW, 2019). These public lands are experiencing higher levels of use almost every year and becoming more crowded. This, in turn, has impacted natural resources and diminished the user experience. As a result of increased use, and other identified needs, Colorado has developed priorities for expanding recreational opportunities, including water-based recreation, fishing, and trails. Priority I is Sustainable Access and Opportunity, which includes the goal of more Coloradans and visitors benefitting from outdoor recreation and conservation.

The SCORP process includes significant stakeholder engagement, including a Land Managers Survey and a Public Survey.[8] Relevant findings from these surveys include the following:

- Over 30 percent of land managers noted the following priorities: (1) expanding opportunities or access for water-based recreation; and (2) expanding opportunities for hunting or fishing.

- Public land managers identified increased visitation, visitor management and access as significant areas of concern related to natural resource management and conservation.

[8] Land managers were defined as individuals working within an agency or organization currently managing land in Colorado for outdoor recreation purposes. The “public” survey included a random sample of Colorado residents.

- About 45 percent of the public surveyed commented that crowding is a barrier to recreational participation. Overcrowding at recreation areas due to population growth and increasing recreation participation presented concerns for many respondents.

- About 26 percent of the public surveyed commented that limited access is a barrier to recreational participation.

- Additional comments from the public survey included the desire for increased fish stocking and higher quality fishing opportunities.

B.2 Population Growth and Future Demand for Recreational Amenities in Northwest Colorado

Colorado has experienced substantial population growth over the last several decades and is projected to grow by another 1.8 million residents by 2050 (Colorado DOLA, 2021). The State's population for 2020 is estimated at 5.8 million, whereas the 2050 population is estimated to be 7.6 million. Most counties in Northwest Colorado are also expected to grow over the next 30 years, several by substantial amounts.

Table B-4 presents the current and projected populations of the seven Colorado counties within the Kenney Reservoir Area (Colorado DOLA, 2021). Together, those seven counties are projected to grow by about 164,000 people by 2070, an increase of almost 49 percent.[9] The demand for recreational opportunities and facilities coming from Colorado residents can be assumed to increase by at least the same rate, putting greater pressure on existing water-based recreation areas in the region.

Additionally, communities in Daggett County, Uintah County and Duchesne County in Utah are also within a 2.5-hour drive of Kenney Reservoir. Together, those three counties had a 2020 population of about 56,000 people and are projected to grow by approximately 14,400 people (more than 31 percent) by 2070 (Census, 2020; Utah, 2022).[10,11]

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9 Between 2050 and 2070, each county was assumed to grow by half of the average annual State Demography Office projected growth rate between 2045 and 2050.

10 The University of Utah prepares county-level population projections through 2060; between 2060 and 2070, each county was assumed to grow by half of the projected growth rate between 2050 and 2060.

11 Residents of Utah are considered in the subsequent projections of out-of-state visitors to the Kenney Reservoir Area.

Table B-4: Estimated and Projected Population, Kenney Reservoir Area

CO County	2020 Population	2050 Population	2070 Population	% Change (2020 – 2070)
Mesa	155,910	226,584	246,300	58.0%
Garfield	61,723	94,886	103,300	67.3%
Eagle	5,5624	71,173	75,100	35.0%
Routt	24,840	36,381	39,100	57.3%
Pitkin	17,363	18,787	19,400	11.6%
Moffat	13,283	11,537	10,800	-18.5%
Rio Blanco	6,532	5,611	5,200	-20.3%
Total	**335,275**	**464,959**	**499,200**	**48.9%**
UT County				
Daggett	935	942	1,050	11.8%
Uintah	35,620	42,971	48,300	35.7%
Duchesne	19,596	20,807	24,400	24.6%
Total	**56,151**	**64,720**	**73,800**	**31.4%**

Note: Population projections do not include the existence of new water-based recreational amenities in Northwest Colorado, which may attract additional residents interested in recreational employment and recreation activities.

Grand Junction, located in Mesa County, is the largest city on the West Slope of Colorado. With a 2020 population of 65,790, the city's population grew by about 12 percent between 2010 and 2020. Mesa County and Grand Junction are expected to continue to experience strong population growth in the future. Grand Junction is about a two-hour drive from Kenney Reservoir and, given Mesa County's expected growth, would be a prime location for attracting visitors to Rio Blanco County.

Assuming that the patterns of recreational participation by Colorado residents remains the same in the future as shown in Tables B-1 and B-2 and based on the projected population increases for the Colorado counties within the defined Kenney Reservoir Area, an estimated 1.96 million Coloradans would be expected to participate in outdoor recreation of any type in that area of the State by 2070. That would include 485,000 people engaging in water-based recreational activities, an increase of about 159,000 people. An additional 374,000 residents are projected to participate in fishing activities. Table B-5 offers projections of Colorado resident participation in outdoor recreation within the Kenney Reservoir Area in 2070, and the change in participation between 2018 and 2070.

Table B-5: Projected Participation in Outdoor Recreation by Colorado Residents in the Kenney Reservoir Area by 2070

Activity Type	Kenney Reservoir Area (1) (5)	Increase from 2018
Trail / Road	1,535,000	504,000

Water-based [2]	485,000	159,000
Winter	941,000	309,000
Fishing	374,000	123,000
Other Wildlife-related [3]	450,000	148,000
Other Outdoor [4]	1,070,000	351,000
Any Outdoor Activity [5] [6]	**1,962,000**	**644,000**

Notes:

(1) The Kenney Reservoir Area includes the following counties within a 2.5 hour drive of the existing reservoir: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(2) Water-based activities include swimming (outdoors), power boating, water/jet skiing, sailing, canoeing/ kayaking, whitewater rafting and stand up paddleboarding.

(3) Other wildlife-related activities include hunting, bird watching and other wildlife viewing.

(4) Other Outdoor activities include developed/ RV camping, tent camping, picnicking, target or skeet shooting, rock climbing, team or individual sports (outdoor) and playground activities.

(5) Data show number of Colorado Residents projected to participate in outdoor recreation, not the number activity days projected for each activity.

(6) Participation in any outdoor activity is not the sum of participation of all outdoor activities. One person may have participated in two or more different activities.

As addressed previously in this section of the report, millions of out-of-state visitors also participate in outdoor recreation during their trips, adding addition demands for water-based activities, fishing opportunities and other recreational experiences. That sector of recreational users is also expected to grow in the future.

The U.S. as a whole is projected to grow at a rate of about 0.51 percent per year through 2060, an increase of about 24 percent over 2018 (Census, 2022). Estimated population growth for the country between 2060 and 2070 was assumed to be half the 2050 to 2060 growth rate. Assuming that the recreational demands from out-of-state visitors increase at those same rates, participation in outdoor recreation from that group will increase by about 5.3 million people across the State by 2070, including an additional 732,000 visitors potentially recreating within the Kenney Reservoir Area as summarized in Table B-6.

Table B-6: Projected Participation in Outdoor Recreation by Out-of-State Residents, Within Colorado and the Kenney Reservoir Area by 2070

Activity Type	Colorado [5]	Kenney Reservoir Area [1] [5]	Increase from 2018 (Kenney Reservoir Area)
All Outdoor Recreation [2]	25,505,000	3,522,000	732,000
Water-based [3] [4]	11,812,000	870,000	181,000
Fishing [3] [4]	4,863,000	672,000	140,000

Notes:

(1) The Kenney Reservoir Area includes the following counties within a 2.5-hour drive of the existing reservoir: Moffat, Rio Blanco, Routt, Garfield, Mesa, Pitkin, and Eagle counties.

(2) All outdoor recreation includes a wide range of outdoor activities, including, but not limited to, hiking / backpacking, camping, boating, fishing, swimming, wildlife viewing, skiing / snowboarding, snowmobiling, and hunting.
(3) Water-based recreation and fishing are sub-sets of All outdoor recreation.
(4) Participation in water-based activities and in fishing activities assumes the same percentage of out-of-state visitors participate in these activities as do Colorado residents.
(5) Data show number of people that participated in outdoor recreation, not the number activity days for each activity.

Accounting for both Colorado residents, Table B-5, and out-of-state visitors, Table B-6, at least 340,000 additional people are projected to recreate in the Kenney Reservoir Area by 2070, as compared to 2018 levels (Table B-7). That assumes that all anglers are also participants in other water-based recreational activities. If anglers and people participating in other water-based recreational activities are completely different sets of people, new recreational demand in the Kenney Reservoir Area would amount to about 603,000 visitors. Harvey Economics assumes that half of all new anglers also participate in other water-based recreation, resulting in approximately 471,000 new recreational visitors to the area. This information is summarized in Table B-7.

Table B-7: Projected Additional Future Participation in Water-Based Recreation and Fishing by Colorado Residents and Out-of-State Visitors, within the Kenney Reservoir Area, 2070

	Water-Based Recreation (1)	Fishing (1)	Total New Recreational Demands (1) (2)
Colorado Residents	159,000	123,000	221,000
Out of State Visitors	181,000	140,000	251,000
Total	340,000	263,000	471,000

Notes:
(1) Data show number of people that participated in outdoor recreation, not the number activity days for each activity.
(2) Assumes that half of new anglers also participate in other water-based recreational activities.

B.3 Ability of Existing or Planned Reservoirs to Meet Water-Based Recreation Needs

B.3.1 Rio Blanco County

In addition to Kenney Reservoir, flatwater recreational opportunities are offered at other lakes and reservoirs in Rio Blanco County, including Rio Blanco Lake and Lake Avery (also known as Big Beaver Reservoir). Each of those water bodies has different physical characteristics, offering water and land based recreational opportunities. However, each of these reservoirs also has certain limitations related to water-based recreation.

- *Rio Blanco Lake:* Rio Blanco Lake is part of the Rio Blanco Lake State Wildlife Area (SWA), managed by Colorado Parks and Wildlife. Located about 40 miles east of Rangely and 20 miles west of Meeker, this lake allows both fishing and motorized activities. Rio Blanco Lake is about 20 feet deep, supporting warm water species. CPW does not stock any fish at the lake; however, many non-native species exist there.

Additional activities allowed at the SWA include camping, hunting and wildlife viewing. Although motor boating is allowed, the reservoir's small size, 1,036 acre-feet of storage and 117 acres of surface area, and the round reservoir shape constrains those activities. Visitation to this SWA is low; CPW does not collect any official visitor data at this location but estimates that maybe 10 cars a day come to the SWA (CPW, 2014).

- *Lake Avery (Big Beaver Reservoir):* Lake Avery is part of the Oak Ridge State Wildlife Area (SWA), also managed by Colorado Parks and Wildlife. Lake Avery is located about 20 miles east of Meeker, has a storage volume of about 7,700 acre-feet and a surface area of about 245 acres. Lake Avery is stocked and is popular for fishing but only allows wake-less motor boating activities. Camping, picnicking, hunting, and wildlife viewing also occur at the SWA. Visitation is not high at this SWA, but the area gets busy over holiday weekends (CPW, 2014).

Fishing opportunities are limited in Rio Blanco County, outside of the reservoirs listed above. Much of the land adjacent to the White River is privately owned and public access to the river does not exist in many locations. Residents of Rio Blanco County are also interested in new fishing experiences, including fishing for larger species, which are generally only available in larger, deeper lakes or reservoirs (Webber, 2014).

Due to the limitations at Kenney Reservoir, Rio Blanco Lake and Lake Avery, many local residents travel to areas outside the for better quality fishing and boating experiences.[12] Those limitations also reduce their attractiveness to visitors traveling from outside the area. At present, visitation to these local lakes is mainly comprised of local residents.

B.3.2 Moffat County

A few locations in Moffat County also offer flatwater recreation.[13] Other than Elkhead Reservoir, these locations do not offer opportunities or amenities comparable to Kenney Reservoir.

- *Elkhead Reservoir:* Elkhead Reservoir, situated within Elkhead Reservoir State Park, offers 900 acres for waterskiing, shoreline and boat fishing and swimming. This State Park is about 100 miles east of Rangely, within a two-hour drive.
- *Freeman Reservoir:* Freeman Reservoir is located within Routt National Forest, about 20 miles north of Craig. The reservoir is a 17-acre manmade lake that offers fishing and non-motorized recreation such as canoes, kayaks. The US Forest Service does not allow any motor-propelled watercraft on the lake. CPW stocks the reservoir with a variety of native trout species.

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[12] According to Tim Webber, some residents travel to Flaming Gorge or to Lake Powell for recreational experiences that involve larger boats or require expanded water-based amenities.

[13] The Yampa River also offers fishing opportunities in Moffat County. The Brown's Park State Wildlife Area in Moffat County offers cold water stream fishing.

- Two small ponds in or near Craig, *Loudy-Simpson Park and the Public Safety Center Pond,* offer fishing opportunities for a variety of species. The Public Safety Center Pond is restricted to children 12 and younger.

B.3.3 Other Areas

Further from Rangely and Kenney Reservoir, Trappers Lake and Sweetwater Lake, both located in Garfield County, may offer some recreational opportunities to Rio Blanco County residents; however, neither of these lakes offer recreation comparable to Kenney Reservoir.

- *Sweetwater Lake:* Located about a three-hour drive from Rangely in the White River National Forest, this 72-acre lake offers fishing and boating. Gas powered motors are prohibited, but electric engines are allowed, and no public boat launch is available. A small number of primitive campsites are available. CPW recently acquired about 500 acres of land in the area for the purpose of developing a State Park at this location (CPW, 2022).
- *Trappers Lake:* Trappers Lake is a 302-acre lake located in the Flat Tops Wilderness area of the White River National Forest. This lake offers fishing and non-motorized boating. Several Forest Service campgrounds are located nearby. The lake is located about 2.5 hours east of Rangely and about an hour and 40 minutes east of Meeker.

There are very few water-based recreation areas of comparable size to the original Kenney Reservoir located in Northwest Colorado. Table B-8 lists existing State Parks on the West Slope that include reservoirs of comparable size, and recent visitation levels (CPW, 2020b).[14]

Table B-8: Flatwater Recreational Areas in Northwest Colorado Comparable to Kenney Reservoir

Recreation Area	Water Surface Area (acres)	Annual Visitation (2019)	Location
Elkhead Reservoir State Park	900	150,942	Moffat/ Routt Counties
Steamboat Lake State Park	1,053	408,191	Routt County
Stagecoach State Park	765	161,213	Routt County
Vega State Park	900	212,740	Mesa County

Visitation at these locations varies due to the amenities offered, access and elevation, among other factors. Elkhead Reservoir State Park is the closest location to Kenney Reservoir, distance-wise. However, it is more than an hour and a half's drive from Rangely and almost three hours from Grand Junction. Other locations require even longer drives from Rio Blanco County or other larger population bases.

[14] Visitation data on the 2020 Fact Sheets is assumed to represent 2019 activity levels.

In summary, there are limited opportunities in the Kenney Reservoir Area to accommodate future demands for water-based recreation. The existing water reservoirs in the White River basin have physical limitations and are already experiencing over-crowding. The existing reservoirs simply cannot meet the future demands for flatwater recreation. New water storage reservoirs in the White River Basin are needed to meet the future demands for flatwater recreation.

APPENDIX C

SUPPLEMENTAL INFORMATION IN SUPPORT OF ENDANGERED FISH

APPENDIX C.1 – TECHNICAL EXPERT REPORT BY MILLER ECOLOGICAL SERVICES, INC.

APPENDIX C.2 – ANNUAL VOLUMES TO ACHIEVE FLOW TARGETS – BREAKDOWN BY SEASON

APPENDIX C.1

TECHNICAL EXPERT REPORT BY MILLER ECOLOGICAL SERVICES, INC.

MILLER ECOLOGICAL CONSULTANTS, INC.
www.millereco.com

Expert Technical Report

In the matter of Application for Water Rights of the Rio Blanco Water Conservancy District, in Rio Blanco County, Colorado Case No. 14CW3043, Water Division 6

Prepared For:
Rio Blanco Water Conservancy District
Rangely, Colorado

May 1, 2020

The technical analyses and opinions presented in this paper were prepared by the undersigned:

William J. Miller, Ph.D.
Senior Aquatic Ecologist

1. Introduction

The Rio Blanco Water Conservancy District (RBWCD) has filed an application for surface water right and storage water right in Colorado Division 6 water court Case No. 14CW3043. The application includes the proposed use of those rights for maintenance and recovery of federally listed threatened and endangered species. This report discusses the proposed Wolf Creek Reservoir, provides an analysis of the hydrology, physical habitat, biological conditions, and flow recommendations for the White River in Colorado and Utah. I have prepared this report for the Rio Blanco Water Conservancy District to summarize my analyses and opinions on the need for water storage in Wolf Creek Reservoir and subsequent release to benefit the endangered fish species in the White River in Colorado and Utah.

1.1. LIST OF DOCUMENTS AND INFORMATION RELIED UPON

The information in this report is based on the following data sources:

1. White River Storage Feasibility Study, Phase 1 Report. W.W. Wheeler & Associates, Inc. Englewood, CO 80110, prepared for the Rio Blanco Water Conservancy District, May 2014.

2. White River Storage Feasibility Study, Final Report. W.W. Wheeler & Associates, Inc., Englewood, CO. Prepared for the Rio Blanco Water Conservancy District. March 4, 2015.

3. Application for Surface and Storage Water Right, Case No. 14CW3043.

4. Engineers' Reply in Support of Motion to Intervene; Concerning the Application for Water Rights of: The Rio Blanco Water Conservancy District, Case No. 14CW3043. November 27, 2019.

5. Letter from Andrew Nicewicz Colorado Assistant Attorney General to Alan E. Curtis, White and Jankowski, LLC. November 22, 2019. Regarding Case No. 14CW3043.

6. Draft Review of Fish Studies with Interim Flow Recommendations for Endangered Fishes of the White River, Colorado and Utah. D.M. Anderson, T.W. Econopouly, J. Mohrman, T. Jones, M.J. Breen and T. Chart. November 5. 2019.

7. White River Base Flow Study for Endangered Fishes, Colorado and Utah, 1995-1996. Final Report. Project 65. Prepared for Upper Colorado River Basin Recovery Implementation Program, G.B. Haines, D. Irving, and T. Modde, US Fish and Wildlife Service, Vernal Utah, February 2004.

8. Flow Recommendations for the White River, Utah-Colorado, Draft Report. Prepared for Upper Colorado River Basin Recovery Implementation Program. Geomorphic analysis in support of a channel maintenance flow recommendation for the White River near Watson, Utah. J.D. Schmidt and K.L. Orchard, Department of Earth Sciences, Utah State University. And. Base Flow Recommendations for Endangered Fishes in the White River, Colorado and Utah, 1995-1996. D. Irving, B. Haines, and T. Modde. U.S. Fish and Wildlife Service, Vernal Utah. August 2002.

9. The White River and Endangered Fish Recovery: A Hydrological, Physical and Biological Synopsis. Publication Number 00-37, Utah Division of Wildlife Resources, Salt Lake City, Utah. Final Report Sept. 1998, Updated and Edited Sept. 2000. L.D. Lentsch, B.G. Hoskins and L.M. Lubonudrow (1998). M.E. Anderson and A. Paschal, (2000).

10. Completion Report, Yampa-White Physical Habitat Study, C.G. Prewitt, B.A. Caldwell, W. Miller; in Colorado River Fishery Project, Final Report Yampa River, W.H. Miller, D. Archer, H.M. Tyus and R.M. McNatt, U.S. Fish and Wildlife Service, Salt Lake City, Utah, April, 1982.

11. Upper Colorado River Endangered Fish Recovery Program. General information pages. https://www.coloradoriverrecovery.org

12. Stream Flow Needs of Rare and Endangered Fishes, Yampa River, Colorado. H.M. Tyus and C.A. Karp. U.S. Fish and Wildlife Service, Vernal Utah. April 1, 1988.

13. Flow Recommendations for Endangered Fishes in the Yampa River. T. Modde and G. Smith, U.S. Fish and Wildlife Service. November 1995.

14. Management Plan for Endangered Fishes in the Yampa River Basin, Environmental Assessment. G. Roehm, U.S. Fish and Wildlife Service, Denver, Colorado September, 2004.

15. Minimum Flow Recommendation for Passage of Colorado Squawfish and Razorback Sucker in the 2.3-Mile Reach of the Lower Gunnison River: Redlands Diversion Dam to the Colorado River Confluence, B.D. Burdick U.S. Fish and Wildlife Service, Grand Junction, Colorado. January 1997.

16. Movement, Migration and Habitat Preference of Radio-telemetered Colorado Squawfish; Green, White and Yampa Rivers, Colorado and Utah. U.S. Fish and Wildlife Service, Colorado River Fishery Project, Salt Lake City, Utah, January 20, 1983.

17. Riverine Fish Flow Investigations, Federal Aid Project F-289-R6, R. Anderson and G. Stewart, Colorado Division of Wildlife, Fort Collins, Colorado, June 2003.

18. Determination of habitat availability, habitat use, and flow needs of endangered fishes in the Yampa River between August and October. T. Modde, W.J. Miller, and R. Anderson. Recovery Implementation Program Project #CAP-9, April, 1999.

19. Chapter 4: Habitat Use, W. Miller and T. Modde, *in* Determination of habitat availability, habitat use, and flow needs of endangered fishes in the Yampa River between August and October. T. Modde, W.J. Miller, and R. Anderson. Recovery Implementation Program Project #CAP-9, April, 1999.

20. An Evaluation of the Role of Tributary Streams for Recovery of Endangered Fishes in the Upper Colorado River Basin, with Recommendations for Future Recovery Actions. Project Number 101, Upper Colorado Endangered Fish Recovery Program, H.M. Tyus and J.F. Saunders, Center for Limnology, University of Colorado, Boulder, Colorado. March 29, 2001.

21. Home-Range Fidelity and Use of Historic Habitat by Adult Colorado Pikeminnow (Ptychocheilus Lucius) in the White River, Colorado and Utah. D. Irving and T. Modde. Western North American Naturalist 60(1): 16-25, 2000.

22. Colorado Squawfish Habitat Use and Movement during Summer Low Flow in the Yampa River Upstream of Cross Mountain Canyon. Prepared for Colorado River Water Conservation District, Glenwood Springs, Colorado. W.J. Miller and D.E. Rees, Miller Ecological Consultants, Inc. Fort Collins, Colorado. December 17, 1997.

23. Colorado Squawfish Winter Habitat Study, Yampa River, Colorado, 1986-1988. E.J. Wick and J.A. Hawkins, Larval Fish Laboratory, Colorado State University, Fort Collins, Colorado. February, 1989.

24. Fishes and Macroinvertebrates of the White and Yampa Rivers, Colorado. Final Report on a Baseline Survey Conducted for the Bureau of Land Management. C.A. Carlson, C.G. Prewitt, D.E. Snyder, E.J. Wick, E.L. Ames, and W.D. Fronk. Colorado State University, Fort Collins, Colorado. February, 1979.

25. Distribution of Fishes in the White River, Utah. S.H. Lanigan and C.R. Berry, Jr. The Southwestern Naturalist 26(4):389-393, November 20, 1981.

26. Colorado Pikeminnow Habitat Use in the San Juan River, New Mexico and Utah. W.J. Miller and J.A. Ptacek, Miller Ecological Consultants, Fort Collins, Colorado, January 31, 2000.

27. Flow Recommendations to Benefit Endangered Fishes in the Colorado and Gunnison Rivers, C. W. McAda. U.S. Fish and Wildlife Service, Grand Junction, Colorado, 2003.

28. Streamflow Needs of Rare and Endangered Fishes: Yampa River Interim Flow Recommendations, Final Report. U.S. Fish and Wildlife Service, Region 6, Denver, Colorado. March 5, 1990.

29. Procedures for Releasing and Administering Water from Elkhead Reservoir to Augment Yampa River Flows for Endangered Fish. J. Mohrman and D. Anderson. Upper Colorado River Endangered Fish Recovery Program. October 3, 2017.

30. Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River. U.S. Fish and Wildlife Service. Lakewood, Colorado. December 1999.

31. Exhibit A – Scope of Work, White River Management Plan. December 19, 2019.

32. Sources of Water for Endangered Fishes in the Colorado River. News Release,U.S. Fish and Wildlife Service, Denver, Colorado. January 10, 2014.

33. Memorandum from Robert Muth to Erin Light providing the Rationale for Management of Water Releases from the Elkhead Reservoir Endangered Fish Pool to Augment August -October Base Flows in the Yampa River, Upper Colorado River Endangered Fish Recovery Program, April 3, 2008.

34. Final Programmatic Biological Opinion on the Management Plan for Endangered Fishes in the Yampa River Basin. Regional Director, Region 6, Fish and Wildlife Service, Denver Colorado. January 10, 2005.

35. Dedication of Elkhead Dam & Reservoir Enlargement in Northwest Colorado. News Release, Upper Colorado River Endangered Fish Recovery Program. Denver, Colorado. July 2, 2007.

36. Microsoft Excel spreadsheet created by W.J. Miller to calculate stream flow volume for each interim instream flow recommendation and wetted perimeter for riffles.

37. Evaluation of Instream Flow Methods and Determination of Water Quantity Needs for Stream in the State of Colorado, R.B Nehring, Colorado Division of Wildlife, September 1979.

38. Expert Report for Case No. 14CW3043, Water Division 6, May 2020. W.W. Wheeler and Associates, Inc.

1.2. Background on Instream Flow needs and Flow Recommendations for the federally listed Colorado Pikeminnow (*Ptychocheilus lucius*) and Razorback Sucker (*Xyrauchen texanus*) in the Upper Colorado River Basin.

The Upper Colorado River Endangered Fish Recovery Program (UCRRIP) was established in 1988 with the dual objectives of recovery of the endangered fishes and allow water development to proceed in accordance with federal and state laws (Figure 1). The UCRRIP Partners include the State of Colorado and Colorado Water Congress. The UCRRIP has set the objective of recovery of the endangered fishes not just to maintain the status quo. The objective will be met when the fishes are first downlisted to "threatened" and then delisted with removal from Endangered Species Act protection (Figure 2).

One element of the UCRRIP is identification and protection of instream flows to restore river and floodplain habitat to benefit endangered fishes (Figure 3). Studies to identify appropriate instream flow needs in the Upper Basin have occurred in the mainstem Colorado, Green, Gunnison, Yampa and White Rivers at various times since the early 1980s. The studies included hydrologic data, geomorphology data, measurement of physical habitat in these rivers, computer simulations of the relationship between habitat and various levels of flow (Prewitt et al. 1982; Haines et al. 2004; Modde et al. 1999; Tyus and Karp 1988; Modde and Smith 1995; Schmidt and Orchard 2002, Burdick 1997). The results of these studies have been used to set appropriate instream flow regimes to benefit endangered fishes in the Upper Colorado River Basin. These flow recommendations have been an integral part of the Programmatic Biological

Opinions in the 15 Mile Reach (Colorado River upstream of the Gunnison River) and Yampa River (McAda 1999, Roehm 2004).

1.3. Sources of water secured to benefit endangered fishes in the Colorado and Yampa Rivers.

Reservoirs in the Colorado River and Yampa River currently provide a portion of the flow volume specified in the flow recommendations for those rivers. Source of the water comes from multiple reservoir locations and multiple entities. The flow recommendations for those two rivers vary by season. The recommended flow regime specifies timing and volume to benefit spawning, rearing and winter habitats. The Coordinated Reservoir Operations in the Colorado River basin were established in 1995 and can provide additional water during peak runoff to benefit spawning endangered fishes. In years with high snowpack and potential extra water in the basin, the reservoir operators coordinate releases in spring to increase the peak flow in the 15 Mile Reach and benefit the endangered fishes. This coordinated release of water can provide a higher peak flow than the previous non-coordinated release during high snowpack years. Additional water (10825 acre-feet) for summer and fall releases to benefit endangered fishes was secured in agreements with water users and the Recovery Program in 2014. The 10825 water is released from Granby Reservoir and Ruedi Reservoir.

Water to benefit endangered fishes in the Yampa River is leased by the Recovery Program from Elkhead Reservoir. The water was secured as part of the dam rehabilitation and enlargement of the reservoir completed in 2007 (US Fish and Wildlife 2007). The release procedures are laid out in a series of UCRRIP documents, which include Muth (2008) and Mohrman and Anderson (2017). The releases are generally made to maintain late summer and early fall stream flows at or above the recommended flows for that time of year.

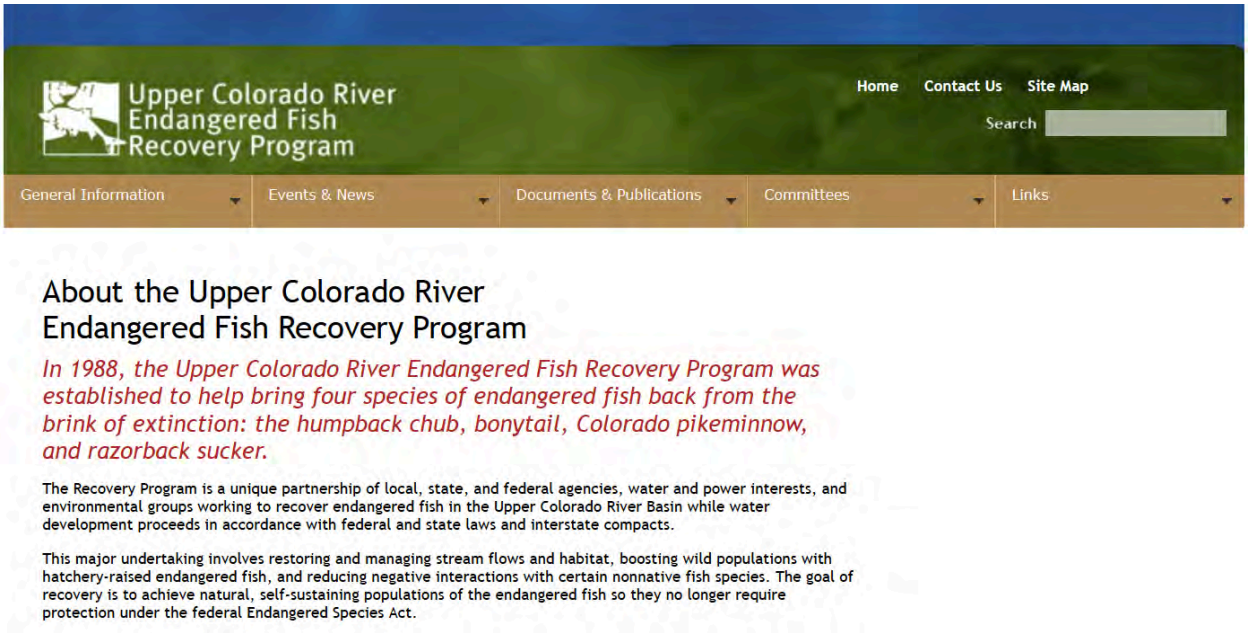


Figure 1. Excerpt from UCRRIP website showing the date of establishment and purpose of the program. https://www.coloradoriverrecovery.org/general-information/about.html

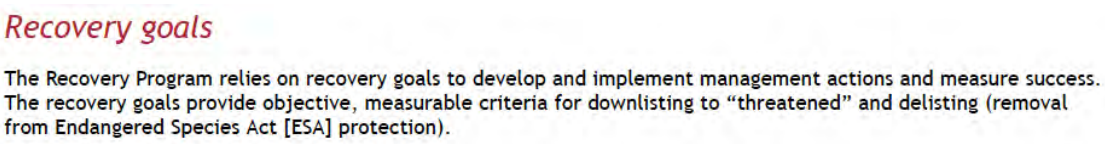


Figure 2. Excerpt for UCRRIP website showing the Recovery goal.
https://www.coloradoriverrecovery.org/general-information/about.html

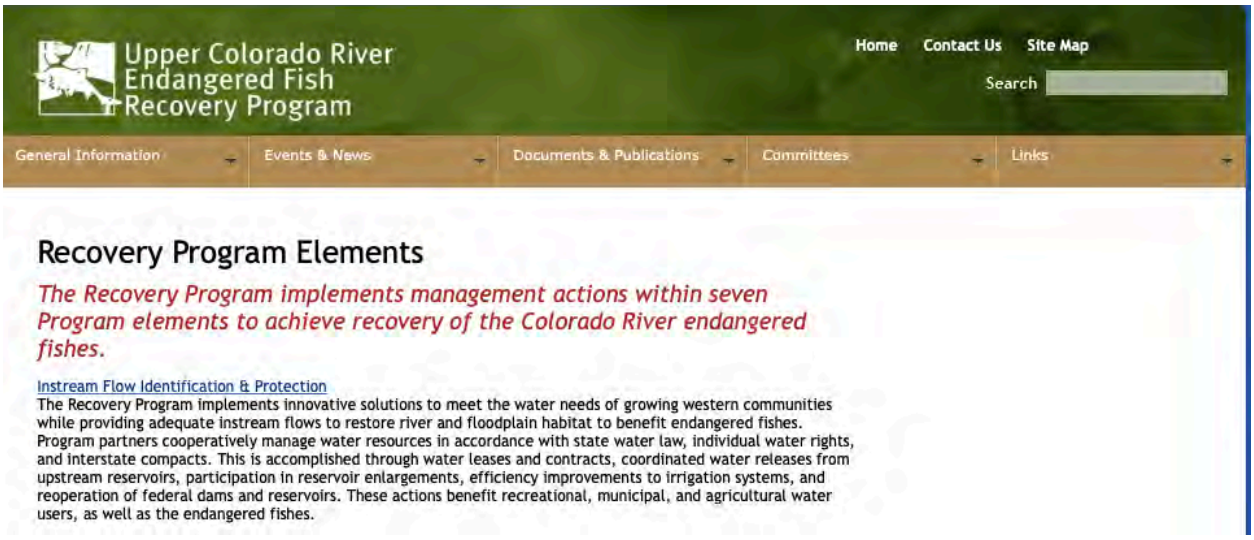


Figure 3. Excerpt from UCRRIP website listing the program element if instream flow identification and protection. https://www.coloradoriverrecovery.org/general-information/recovery-program-elements.html

2. Background on Endangered Fish and Flow Recommendations in the White River.

2.1. Hydrology

The White River is a major tributary in the Green River basin. The flow regime still maintains a snowmelt hydrograph with peak flow occurring in late May and early June. These peak flows are most pronounced in wet and average years, however, there is a small peak flow in drier years (Figure 4). Until the construction of Taylor Draw Dam and Kenney Reservoir in the 1980s, the White River contained only direct flow diversion structures and no large impoundments. Taylor Draw Dam is a run of the river facility and still passes spring peak flows through the spillway. Anderson et al. (2019) conclude the following about the current flow regime:

> *The current hydrologic regime of the White River includes the annual occurrence of relatively robust spring peak flows (Figure 7, and Appendix A) which, together with the*

> *current magnitude and timing of base flows, have been adequate to provide and maintain habitat characteristics that sustain Colorado pikeminnow and razorback sucker populations.*

The flows referenced above include within and between year variation that has supported the aquatic community in the river. Current peak flows in wet hydrologic conditions exceed 3500 cfs and reach 1000 cfs in dry hydrologic conditions. Median peak flows exceed 2000 cfs at the Watson, Utah USGS gage (#9306500) (Anderson et al. 2019, Figure 4). The White River flow regime and resulting habitats are adequate to support the substantial populations of endangered and native fish species as discussed below.

Spring peak flows provide the hydraulic forces required to create and maintain habitat as well as transport sediment from the upper river downstream through the lower river. These peak flows also provide spawning cues for species such as Colorado Pikeminnow. High spring flows and the shoulder flows preceding those flows inundate backwaters and embayments that are used by the endangered fish prior to spawning. Colorado Pikeminnow use the areas as staging locations prior to spawning. These areas are generally warmer than the mainstem river and also concentrate Colorado Pikeminnow prey, both of which are needed for reproductive maturation of the fish.

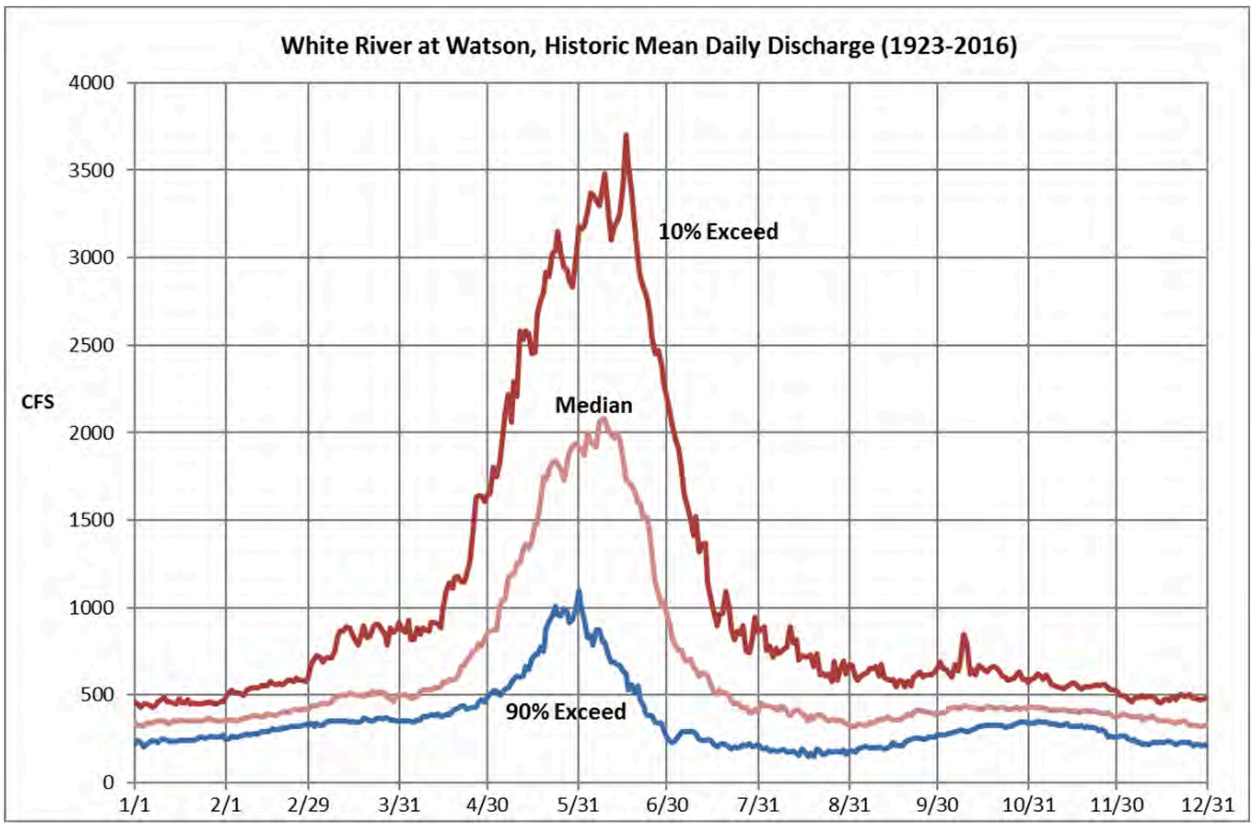


Figure 4. Hydrographs presented in Anderson et al. 2019. ***Distribution of flows (mean daily discharge) as measured by the USGS at the White River near Watson, Utah gage (#09306500) for the period 1923-2016 (missing 1980-1985). The traces illustrate 90% exceedance, 50% exceedance, and 10% exceedance values for each individual date over the period of record.***

Base flows are also variable by hydrologic year type. Summer base flows in wet years are greater than 500 cfs while flows in dry years can be as low as 100 cfs (Figure 4). White River summer base flows are noted to have decreased somewhat with the upstream consumptive uses for irrigation and municipalities. Irrigation return flows can be delayed as it either comes as overland flow from surface irrigation or as groundwater return.

2.2. Fish

Studies to determine occurrence of fish species and habitat conditions in the White River in Colorado and Utah have been conducted for several decades. These studies have documented

the presence of endangered species, in particular Colorado Pikeminnow, since the 1970s (Carlson et al. 1979, Lanigan and Berry 1981, Miller et. al. 1983, Irving and Modde 1994, Lentsch et al. 2000). The White River has some of the highest catch rates of Colorado Pikeminnow in the Upper Colorado River Basin, which demonstrates importance of the White River to the recovery effort for that species.

In addition to the endangered species these studies also document the other components of the biotic community including native and non-native fish species and macro-invertebrates. The studies document the presence of all trophic levels from primary producers to top level consumers. Native species, in addition to Colorado Pikeminnow, present include Roundtail Chub, Speckled Dace, Flannelmouth Sucker and Bluehead Sucker. These species are consumers of the primary and secondary producers, algae and macroinvertebrates, respectively. All of these fish species are potential prey items for Colorado Pikeminnow.

Razorback sucker were undetected in the White River until more recent intensive monitoring including installation of Passive Integrated Transponder (PIT) tag antenna arrays (Anderson et al. (2019). Razorback Sucker from larval to adult age classes have been collected in the White River since 2002 indicating the presence of suitable habitat for all life stages of that species. Razorback Sucker feed on algae and invertebrates similar to the Flannelmouth Sucker and Bluehead Sucker. Maintaining primary and secondary production is important to recovery of this species.

2.3. Movement and Migration

Several researchers have studied the movement and migration of Colorado Pikeminnow captured in the White River. Miller et al. (1983) documented migration of adult Colorado Pikeminnow from the White River downstream to the Green River and migration from the Green River into the White River. Colorado Pikeminnow tagged in the White River were documented to move as much as 250 miles, which included a migration from the White River

downstream into the Green River and return. This same study documented the movement of Colorado Pikeminnow tagged in the Green River to an upstream location in the White River and return to the Green River. These movements occurred during the usual spawning period for Colorado Pikeminnow. The movement of the individual fish from the Green River into the White River may be an indication of potential spawning habitat in the White River. The usual period for spawning migrations is from June into early August.

Irving and Modde (2000) report migrations of as much as 400 miles for Colorado Pikeminnow tagged in the White River. These migrations were from the White River into either the Green or Yampa Rivers and then back to the White River. The movement out of the White River usually occurs in June and early July. The fish return to the White River by August. This study also reported localized movements in the White River. Late summer movements were more localized, which would imply a home range area. This same type of localized movement was reported by Miller et al. (1983).

Similar localized movement was reported for Colorado Pikeminnow in the Yampa River during August to October (Miller and Rees 1997, Miller and Modde 1999). Movements of these fish appeared to be associated with feeding in riffle habitats and movement between habitats after dark. A study in the San Juan River reported similar movement as previous studies in the Yampa and White rivers. Miller and Ptacek (2000) reported longer movement by Colorado Pikeminnow during the spawning period and shorter localized movement post-spawn in late summer.

Movement by Colorado Pikeminnow during winter is not extensively studied. Irving and Modde (2000) report only small differences in fish locations from late fall until early spring in the White River. Miller and Ptacek (2000) report on small movements for Colorado Pikeminnow during a one-week observation period during February in the San Juan River. Wick and Hawkins (1989) studied Colorado Pikeminnow habitat use and movement in the Yampa River for two winters. They report Colorado Pikeminnow staying within the wintering area and movements of no

more than 0.3 miles. Most Colorado Pikeminnow stayed within a specific habitat complex with some local undirected movements.

2.4. Habitat Availability and Habitat Use

Studies to characterize aquatic habitat conditions have occurred since the 1980s similar to those for fish studies. These studies have included habitat characterization by habitat type (e.g. pools, riffles, runs, backwaters, etc.) as well as studies to determine change in habitat with stream flow. The latter include studies of geomorphology (Schmidt and Orchard 2002) and studies of change in channel physical parameters of wetted width, depth and velocity (Haines et al. 2004).

A complex suite of habitat types is required to support a fully functioning aquatic ecosystem. This includes habitat heterogeneity with a mix of riffles, runs, pools, low velocity habitats and a mix of streambed substrate types. These type of habitat characteristics are currently present in the White River. The amount of each habitat type varies by season and level of stream flow. Backwaters, embayments and floodplain habitat is more abundant during shoulder and high flows as these features are inundated with rising water. Pools, runs and riffles are dominant during the base flows. All of these habitats are used by Colorado Pikeminnow and other fish at various times of the year. Adequate flow and water depths are needed to allow production of food and to allow the passage and localized movement inherent in Colorado Pikeminnow behavior.

Riffle habitat is important for primary productivity which provides the food base for higher trophic levels. Production in the riffles is highest when the greatest wetted area is maintained. Riffle wetted area was one of the key elements examined in the habitat study by Haines et al. (2004). Haines et al. (2004) determined the number of riffles with sufficient depth for passage as a function of discharge and also the amount of wetted area present as a function of discharge. A value of 30 cm was used a sufficient for unrestricted passage by Colorado

Pikeminnow. This was the same value as used in previous determinations of minimum flow for passage in the Gunnison River (Burdick 1997) and Yampa River (Modde et al. 1999). Anderson et al. (2019) summarized the results of Haines et al. (2004) in the following table.

Table 1. Number of riffle cross sections with thalweg depth greater than 30 cm (Source: Anderson et al. 2019) and percent of total passable In parentheses.

Flow in cfs	100	150	200	250	300
Number of 49 transects with riffle thalweg depth ≥ 30 cm.	35 (71)	43 (88)	45 (92)	46 (94)	47 (96)

Passage at riffles is important during the summer and fall base flow period for Colorado Pikeminnow. Habitat use studies have shown that Colorado Pikeminnow can move up to a few miles each day from a resting habitat to a foraging habitat (Miller and Rees 1997). The largest change in the percent of riffles passable occurs as flows increase from 100 cfs to 150 cfs.

The wetted perimeter coverage also shows a similar response based on the graphs presented by Haines et al. (2004). The greatest loss of wetted perimeter coverage occurs as flow drop below the range of 200 to 150 cfs and lower. Maintaining wetted perimeter through the summer growth period for fish is important to provide adequate food supply to support the fish over winter. Greater wetted perimeter provides more area for macroinvertebrate production upon which small bodied fishes and Razorback Sucker feed. A robust community of small bodied and other fishes is needed to support Colorado Pikeminnow, which primarily forage on fish as they grow from juveniles to adults. A flow regime that restricts wetted perimeter below a somewhat typical baseflow can be detrimental to productivity and survival. Lower than normal base flows have also been shown to be advantageous to non-native species in the Green River basin (Anderson et al. 2019).

2.5. White River Flow Recommendations

Studies completed from the 1980s through the early 2000s were conducted to determine the relationship between stream flow and habitat in the White River. Most recently, there is an ongoing effort to synthesize the available data and make updated flow recommendations for the White River (Anderson et al. 2019). The current effort combines biological data, physical habitat data and hydrologic data to recommend a suite of flows to maintain and benefit the endangered fishes in the White River.

Haines et al. (2004) applied the physical habitat model RHABSIM to habitats in the White River downstream from Taylor Draw Dam in 1995 and 1996. This model was state of the science at the time. Newer more robust 2-dimensional hydraulic/habitat models are now the state of the science, however, this does not diminish the usefulness of the Haines et al. work. RHABSIM provides hydraulic data at each cross section for water width, wetted perimeter, water depth and water velocity. The State of Colorado uses several of these parameters (wetted perimeter, depth and velocity) to set minimum instream flows. The threshold values were first determined by Nehring (1979) and are still applied. The thresholds for these parameters vary by stream width (Table 2) and have been applied in many streams and rivers in Colorado.

The method used by the State is R2Cross and based on data from riffle cross sections. April through October minimum flows are set when all three thresholds are met or exceeded. While specific data for an R2Cross analysis was not generated from the RHABSIM model, there are data that can be used as surrogates to calculate an approximate minimum flow similar to the R2Cross model. Haines et al. (2004) and Anderson et al. (2019) provide data on wetted perimeter, thalweg water depth, and velocity.

Table 2. Key flow parameters used to determine minimum flow requirements using the R2Cross method (from Nehring 1979).

Stream width (ft)	Average depth (ft)	Average velocity (ft/sec)	Wetted Perimeter (%)
1-20	0.2 or greater	1	50
21-40	0.2-0.4	1	50
41-60	0.4-0.6	1	50 to 60
61-100	0.6-1.0	1	70 or greater

Based on the above parameters and the White River riffle width, the threshold values would be at the highest level in the parameter table. Haines et al. (2004) summarize the riffle water width coverage for 75% water coverage. The average discharge required for 75% water width across 42 riffles is 218.7 cfs. An analysis of the wetted perimeter graph in Haines et al. (2004) results in a similar flow value of 221 cfs (Table 3). The average depth threshold base on the average riffle width would be 1.0 foot. The flow value that meets this threshold in 88 percent of more of the riffles is 150 cfs or higher (Table 1). Haines et al. (2004) do not provide individual velocity values for each riffle at all flows simulated. They provide a summary for all riffles at a flow of 339 cfs, 424 cfs and 552 cfs. The mean velocities at 339 cfs (the lowest flow reported) range from 1.8 feet/second (fps) to 2.2 fps across all riffles. The mean depths at 339 cfs range from 1.2 feet to 1.3 feet (Haines et al. 2004). These values are higher than the R2Cross parameter threshold so the minimum flow for the depth and velocity criteria would be lower than 339 cfs and equal to or greater than the 70% wetted perimeter value of 221 cfs. The lowest possible summer minimum flow based on the data from Haines et al. using the State of Colorado criteria would be 221 cfs.

Table 3. Discharge that provides 70% wetted perimeter and total wetted width for individual White River riffle cross sections from visual estimates of graphs presented in Haines et al. 2004.

Cross Section	Discharge (cfs) at 70% wetted perimeter	Total wetted width (ft)
10102	175	175
10302	175	150
10401	225	110
10501	575	225
10602	575	125
20201	175	110
20202	100	
20302	300	225
20402	175	175
20501	100	
20502	100	140
20701	100	140
20802	175	150
20902	200	175
21002	200	175
21101	75	110
20102	250	160
21201	75	75
21202	150	160
21302	150	75
21401	50	100
21402	275	150
30102	575	300
30701	200	140
30802	150	
31001	350	125
31201	200	
31202	175	125
31303	250	
31302	350	125
31401	225	
Average value	**221**	**149**

The interim flow recommendations (Anderson et al. 2019) vary by hydrologic year type, season and recurrence interval. Specific recommendations are made to address spring peak and shoulder flows intended for habitat maintenance, creation, and sediment transport (Table 4). Base flows recommendations are separated into irrigation season (Table 5) and non-irrigation season (Table 6). The logic for the recommended flows is to continue the inter- and intra-annual variation in stream flow that currently supports the robust native fish and aquatic community in the White River, which will benefit the endangered fish. The water volumes needed to meet these flows ranges from near 60, 000 acre-feet (90% exceedance, wet year) to just over 8,000 acre-feet (100 % exceedance, dry year) at the USGS gage at Watson (Table 7).

The shoulder flows and spring peak flows function to support and benefit preparation and migration for spawning fish. The irrigation base flows function to preserve and maintain the fish passage and stream productivity needed to maintain and improve conditions for the endangered fish. The USFWS state that the greatest change in riffle wetted perimeter and loss of depth for passage occurs at flow less than 150 cfs (Anderson et al. 2019). The non-irrigation season flows are intended for preserve over-winter habitat for all species including the endangered fish. Interim flow recommendations are intended to mimic the current flow regime in the White River at the Watson gage, which exists at the current level of water use in the basin. The draft interim flow recommendations were derived from a combination of hydrologic modeling and interpretation of gage data. Hydrologic modeling using the current baseline for the White River predicted zero flow days at the Watson gage. The gage data included a low flow in a dry year of 13 cfs. The USFWS lists the proposed instream flow at the 100% exceedance value in dry year of 30 cfs for the 139-day June 15-October 31 time period to avoid extremely detrimental conditions to the endangered species. The flow volume to meet the 30 cfs flow would require 8257 acre-feet of water, not accounting for transit loss or evaporation during the irrigation season. For comparison, a higher minimum flow of 150 cfs for 139 days that maintains riffle passage and productivity at the level prior to the greatest decline, would require 41,283 acre-feet of water at the Watson gage during the irrigation season.

Additional consumptive use is predicted based on future growth in the Whiter River basin, which would reduce streamflow downstream from those uses from those now reported for current conditions. The interim flow recommendations are a stepped function that results in a different flow exceedance value is the river is managed down to the recommendations (Figure 5). The ability to maintain and recover the endangered species would be impacted if flows are reduced from current conditions. Increased demand and consumption without augmentation in downstream river reaches could shift the hydrologic regime to a drier condition and less beneficial conditions for the endangered species. Maintaining the flow at a minimum of 150 cfs for all conditions shown in the shaded portion of Table 5 for Average, Moderately Dry and Dry year types would be more beneficial to the endangered fish.

Table 4. Recommended spring peak and shoulder flows by hydrologic year type from Anderson et al. (2019).

	Hydrologic Year Type				
	Wet (10%)	Mod Wet (10-30%)	Ave (30-70%)	Mod Dry (70-90%)	Dry (100%)
Median Annual peak (1-day)	5,250 cfs	4,100 cfs	3,300 cfs	1,700 cfs	1,000 cfs
Shoulder peak magnitude	3,700 cfs	2,900 cfs	1,700 cfs	1,400 cfs	700 cfs
Shoulder peak duration in 50% of years (and range)	≥ 30 days (25 to 35 days)	≥ 20 days (15 to 40 days)	≥ 30 days (20 to 45 days)	≥ 10 days (1 to 30 days)	≥ 15 days (5 to 40 days)

Table 5. Recommended irrigation season base flows by hydrologic year type from Anderson et al. (2019).

Percent of days specified target met*:	Hydrologic Year Type				
	Wet (10%)	Mod Wet (10-30%)	Ave (30-70%)	Mod Dry (70-90%)	Dry (100%)
	Dates of Applicability				
	Aug 15 – Oct 31 (78 days)	Aug 1 – Oct 31 (92 days)	Jul 15 – Oct 31 (109 days)	Jul 1 - Oct 31 (123 days)	Jun 15 - Oct 31 (139 days)
50%	500 cfs (39 days)	490 cfs (46 days)	390 cfs (55 days)	280 cfs (62 days)	150 cfs (70 days)
90%	430 cfs (70 days)	305 cfs (83 days)	200 cfs (98 days)	150 cfs (111 days)	70 cfs (125 days)
100%	230 cfs (78 days)	200 cfs (92 days)	120 cfs (109 days)	100 cfs (123 days)	30 cfs (139 days)

*These percentages indicate targeted frequencies of exceedance; they do not establish legal or administrative requirements. The Service recognizes that current and future basin conditions may not support these recommended flows at the recommended frequencies.

Table 6. Recommended non-irrigation season base flows by hydrologic year type from Anderson et al. (2019).

Percent of days specified target met:	Hydrologic Year Type				
	Wet (10%)	Mod Wet (10-30%)	Ave (30-70%)	Mod Dry (70-90%)	Dry (100%)
	Dates of Applicability: Nov 1 through Mar 31 (151 days)				
50%	500 cfs (76 days)	425 cfs (76 days)	390 cfs (76 days)	340 cfs (76 days)	300 cfs (76 days)
90%	360 cfs (136 days)	295 cfs (136 days)	265 cfs (136 days)	230 cfs (136 days)	165 cfs (136 days)
100%	220 cfs (151 day)	200 cfs (151 days)	145 cfs (151 days)	135 cfs (151 days)	105 cfs (151 days)

Table 7. Flow volume (acre-feet) required for each interim instream flow recommendation from Anderson et al. 2019.

	Wet	Mod Wet	Ave	Mod Dry	Dry
Peak flows	10395	8118	6534	3366	1980
Shoulder Peak	219780	114840	100980	27720	20790
Base flow	**Irrigation season**				
50%	38610	44629	42471	34373	20790
90%	59598	50124	38808	32967	17325
100%	35521	36432	25898	24354	8257
Base flow	**Non-Irrigation season**				
50%	75240	63954	58687	51163	45144
90%	96941	79438	717631	61934	44431
100%	65776	59796	43352	40362	31393

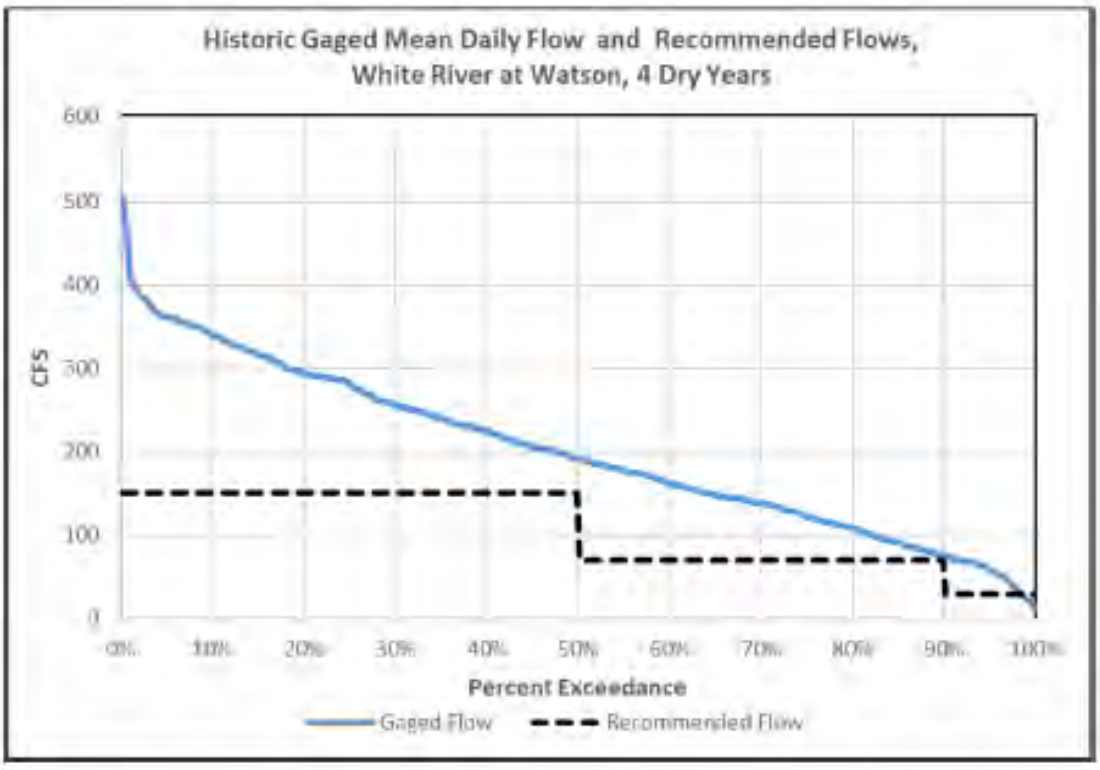


Figure 5. Flow duration curve for White River at Watson gage from June 15 to October 31 of four "dry" years as presented in Anderson et al. 2019.

2.6. Future White River consumptive and non-consumptive water demands and the Rio Blanco Water Conservancy District proposed storage water right.

An ongoing effort is in place to develop a Management Plan for the White River as well as a Programmatic Biological Opinion (PBO) to address future water development in the basin. This same approach of developing a management plan and PBO has been applied on the Colorado, Yampa and Gunnison rivers. This approach fits with the dual goals of the UBCRRIP to recover the endangered fishes and allow water development to proceed according to federal and state laws. An estimate of future development and consumptive use as well as the amount of water needed to support environmental flows is part of this process. The scenarios include a range for projections from low levels of new demands to high levels of new demands. The Colorado Water Plan makes predictions for water use to the year 2050. The projections include predicted increases for Municipal & Industrial use and energy development. Energy development includes both Oil and Natural gas and Oil Shale. An increase in future water use could reduce the frequency and occurrence of the current flows. The Rio Blanco Water Conservancy District has made an application for storage water rights for Wolf Creek Reservoir that includes releases of stored water for maintenance and recovery of federally listed threatened and endangered species. The amount of water specified for endangered fish flows is 42,000 acre-feet (Wheeler 2015) but could range from 21,283 acre-feet to 208,850 acre-feet to meet the endangered fish augmentation requirements (Wheeler 2020). The total maximum long-term needs for M&I, Oil and Natural Gas, and Oil Shale is listed as 48,950 acre-feet (Wheeler 2015, Wheeler 2020).

3. Summary and Opinion

The White River is a major tributary in the Green River basin. The endangered species that are found in the White River are part of a larger metapopulation within the Green River basin and its tributaries. The importance of the White River to the recovery of the endangered species is

noted in Tyus and Saunders (2001) and Lentsch et al. (2000). The White River currently supports all life stages of Colorado Pikeminnow and reproduction by Razorback Sucker was documented in recent years. The presence and increase in the numbers of these fish demonstrate the importance of the White River to recovery of these species. The current populations are the result of the habitat and flow conditions in the river with current levels of use.

Colorado Pikeminnow use a wide range of habitats depending on season and activity. Some Colorado Pikeminnow also make long spawning migrations during summer from the White River to known spawning locations in other portions of the Green River basin. Colorado Pikeminnow also move within shorter river reaches during late summer and fall to feed in riffles. Some of these movements require passage through several riffles on a daily or weekly basis. Razorback Sucker feed on periphyton, algae and invertebrates and these prey items are generally found in or near riffle habitats. It is important for the recovery of the endangered species to keep these riffle habitats passable and productive. The USFWS state that research in the White River has shown that a flow of 150 cfs is the point at which the decline in riffle habitat and depth becomes greatest (Anderson et al. 2019).

The flow regime in the river today still retains a relatively natural snow-melt runoff shape with inter- and intra-annual variation. These variations provide the range of conditions that maintain the habitat and support the aquatic species, including endangered species, in the river. Future water consumptive use, as projected, in the White River without augmentation would reduce the flow volume and potentially seasonal timing of flows to the detriment of endangered species. Fish monitoring data in the Upper Colorado River Basin under current conditions has shown that extreme low flows in dry water years favor some non-native species, such as Smallmouth Bass, and are not beneficial to native fish. The USFWS interim flow recommendations list a flow of 30 cfs should be the flow met 100% of the time in dry years. The USFWS acknowledges that this low flow while preventing complete drying of the river may result in increased non-native populations and result in less productivity and riffle passage.

The UCRRIP has the dual objective of recovery of endangered species and allow water development to proceed in accordance with federal and state laws. It is important to note the objective of "recovery" of endangered species is not to maintain the status quo (i.e. endangered status but avoid extinction). The UCRRIP identified several elements to recover the endangered fish. One of these elements is to identify, provide and protect instream flows to maintain and benefit endangered species. Identification and providing water to meet recommended instream flow regimes has occurred in the Colorado, Gunnison and Yampa rivers through the use of reservoir releases. Yampa River summer base flows are augmented with water specifically for endangered fish benefit from Elkhead Reservoir.

In conclusion, it is my opinion that the interim flow recommendations for peak flows and shoulder flows are appropriate to maintain and benefit the endangered fish in the White River. The flows are typical of the magnitude and timing of the current peak and shoulder flow regime, which create and maintain habitat, provide spawning cues, and opportunities for migration.

It is my opinion that separation of base flows into irrigation and non-irrigation seasons is appropriate. The endangered species use habitat differently in summer and winter, which require different levels of flow. Mid-summer is the time when migrating Colorado Pikeminnow return to the White River and passage over riffles is critical to the return to their home ranges. Summer and fall are the seasons when water temperature and food availability promote growth for aquatic biota, including the endangered fish, to prepare the species for the colder winter months. Movement through and within riffle habitat is critical for feeding and growth.

It is my opinion that maintaining summer base flows at a minimum of 150 cfs is more likely to assist in recovery of the endangered species than the lowest flows specified in dry years. Fish passage and riffle wetted perimeter are substantially higher at 150 cfs than at flows of 100 cfs and lower. The hydrologic modeling and gage analysis show that the 150 cfs flow is not

available at all times, which would require augmentation of flows. Wolf Creek Reservoir would have water specifically available for release to benefit the endangered fishes. Further, it is my opinion that the projected additional future water consumption in the White River over current conditions would require augmentation of flows to meet the USFWS interim flow recommendations. The predicted long-term future non-irrigation uses are as much as 48, 950 acre-feet (Wheeler 2015, Wheeler 2020). Future water demands and use at that level would require a commensurate release to meet the interim flow recommendations.

The Rio Blanco Water Conservancy District has applied for a storage right for Wolf Creek Reservoir that includes a specified use for maintenance and recovery of endangered fish that could offset the stream flow reduction due to future demands. It is my opinion that the best reservoir site for releases to benefit endangered species in the White River downstream from Taylor Draw Dam would be a location upstream of and close to Kenney Reservoir. The Wolf Creek Reservoir location meets these criteria.

It is my opinion that the minimum flow in the White River to benefit endangered fishes is 150 cfs. A flow of 150 cfs keeps the majority of riffles passable by Colorado Pikeminnow and productive for food resources consumed by Colorado Pikeminnow and Razorback Sucker.

It is my opinion that additional releases will be needed to meet these criteria in certain average, moderately dry and dry years. The water volume needed would range from approximately 21,000 acre-feet (50% exceedance dry year) to over 41,000 acre-feet (100% exceedance dry year) at the Watson Gage, not including transit loss and evaporation (Table 8).

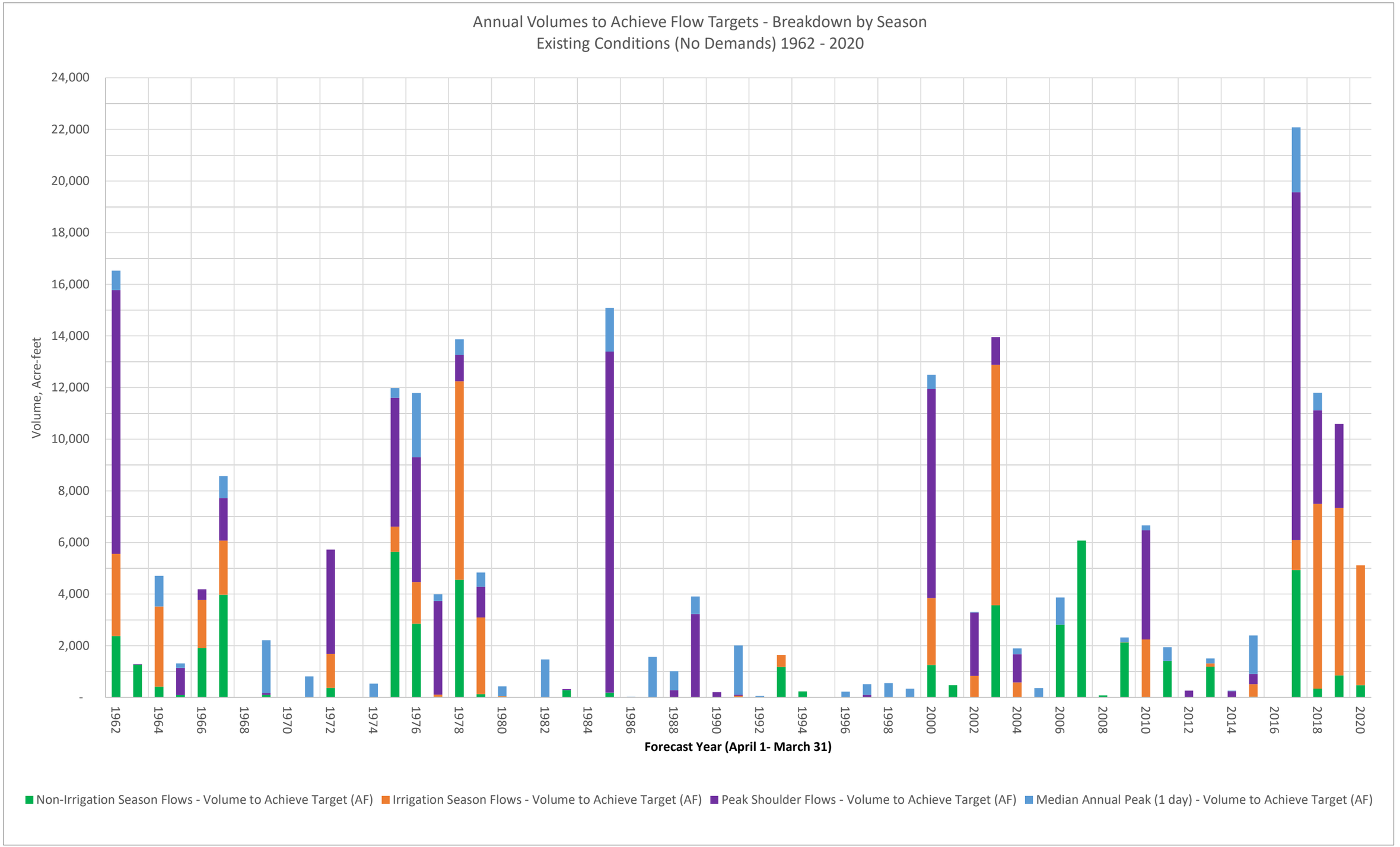
Table 8. Acre-feet volume required to meet the 150 cfs recommended minimum flow during irrigation season in average, moderately dry and dry years.

	Wet	Mod Wet	Ave	Mod Dry	Dry
Base flow	**Irrigation season**				
50%					20790
90%				32967	37125
100%			32373	36531	41283

It is my opinion that the storage right for Wolf Creek Reservoir will needed for the additional releases to meet the recommended flows for maintenance and recovery of endangered fishes.

APPENDIX C.2

ANNUAL VOLUMES TO ACHIEVE FLOW TARGETS – BREAKDOWN BY SEASON


Annual Volumes to Achieve Flow Targets - Breakdown by Season
Existing Conditions (No Demands) 1962 - 2020
Volume, Acre-feet
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Forecast Year (April 1- March 31)
Non-Irrigation Season Flows - Volume to Achieve Target (AF)
Irrigation Season Flows - Volume to Achieve Target (AF)
Peak Shoulder Flows - Volume to Achieve Target (AF)
Median Annual Peak (1 day) - Volume to Achieve Target (AF)

Annual Volumes to Achieve Flow Targets - Breakdown by Season
Future Conditions - 16,000 AF in Demands - 1962 - 2020

Volume, Acre-feet

30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-

1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020

Forecast Year (April 1- March 31)

Median Annual Peak (1 day) - Volume to Achieve Target (AF)
Peak Shoulder Flows - Volume to Achieve Target (AF)
Irrigation Season Flows - Volume to Achieve Target (AF)
Non-Irrigation Season Flows - Volume to Achieve Target (AF)

Appendix E

Recreation Plan Documents

(Logan Simpson, 2019; Logan Simpson, 2022)

Wolf Creek Reservoir
Recreation Potential

Prepared by:

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August 22, 2019

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1. Introduction

The proposed Wolf Creek Reservoir has the potential to contain 20,000 to 90,000 acre-feet of water based on the *White River Storage Feasibility Study Phase 2A Report, September 30, 2018,* prepared by Wheeler and Associates; and has a potential maximum surface area that ranges from 1,335 to 3,288 acres.[1] The minimum surface area of the water is anticipated to range from 700 to 1,500 acres. Even at the smaller storage volume, the reservoir would be among the largest water bodies in northwestern Colorado, making it very suitable for motorized boating and sailing. Non-motorized boating using kayaks, stand-up paddleboards, and canoes may also be accommodated on the reservoir. Camping, fishing, hiking, biking, off-highway vehicle (OHV) use, nature observation, and other activities could be accommodated on the lands surrounding the reservoir.

To understand the potential recreation demand and potential gaps in recreational opportunities in the region, we used the following methodology:

1. Document environmental and climatic factors that will influence the types of outdoor recreation, the recreation experience, and the length of the high-use recreation season at Wolf Creek Reservoir.
2. Review existing State and national data on outdoor recreation trends and preferences.
3. Understand the regional population growth projections and market base.
4. Document the facilities within, and visitation levels of, water-based public recreation areas in the region that have similar characteristics as the proposed Wolf Creek Reservoir.
5. Summarize the potential demand for outdoor recreation and potential gaps in service that could be met at Wolf Creek Reservoir through the development of recreational facilities.
6. Analyze the proposed site to identify potential recreational use zones, possible locations for recreation-related facility development, and access routes.
7. Identify how the Town of Rangely could benefit from increased river-related recreation as a result of increasing flows in the White River during late summer, and improving river access points and trails that connect them.
8. Document other recreational activities in the Rangely/Meeker area that could attract more people to the reservoir, increase the demand for recreation at the reservoir, boost the local economy, and improve the quality of life for residents.

2. Environmental and Climatic Factors

Landscape and Vegetation

The proposed site for Wolf Creek Reservoir is located approximately 20 miles east of Rangely, Colorado, with the base of the dam approximately 5,500 feet above mean sea level (amsl) in elevation. The existing landscape is characterized by rolling ridges that are separated by dry washes and gulches. The vegetation is currently composed primarily of shrubs (e.g., greasewood, sagebrush, and saltbush), and the soils are classified as saline and susceptible to erosion. The low vegetation and lack of trees afford long-range views in all directions, but also offer little protection to recreational users from wind or sun in comparison to reservoirs that are located in forested areas. Treeless landscapes are not unusual for reservoirs in Colorado and occur at many that are located in northwest Colorado. Colorado State Parks is moving away from irrigating landscapes to support trees

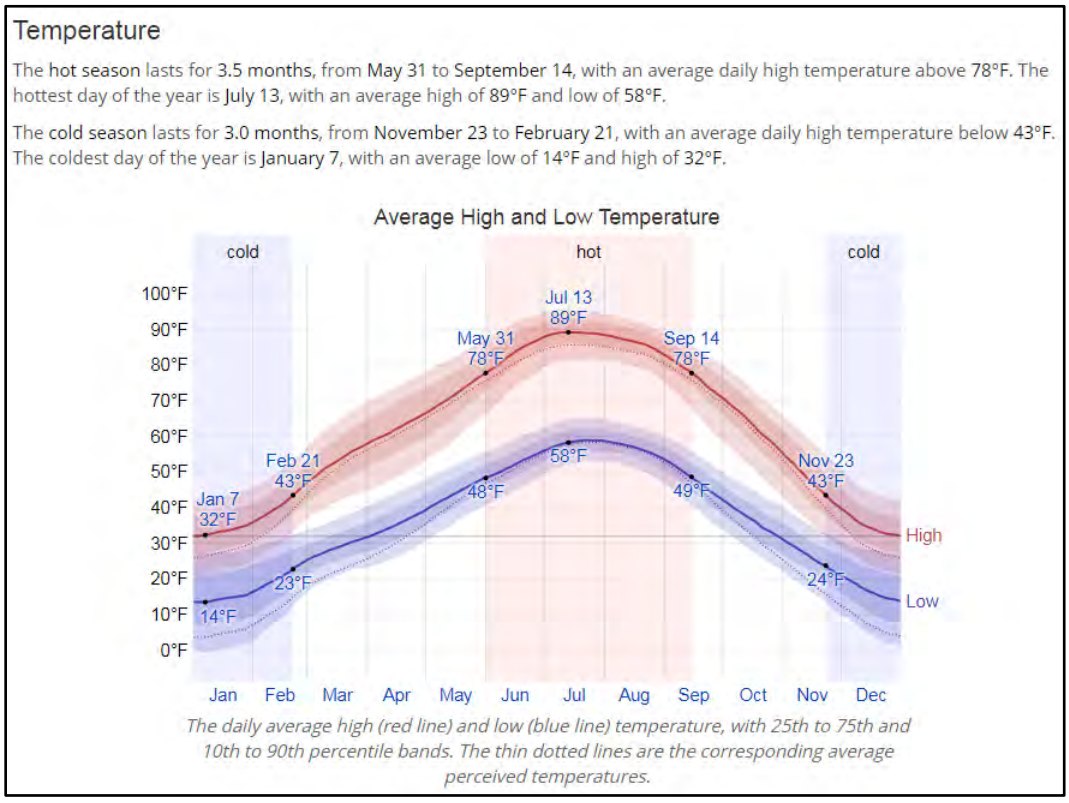
[1] *Source*: Logan Simpson geographic information system (GIS) area estimate based on GIS layers provided by Wheeler & Associates in January 2019.

because of the high maintenance and water costs.[2] Depending on the operational characteristics of the proposed Wolf Creek Reservoir, riparian trees and shrubs could potentially grow at the edges of the reservoir and be supported by the water it retains (i.e., no additional irrigation required). These species could create landscape interest and wildlife habitat, as well as provide areas of shade near the shoreline. Trees in developed recreational use areas around the reservoir would need to be irrigated to survive, or be located in natural or manmade depressions that collect natural precipitation.

Precipitation, Temperature, and Wind

Rangely receives an average of 10 inches of precipitation annually, which occurs on average 58 days per year; there is no precipitation for approximately 307 days per year.[3] Temperatures vary greatly throughout the year, with average lows in January of 14 degrees Fahrenheit, and average highs in July of 89 degrees Fahrenheit (Figure 1). From mid-December through January, it is possible that the water surface would be covered at times with ice, and ice fishing could occur if the reservoir's water level stays relatively constant, creating a uniform and safe surface. The major boating season would be approximately five or six months long, between May and mid-October, when the average low temperatures are above freezing. Use of trails and camping areas could occur throughout the year, but the highest use times are likely to correspond with the boating season, when the weather is warmer.

Figure 1. Average High and Low Temperature



Source: Weatherspark.com. 2019. *Average Weather in Rangely Colorado, United States.* https://weatherspark.com/y/3119/Average-Weather-in-Rangely-Colorado-United-States-Year-Round.

[2] *Source:* Based on an interview with Kirstin Copeland, Park Manager, Ridgway State Park, February 28, 2019.
[3] *Source:* State of Colorado. 2019. *Rangely Colorado, Climate.* https://www.colorado.gov/pacific/townofrangely/climate.

Winds are predominantly from the south/southwest with an average speed of 6.8 to 9.4 miles per hour throughout the year. The area experiences an average of 241 sunny days, with June through October being the sunniest months.[3] Shade and wind protection during the hot and sunny summer months would be important, and could be provided with pavilions or enclosed cabins or yurts in developed camping areas. Users could also create their own shade and shelter with temporary tents, or by using trailers or other recreational camping vehicles (RVs).

3. Outdoor Recreation Trends and Preferences

Most Popular Outdoor Recreation Activities in the United States

According to a 2018 report by The Outdoor Foundation[4], the top five outdoor recreation activities in the United States are:

1. Running and jogging (19% of Americans)
2. Freshwater, saltwater, and fly fishing (17% of Americans)
3. Road biking, mountain biking, and BMX (16% of Americans)
4. Hiking (15% of Americans)
5. Camping (car, backyard, or RV) and backpacking (14% of Americans)

Across the Nation, people are looking for outdoor experiences that are remote, wild, and natural. People are migrating to live and work in areas with access to large amounts of Federal lands, and the number of visitor days associated with all types of developed, backcountry, motorized, and non-motorized activities are predicted to grow substantially by 2030.[5] National statistics regarding growth or decline in boating are difficult to find and there a numerous types of boating (e.g., motorized, non-motorized, personal flotation devices, etc.), which are often not segregated in reports and surveys. The 2011 National Recreational Boating Survey reported that 8.1% of American households participated in recreational boating: 12.0% used a canoe; 14.7% fished from a recreational boat; and, 23.1% spent time on a recreational boat.[6]

Overnight stays often involve more than one recreational activity. For example, people may come primarily to use the water surface of a reservoir to participate in activities such as waterskiing, canoeing, sailing, stand-up paddleboarding, fishing from a boat, or ice fishing. Campsites close to a water body are desirable for easy access to these activities. During a boating/camping trip, people may also hike, bike, fish from the shore, swim, or drive OHVs on nearby roads and trails. Others may visit specifically for the land-based activities and to enjoy the water for its scenic and wildlife habitat attributes. Table 1 shows the activities that are the most popular with U.S. residents while camping.[7] The proposed Wolf Creek Reservoir has the potential for all of these types of recreational activities either on Bureau of Land Management (BLM) lands, or nearby U.S. Forest Service (USFS) lands. Data specific to Coloradans is not available.

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[4] *Source*: The Outdoor Foundation. 2018. *Outdoor Recreation Participation Report 2018.* https://outdoorindustry.org/oia-participation/.

[5] *Source*: U.S. Forest Service, 2016. *Federal Outdoor Recreation Trends: Effects on Economic Opportunities*. USFS, Pacific Northwest Research Station, General Technical Document PNW-GTR-945, November 2016. https://www.fs.fed.us/pnw/pubs/pnw_gtr945.pdf.

[6] *Source*: U.S. Coast Guard. 2011. *2011 National Recreational Boating Survey*. http://www.uscgboating.org/assets/1/Page/1520b_USCG_RBS_NationalSurvey_Online_SinglePages.pdf.

[7] *Source*: The Coleman Company Inc. and The Outdoor Foundation. 2017. *2017 American Camper Report.* https://outdoorindustry.org/oia-participation/.

Table 1. Top 10 Favorite Activities While Camping

Activity	% of Respondents
Hiking	45
Outdoor cooking	44
Fishing	39
Photography	25
Card or board games	21
Traditional yard games (e.g., badminton, croquet, horseshoes)	16
Canoeing	15
Boating	14
Kayaking	13
Climbing	7

Source: 2017 American Camper Report.[7]

People who fish also typically participate in other recreational activities. In a 2018 survey conducted by the Outdoor Foundation and Recreational Boating and Fishing Foundation, 78% of people who fish also participate in another activity during their trip. The most popular crossover activities are: camping (36.5%), hiking (29.7%), bicycling (28.4%), running (26.8%), and hunting (24.8%).[8]

In the same survey, respondents stated that the best things about fishing were: getting away (38.9%), sounds and smells of nature (33.3%), spending time with family and friends (31.6%), catching fish (30.8%), being close to nature (24.3%), observing scenic beauty (18.6%), the "chase" of catching fish (16.5%), and experiencing solitude (13.6%). The proposed Wolf Creek Reservoir site could provide all of the crossover activities and experiences that flatwater fishermen are looking for, as long as the use areas are designed and managed to minimize conflicts between motorized boating activities and those who desire solitude.

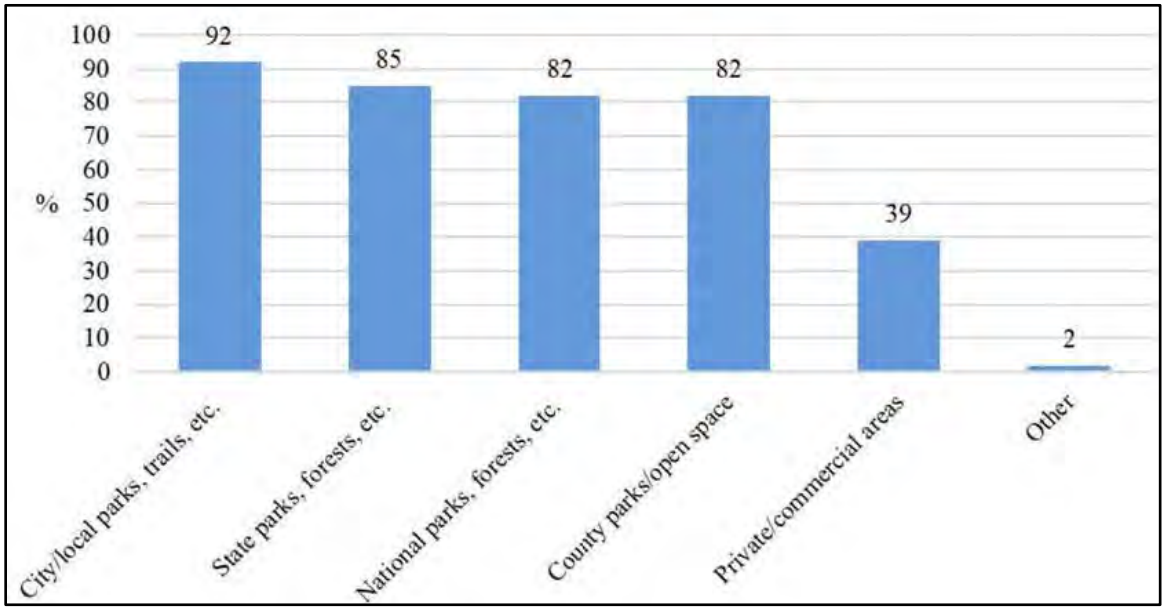
Recreation Participation and Needs in Colorado

Colorado's 2019 *Statewide Comprehensive Outdoor Recreation Plan (SCORP)* reports that Coloradans are generally outdoor enthusiasts, with 82% to 85% of residents visiting county, State, and/or Federal open space and natural lands every year (Figure 2).[9] These public lands are experiencing higher levels of use almost every year and becoming more crowded, which is impacting natural resources and changing the user experience. As a result of increased use, and other needs that were identified, Colorado has developed priorities for expanding recreational opportunities, including water-based recreation, fishing, and trails (Figure 3).

The 2019 SCORP also identifies the top 10 outdoor recreation activities for State residents, many of which could be accommodated at the proposed Wolf Creek Reservoir (Figure 4).

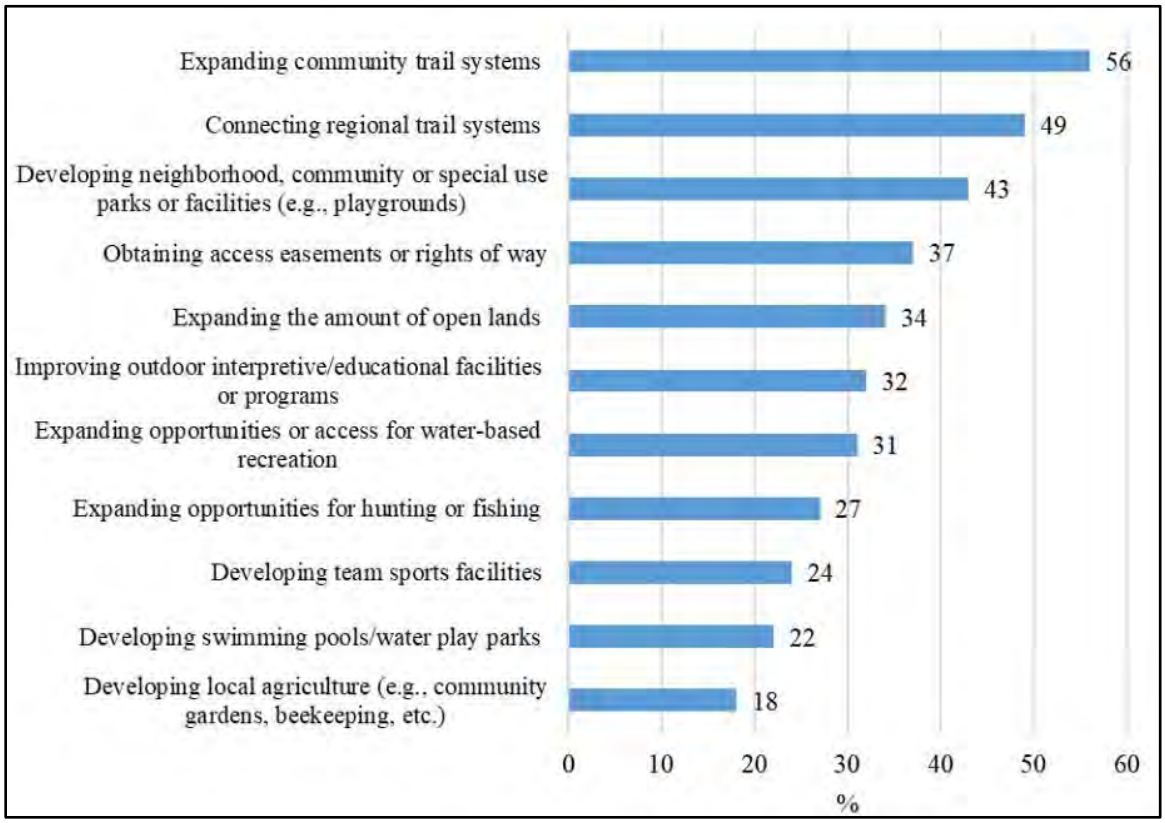
[8] *Source:* Recreational Boating and Fishing Foundation and Outdoor Industry Association. 2018. *2018 Special Report on Fishing*. https://outdoorindustry.org/resource/2018-special-report-fishing/.
[9] *Source:* State of Colorado. 2019. *2019 Statewide Comprehensive Outdoor Recreation Plan.* https://cpw.state.co.us/Documents/Trails/SCORP/Final-Plan/2019-SCORP-Report.pdf.

Figure 2. Types of Outdoor Recreation Areas Used by Coloradans, 2019 SCORP



Source: 2019 SCORP[9]

Figure 3. Future Recreation Priorities for Colorado



Source: 2019 SCORP[9]

Figure 4. Top Recreation Activities and Number of Days Engaged in Activities for Coloradans, 2019 SCORP

Number of *Coloradans* who participated in a given activity**				Average number of *days* Coloradan's participated in a given activity**		
Rank	**Activities**	**# People**	**% of survey respondents**	**Rank**	**Activities**	**# Days**
1	Walking	3,193,283	74	1	Walking	75
2	Hiking/backpacking	2,257,282	52	2	Jogging/running (outdoors)	50
3	Picnicking	1,389,271	32	3	Road biking	35
3	Tent camping	1,389,271	32	4	Bird watching	32
4	Fishing	1,266,888	29	4	Team or individual sports (outdoors) (e.g., basketball, golf, tennis, etc.)	32
5	Playground activities	1,248,757	28	5	Playground activities	30
6	Jogging/running (outdoors)	1,228,360	28	6	Horseback riding	28
7	Skiing (alpine/tele)/ snowboarding	1,205,697	27	7	Wildlife viewing (excluding bird watching)	25
8	Wildlife viewing (excluding bird watching)	1,162,636	26	7	Hiking/backpacking	25
9	RV camping/cabins	1,137,706	26	8	Mountain biking	23
10	Team or individual sports (outdoors) (e.g., basketball, golf, tennis, etc.)	1,071,982		9	Fishing	17
N/A				10	Skiing (alpine/tele)/ snowboarding	14

**Data are weighted based on U.S. Census Data.

Source: 2019 SCORP[9]

Boating was not in the list of top 10 activities in the 2019 Colorado SCORP, and the survey data regarding the ranking of boating, kayaking, canoeing, and other activities is not readily available online. However, the 2014 Colorado SCORP[10] contained a list of the top 38 activities from a survey conducted in 2012, and power boating was ranked 20th, with 13.3% of the population participating in this activity.[11]

In both the 2014 and 2019 Colorado SCORPs, fishing was ranked fourth out of 38 outdoor recreation activities (Figure 5). Tent camping is also within the top five in both the 2014 and 2019 documents, and RV camping (or cabins) increased over five years from a 14.5% participation rate to 26%. This increase could be attributed to "cabins" being added to the RV camping category in the 2019 report.

[10] *Source*: State of Colorado. 2014. *2014 Colorado Statewide Comprehensive Outdoor Recreation Plan.* https://www.recpro.org/assets/Library/SCORPs/co_scorp_2014.pdf.

[11] The national statistic reported in the 2011 National Recreational Boating Survey (see page 3) was 8.1% of households, not individuals, and it included all types of boats.

Figure 5. Top 38 Outdoor Recreation Activities, 2014 SCORP

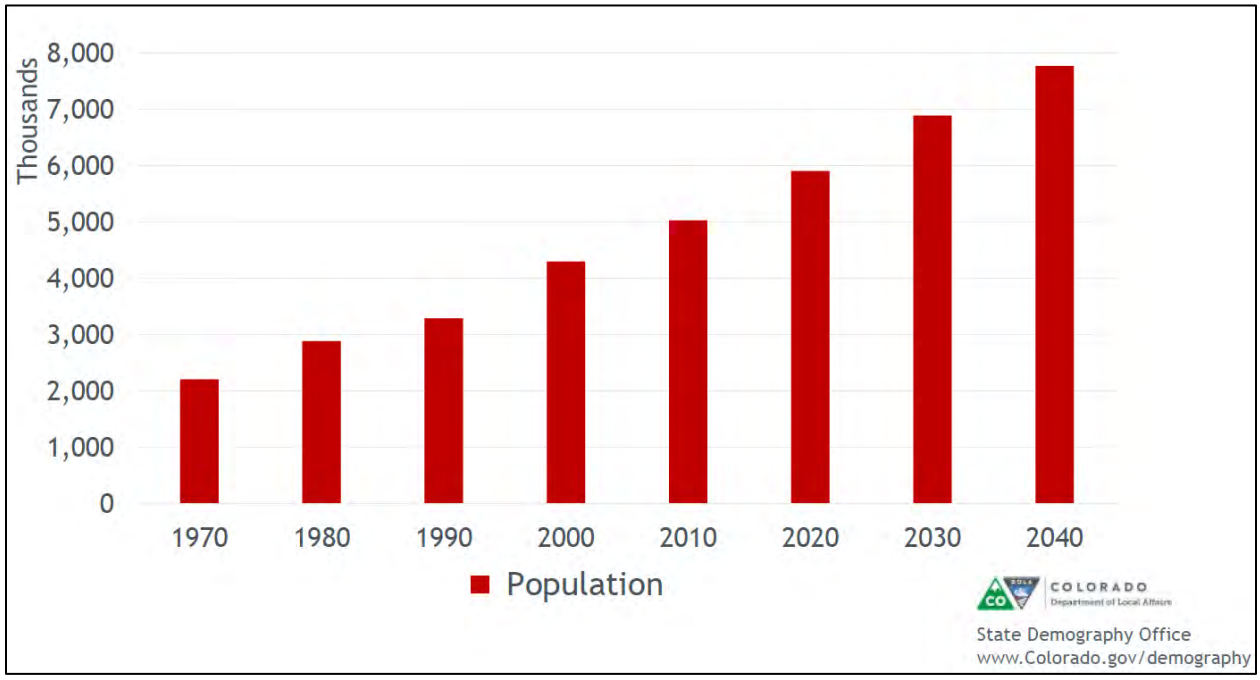
Activity	% Population	Rank	# Activity Days	Rank by Days
Walking	66.3%	1	103,861,714	1
Hiking/Backpacking	51.9%	2	47,600,791	2
Picnicking	37.1%	3	17,312,343	8
Fishing	36.4%	4	26,411,408	6
Tent camping	35.6%	5	14,158,319	12
Skiing or snowboarding at a ski area	33.5%	6	14,546,563	10
Jogging/Running (outdoors)	30.8%	7	46,888,810	3
Swimming (outdoors)	30.2%	8	17,662,875	7
Road biking	27.2%	9	32,772,438	4
Playground activities	22.3%	10	26,516,371	5
Mountain biking	22.1%	11	15,397,750	9
Wildlife viewing (including birding)	19.2%	12	14,456,827	11
Golf	18.7%	13	11,180,042	15
Snowshoeing or cross country skiing	17.7%	14	7,108,319	16
ATV riding or 4-wheel driving	16.9%	15	13,190,020	13
Sledding/tubing	15.7%	16	3,503,863	23
Team or individual sports (outdoors)	14.9%	17	12,205,823	14
Developed/RV camping	14.8%	18	6,474,549	17
Target or skeet shooting	13.7%	19	6,368,714	18
Power boating	13.3%	20	6,290,670	19
Rock climbing	12.5%	21	3,911,605	21
Big game hunting	12.0%	22	6,091,660	20
Whitewater rafting	9.3%	23	3,827,896	22
Upland bird and small game hunting	8.0%	24	2,964,683	27
Backcountry skiing	7.5%	25	2,328,741	31
Horseback riding	7.4%	26	2,874,784	28
Water skiing	7.0%	27	3,284,044	24
Off-road motorcycling	5.6%	28	2,420,919	30
Ice skating (outdoors)	5.3%	29	816,630	35
Kayaking	5.1%	30	3,191,695	25
Snowmobiling	5.0%	31	1,955,665	32
Ice fishing	4.9%	32	2,544,540	29
Jet skiing*	4.1%	33	1,678,259	33
Canoeing	3.6%	34	602,243	36
Waterfowl hunting	3.4%	35	1,420,099	34
Geocaching	2.8%	36	3,088,773	26
Stand up paddleboarding*	2.6%	37	406,957	37
Sailing*	1.3%	38	383,383	38
* = Sample size is small (<30) and results should be interpreted with caution.				
Unique Hunters	15.6%			
All Trail Activities (including walking/jogging)	82.9%			
All Water Activities	57.3%			
All Winter Activities	50.4%			
All Wildlife Activities	29.4%			
Other	73.0%			

Source: 2014 Colorado SCORP[10]

4. Population Growth Projections and Market Base

Colorado has experienced tremendous population growth and is projected to have another 2 million residents by 2040 (Figure 6). As water-based recreation areas become more crowded, it will be more difficult to find available boating and camping sites.

Figure 6. Colorado's Growing Population



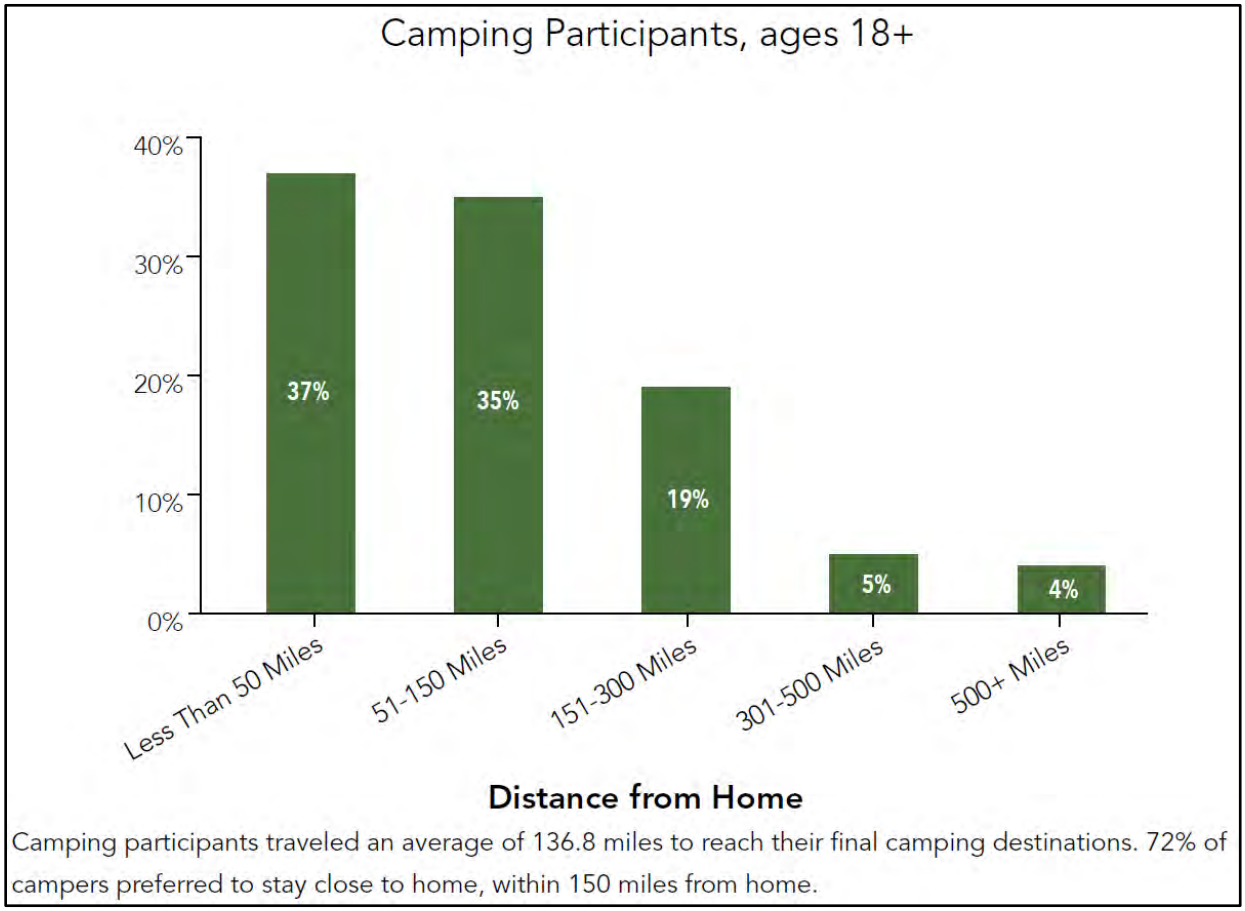
Source: CPW. 2018. *State Parks Revenue and Visitation Trends*. Presented by Krista Heiner, February 7, 2018. https://cpw.state.co.us/Documents/Commission/2018/Feb/Item_8-PowerPoint-Parks_Trends_Update-Feb2018-PWCMtg.pdf.

The demand for recreation is correlated to travel distances and the population base in the region. A 2-hour drive is estimated to be the maximum time that the average person is willing to drive one way for a day trip (4-hour round trip), especially if there are other places to go that are closer and available. National statistics report that 72% of campers traveled 150 miles or less to their destinations, which correlates to a 2.5 to 3-hour drive (Figure 7).[7]

Grand Junction is within a 2-hour drive and is the largest city in the region, with a 2017 population of 62,475. The total population of the eight counties within a 3-hour drive (approximately 150 miles) is approximately 360,000 (Table 2) There may be some day use from residents of these counties, but camping facilities and/or other overnight accommodations are essential for users who desire to stay more than one day or that are coming from longer distances.

These eight counties are projected to grow by 153,000 people within 25 to 30 years, which is a 43% increase. The demand for recreational opportunities and facilities could increase at the same rate, putting greater pressure on existing water-based recreation areas in the region.

Figure 7. Travel Distance to Camping



Source: 2017 American Camper Report.[7]

Table 2. Existing and Projected Population in Colorado Counties within a 3-Hour Drive

County	2017 Estimated Population	2045 Projected Population
Mesa	151,616	225,256
Garfield	59,118	95,137
Eagle	54,772	81,774
Delta	30,568	38,724
Routt	25,220	39,811
Pitkin	17,890	20,391
Moffat	13,131	13,516
Rio Blanco	6,420	6,993
Total	**358,735**	**521,602**

Sources: U.S. Census Bureau. 2019. American Fact Finder. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml; and State of Colorado. 2019. *Population Totals for Colorado Counties*. https://demography.dola.colorado.gov/population/population-totals-counties/#population-totals-for-colorado-counties.

5. Existing Regional Water-Based Recreation Areas Comparisons and Trends

Existing Regional Water-Based Recreation Areas

There are 18 water-based recreation areas in northwest Colorado that could be considered competitors to the proposed Wolf Creek Reservoir for recreational activities. Figure 8 shows the location of these reservoirs, the counties within which they are located, and the cities and towns that are near them. Table 3 lists the acreages of the water-based recreation areas and summarizes relevant facilities at each site.

Flaming Gorge National Recreation Area is located far away from major population centers, but is significant enough to be an attraction for trips that are several days long. Some of the other recreation areas do not allow motorized boating, and others do not provide public campgrounds. Elkhead Reservoir State Park, Ridgway State Park, Stagecoach Reservoir State Park, Vega Reservoir State Park, and Wolford Mountain Reservoir are the most comparable recreation sites to the proposed Wolf Creek Reservoir due to their large water surface areas and open landscape typologies, though all of them are higher in elevation than Wolf Creek Reservoir would be (i.e., 5,500 feet); their elevations range from 6,400 feet amsl at Elkhead Reservoir State Park to 8,000 feet amsl at Vega State Park.

Four of the five comparable recreation sites are managed by Colorado Parks and Wildlife (CPW). Ridgway State Park has the most individual campsites (275), which includes 3 yurts/cabins. Elkhead Reservoir State Park has the least number of campsites, with a total of 35. None of the sites at Elkhead Reservoir State Park have utility hookups, but all are planned to be upgraded to provide electrical services. Many State and county parks across Colorado are planning to add cabins or yurts because the demand is increasing, and they generate more revenue than tent or RV campsites. The trend is to provide more amenities in the cabins and yurts so that they are fully self-contained and usable throughout the year. The campsites at the recreation areas are also continuing to be upgraded to include water, electricity, and sewer, where feasible.

Colorado State Parks Visitation Data and Trends

Visitation to Colorado's State parks has increased from approximately 10 million visitors in 2010 to almost 15 million in 2017 (Figure 9).[12] This trend is expected to continue because the State's population, as well as the popularity of outdoor recreation activities, is increasing.

Available visitation data from 2017 for the comparable reservoirs in northwestern Colorado is shown in Table 4. Ridgway State Park has the highest annual visitation of the comparable recreation areas, and is the only State park that requires all campsites to be reserved in advance (no first-come, first-served sites), presumably because of its popularity. Ridgway State Park is located immediately south of Mesa County, which has the largest population in the region, and the park is along a major tourist route to Ouray, Telluride, Silverton, Durango, and other destinations within the abundant Federal lands that surround the park. Elkhead Reservoir State Park has the lowest visitation, and is farthest from large population areas. There is no data available on visitation to Wolford Mountain Reservoir, or a few of the other reservoirs in the region.

[12] CPW. 2018. *State Parks Revenue and Visitation Trends.* Presented by Krista Heiner, February 7, 2018. https://cpw.state.co.us/Documents/Commission/2018/Feb/Item_8-PowerPoint-Parks_Trends_Update-Feb2018-PWCMtg.pdf.

Figure 8. Existing Regional Water-Based Recreation Areas

Existing Regional Water-Based Recreation Areas

Wolf Creek Reservoir Site

Large Water-based Recreation Area

Major Waterways

Interstate 70

Date: 8/14/2019

NORTH

0 10 20 40

Miles

LOGAN SIMPSON

Table 3. Regional Water-Based Recreation Areas

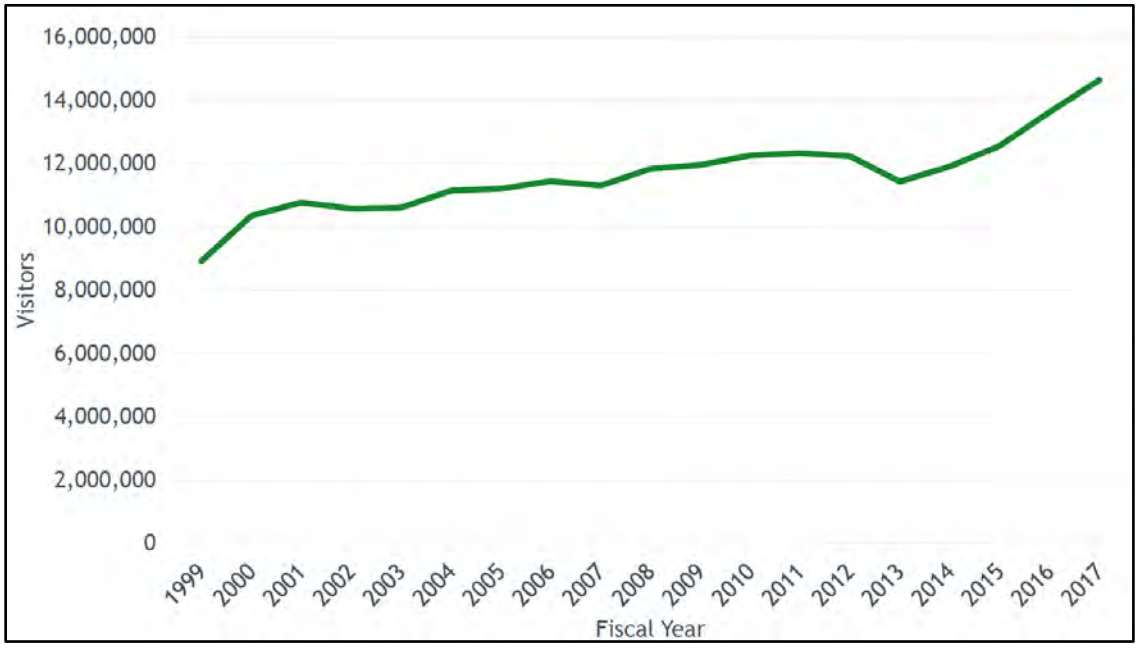
Recreation Area (Land Manager)	County, State	Water Surface Area (Acres)	Total Area (Acres)	Camping Sites	Marina	Swim Beach	Boat Ramps	Trails (Miles)	Other Facility Notes
Curecanti National Recreation Area (NPS)	Gunnison, CO	9,180	NA	385	Yes	No	3	NA	Includes Blue Mesa Reservoir. Allows motorized boating; cabins and more campsites on private property adjacent to lake
Crawford State Park (CPW)	Delta, CO	400	737	56	No	Yes	2	3.6	Allows motorized boating
Elkhead Reservoir State Park (CPW)	Routt/ Moffat, CO	900	2,105	46	No	Yes	2	10.5	Allows winter OHV use and hunting; 31 campsites with electric hookups are under construction in 2019
Flaming Gorge National Recreation Area (USFS)	Wyoming/ Utah	42,020	201,000	700	Yes	Yes	11	NA	91-mile-long site with numerous access points
Green Mountain Reservoir (USFS)	Summit, CO	2,175	NA	40	Yes	No	1	NA	Estimate based on very primitive campsites; minimal facilities present
Harvey Gap State Park (CPW)	Garfield, CO	160	304	30	No	Yes	1	0	Allows motorized boating with a maximum of 20 horsepower
Highline Lake State Park (CPW)	Mesa, CO	160	562	36	No	Yes	2	9.6	Allows motorized boating
James M Robb-Colorado River State Park (CPW)	Mesa, CO	NA	936	137	No	Yes	3	13	Offers multiple sites with boat ramps to the Colorado River; no boat ramps to any of the park lakes; no trailered watercraft
Pearl Lake State Park (CPW)	Routt, CO	167	298	36	No	No	1	0.6	Allows wakeless boating only
Ridgway State Park (CPW)	Ouray, CO	940	3,201	275	Yes	Yes	1	15.6	Camping is by reservation only; offers a highly developed park with multiple amenities
Rifle Gap State Park (CPW)	Garfield, CO	360	1,333	89	No	Yes	1	0	Allows motorized boating
Rio Blanco Lake State Wildlife Area (CPW)	Rio Blanco, CO	123	383	0	No	No	1	NA	Allows motorized boating, hunting, and fishing
Ruedi Reservoir (USFS)	Pitkin/ Eagle, CO	997	NA	73	Yes	No	1		Allows motorized boating

Recreation Area (Land Manager)	County, State	Water Surface Area (Acres)	Total Area (Acres)	Camping Sites	Marina	Swim Beach	Boat Ramps	Trails (Miles)	Other Facility Notes
Stagecoach Reservoir State Park (CPW)	Routt, CO	765	1,630	92	Yes	Yes	2	8	Allows motorized boating
Steamboat Lake State Park (CPW)	Routt, CO	1,053	2,824	192	Yes	Yes	2	1.1	Allows motorized boating; provides access to USFS trails.
Sweitzer Lake State Park (CPW)	Delta, CO	137	210	0	No	Yes	1	3	Allows motorized boating; fish contain selenium so fishing is catch and release only
Vega State Park (CPW)	Mesa, CO	900	1,842	118	Yes	Yes	3	4.8	Allows motorized boating; offers stables, OHV use, and 28 campsites with water and electric hookups
Wolford Mountain Reservoir (BLM)	Grand, CO	1,550	NA	73	Yes	No	1	NA	Allows motorized boating; the picnic area is used as a group campsite; offers a concessionaire (camping and marina)

Sources: CPW. 2017. Fact sheets for Crawford, Elkhead, Harvey Gap, Highline Lake, James M Robb- Colorado River, Pearl Lake, Ridgway, Rifle Gap, Stagecoach, Steamboat Lake, Sweitzer Lake, and Vega State parks. https://cpw.state.co.us/placestogo/parks/Pages/default.aspx; CPW. 2019. *Annual Reports.* https://cpw.state.co.us/aboutus/Pages/AnnualReports.aspx; USFS. 2019. *Flaming Gorge National Recreation Area*. https://www.fs.usda.gov/detail/ashley/specialplaces/?cid=stelprdb5212203; USBR. 2018. *Flaming Gorge Unit*. https://www.usbr.gov/uc/rm/crsp/fg/index.html; and Colorado River District. 2019. *Wolford Mountain Reservoir.* https://www.coloradoriverdistrict.org/wolford-mountain-reservoir-2/.

Acronyms: BLM=Bureau of Land Management; CO=Colorado; CPW=Colorado Parks and Wildlife; NA=not applicable; NPS=National Park Service; OHV=off-highway vehicle; USFS=U.S. Forest Service

Figure 9. Colorado State Parks Visitation



Source: CPW *State Parks Revenue and Visitation Trends.*[12]

Table 4. Regional Water-Based Recreation Area Visitation

Recreation Area	Water Surface Area (Acres)	Total Area (Acres)	2017 Visitation
Curecanti National Recreation Area (NPS)	9,180	NA	NA
Elkhead Reservoir State Park (CPW)	900	2,105	152,931
Flaming Gorge National Recreation Area (USFS)	42,020	201,000	NA
Green Mountain Reservoir (USFS)	2,175	NA	NA
Harvey Gap State Park (CPW)	160	304	39,565
Highline State Park (CPW)	160	562	180,691
James M Robb- Colorado River State Park (CPW)	NA	936	423,583
Pearl Lake State Park (CPW)	167	298	44,701
Ridgway State Park (CPW)	940	3,201	412,058
Rifle Gap State Park (CPW)	360	1,333	250,457
Rio Blanco Lake State Wildlife Area (CPW)	123	383	NA
Ruedi Reservoir (USFS)	997	NA	NA
Stagecoach Reservoir State Park (CPW)	765	1,630	179,403
Steamboat Lake State Park (CPW)	1,053	2,824	408,588
Sweitzer Lake State Park (CPW)	137	210	NA
Vega State Park (CPW)	900	1,842	209,176
Wolford Mountain Reservoir (BLM)	1,550	NA	NA

Sources: CPW. 2017. Fact sheets for Crawford, Elkhead, Harvey Gap, Highline Lake, James M Robb- Colorado River, Pearl Lake, Ridgway, Rifle Gap, Stagecoach, Steamboat Lake, Sweitzer Lake, and Vega State parks. https://cpw.state.co.us/placestogo/parks/Pages/default.aspx; USFS. 2019. *Flaming Gorge National Recreation Area*. https://www.fs.usda.gov/detail/ashley/specialplaces/?cid=stelprdb5212203; USBR. 2018. *Flaming Gorge Unit*. https://www.usbr.gov/uc/rm/crsp/fg/index.html; and Colorado River District. 2019. *Wolford Mountain Reservoir.* https://www.coloradoriverdistrict.org/wolford-mountain-reservoir-2/.

Acronyms: BLM=Bureau of Land Management; CPW=Colorado Parks and Wildlife; NA=Not applicable; NPS=National Park Service; USFS=U.S. Fish and Wildlife Service

Colorado State Park Managers Interviews

The managers of three of the most comparable recreation sites (Elkhead Reservoir, Ridgway, and Vega State parks) were interviewed to understand visitation trends, recreation trends, plans for new facilities, and potential impacts as the State and region grow in population.

Elkhead Reservoir State Park has been experiencing more use since Colorado State Parks took over its operation and management.[13] The 30 spaces for parking trucks and boat trailers is at capacity on a few weekends, most holidays, and when there is a fishing tournament. Additional temporary parking is provided for these peak use days. Most of the day-use boating and swim beach users are from Craig, which is 15 miles away. The swim beach is very popular and at capacity almost every weekend. Reservations for the existing 15 campsites are primarily for people who live on the Western Slope (in Grand Junction or along the Interstate 70 corridor), and they are attracted primarily because of the access to the water and boating. Because of increasing demand, the park is constructing 31 new campsites that will have electrical hookups. Additional boat trailers can then be accommodated at the campsites. The popularity of stand-up paddleboarding is growing some, but is not as high as at reservoirs close to Steamboat.

Ridgway State Park is an extremely popular destination and its 275 campsites are fully booked almost every weekend.[14] More users are coming to boat and camp at Ridgway State Park from the Colorado Front Range because the reservoirs there are becoming less available due to crowding. Ridgway State Park's long boat ramp allows for boating to occur when the reservoir is at its minimum pool, unlike many other reservoirs in northwest Colorado. The park has transitioned from a boating-dominated park to one that is also used as a staging area for access to not only the reservoir, but also regional attractions like Ouray and Telluride and activities like rafting and hiking on the abundant USFS and BLM lands that are nearby. Approximately 60% of the park's revenue is generated by camping, 30% by day-use passes, and 10% by other activities.

Visitation at Ridgway State Park in 2006 was approximately 200,000, and in 2017 was getting close to 500,000 according to the Park Manager, Kirsten Copeland.[15] Revenues during this timeframe also doubled. In 2018, the park visitation declined because drought conditions decreased the water surface of the reservoir. Local residents, including people from Grand Junction, visit in the shoulder seasons (spring and fall), but do not fill the campsites to capacity. The concessions for renting paddleboards helps to generate more users because renters may not have come to the reservoir unless this service was offered; these users then become return visitors. Providing vehicle access to the shoreline in designated areas is very important as the water recedes because it could otherwise be too far to portage paddleboards, canoes, and other personal watercraft. The yurts are very popular, but there are no current plans to build more of them. There is not a designated swim beach, but there are "open swimming areas" that do not require lifeguards and are not subject to strict water quality regulations.

Vega State Park reported a visitation number of 209,176 in 2017, and offers the following recreational uses: camping, picnicking, walking trails, boating for fishing, and shoreline fishing. Because Vega Reservoir is at an elevation of 8,000 feet amsl and the site is often snow-covered during winter, camping is not available year-round. There is also not a lot of waterskiing during the summer due to cold water temperatures. There are five cabins that can be rented year-round, and they are popular features. There is access to nearby USFS lands and trails, so the park is sometimes used as a camping/staging area for OHV use, hunting, bicycling, and equestrian

[13] *Source:* Logan Simpson interview with Mark Leahy, Elkhead Reservoir State Park Interim Manager, February 27, 2019.
[14] *Source:* Logan Simpson interview with Kirsten Copeland, Ridgway State Park Manager, February 28, 2019.
[15] The CPW Fact Sheet for the park stated visitation in 2017 was 412,058.

use. The park provides a skinning rack to clean and butcher game. Gates are installed at each of the three boat ramps so that in the future, the ramps can be closed at night when inspections for aquatic nuisance species cannot be conducted. These inspections and control of the invasive aquatic species is a very high priority for CPW.

The Vega State Park Manager, James Masik, reports that there has been an approximate 10% to 15% increase annually in visitation over the past four years, with the exception of last year (2018) because it was such a dry year and reservoir levels dropped dramatically. Most of the visitors are from the Grand Junction area and Colorado's Western Slope. Because it is difficult to get to, there is not a lot of day use. More Front Range visitors are coming to the park as the water-based recreation areas nearer to their homes are almost always at capacity, and require reservations to camp well in advance. There are a total of 109 campsites, with 28 that have water and electric hookups. A camper services building with showers and flush toilets is provided in the campground, which also provides utility hookups. Sewer hookups are not provided, but there is a dump station available. The park still requires a subsidy for its operation, maintenance, and life-cycle replacements of facilities, but it is getting closer to break even. Only four parks in the Colorado State Parks system make a profit, and they are all on the Front Range: Cherry Creek, Chatfield, Lake Pueblo, and Boyd Lake State parks.

6. Potential Recreation Demand for Facilities at Wolf Creek Reservoir

It is reasonable to expect that with the growing population in Colorado, specifically northwestern Colorado, more of the existing water-based recreation areas and camping areas will reach capacity, and Wolf Creek Reservoir could help to fill the gap between supply and demand.

At a volume of 90,000 acre-feet and 3,299 acres of water surface, Wolf Creek Reservoir could potentially be one of the largest water bodies in the entire state of Colorado. Even with a lower volume of 20,000 acre-feet and 1,335 water surface acres, it would be one of the largest bodies of water on the Western Slope. The boating capacity of a reservoir this large could be 134 to 330 boats, which would each apply for a standard of 10 to 20 acres. This is less than the standard that has been adopted at reservoirs along the Front Range, which range between 3 and 5 acres per boat for all boating types combined. Attracting over 300 boaters in the next 10 to 20 years is probably not realistic because the population base within a 2- to 3-hour drive (day-use range) is relatively small, and other reservoirs are closer.

The analogs for water-based recreation areas suggest that Wolf Creek Reservoir could capture more users than Elkhead Reservoir State Park because Wolf Creek Reservoir would be closer to areas with larger populations. Elkhead Reservoir State Park will have 46 campsites and 30 designated boat trailer parking spaces by the end of 2019. It is feasible that within 10 years Wolf Creek Reservoir could have a similar level of visitation as experienced at Vega State Park, because Vega is a somewhat remote site near Mesa County and the City of Grand Junction. Vega State Park currently has 118 campsites and 61 designated boat trailer parking spaces, 1 marina (no slips), and 3 boat ramps.

Given the larger size of the proposed Wolf Creek Reservoir and lower elevation than either Elkhead or Vega reservoirs, it is possible that within 10 years Wolf Creek could justify developing 120 to 140 campsites, 60 to 70 boat trailer parking areas, 1 or 2 boat ramps, and a fully equipped marina with fuel, boat rentals, supplies, and slips. Substituting some of the campsites for cabins or yurts would increase the appeal for people who desire to participate in outdoor recreation activities while having a few more modern conveniences and more secure weather protection. Cabins and yurts also generate more revenue. Visitation numbers for water-based activities may be influenced by water levels through the summer, extreme weather that shortens the summer recreation

season, water quality in the reservoir, its ability to sustain a high quality fishery, and easy access by vehicles from use areas to the shoreline through the warm months of the year.

If water that would be stored in Wolf Creek Reservoir could be released to augment low flows in the White River, the river downstream through Rangely could potentially be a more attractive flat-water boating amenity. Also, local initiatives to improve public access to a waterfront along the White River, as well as developing and marketing other recreational opportunities in the Rangely area, could collectively create additional demands for recreation at Wolf Creek Reservoir by attracting visitors from a broader geographic area who come for multiple days to participate in a variety of activities. The result could be a more robust and sustainable local economy and improved quality of life for residents.

7. Potential Locations for Recreational Facilities at Wolf Creek Reservoir

Recreation Suitability Analysis

There are several factors that influence the suitability of the land at the proposed Wolf Creek Reservoir site for development of recreational facilities and trails:

- Road access from population centers
- Land ownership
- Water levels
- Topography (drainages and slopes)
- BLM travel management designations

The distance from existing major roads and the Town of Rangely, one of the major benefactors of the project, is important to consider in choosing a site for the recreational destination. Driving a shorter distance is important to local users and people who are coming from the Grand Junction area, the region with the largest population within a 3-hour drive. Figure 10 shows the length of potential access roads to the highways north and south of the proposed site. The northern-most arm of the reservoir is further from major roads and the Town of Rangely than the west and northeastern arms. It is approximately 49 miles to Rangely from the northern arm, 33 miles from the western arm, and 22 miles from the eastern shoreline and Rio Blanco Water Conservancy District property described above.

Roads leading to recreation use areas must be able to accommodate large recreational camping vehicles, passenger cars, and trucks that are pulling boats and therefore must be gentle in grades, stabilized, and wide. This type of road is expensive to construct, especially if there are steep grades and drainages to cross. The grades on the existing BLM Road 1508 from State Highway 64 are relatively gentle and the BLM owns an access easement across the private land along the White River, but the bridge over the White River that has washed out would need to be replaced. This access road could also be used for access during construction of the dam.

To minimize impacts to private property and associated costs, it is preferable to use public lands for the development of recreational facilities, roads, and trails. The BLM manages most of the land within and surrounding the proposed reservoir site. On the west and southwest sides of the reservoir site, the BLM has designated areas that are classified as “Lands with Wilderness Characteristics” (LWC), which means that the lands have relatively few or no established travel routes through them. The LWC area along Coal Ridge has been classified as non-motorized, and travel within all of the LWC areas are restricted to existing routes only. Additionally, there is a square mile of land owned by the State of Colorado that would be partially affected by water storage. Private lands are located along the White River, along U.S. Highway 40, and northeast of the

reservoir site. Unimproved or minimally-maintained roads provide access to the private lands and BLM-managed lands, requiring four-wheel drive vehicles for many of them. Rio Blanco Water Conservancy District recently purchased an approximately 160-acre parcel of land that is located north of the proposed dam site in anticipation of the Wolf Creek Reservoir project.

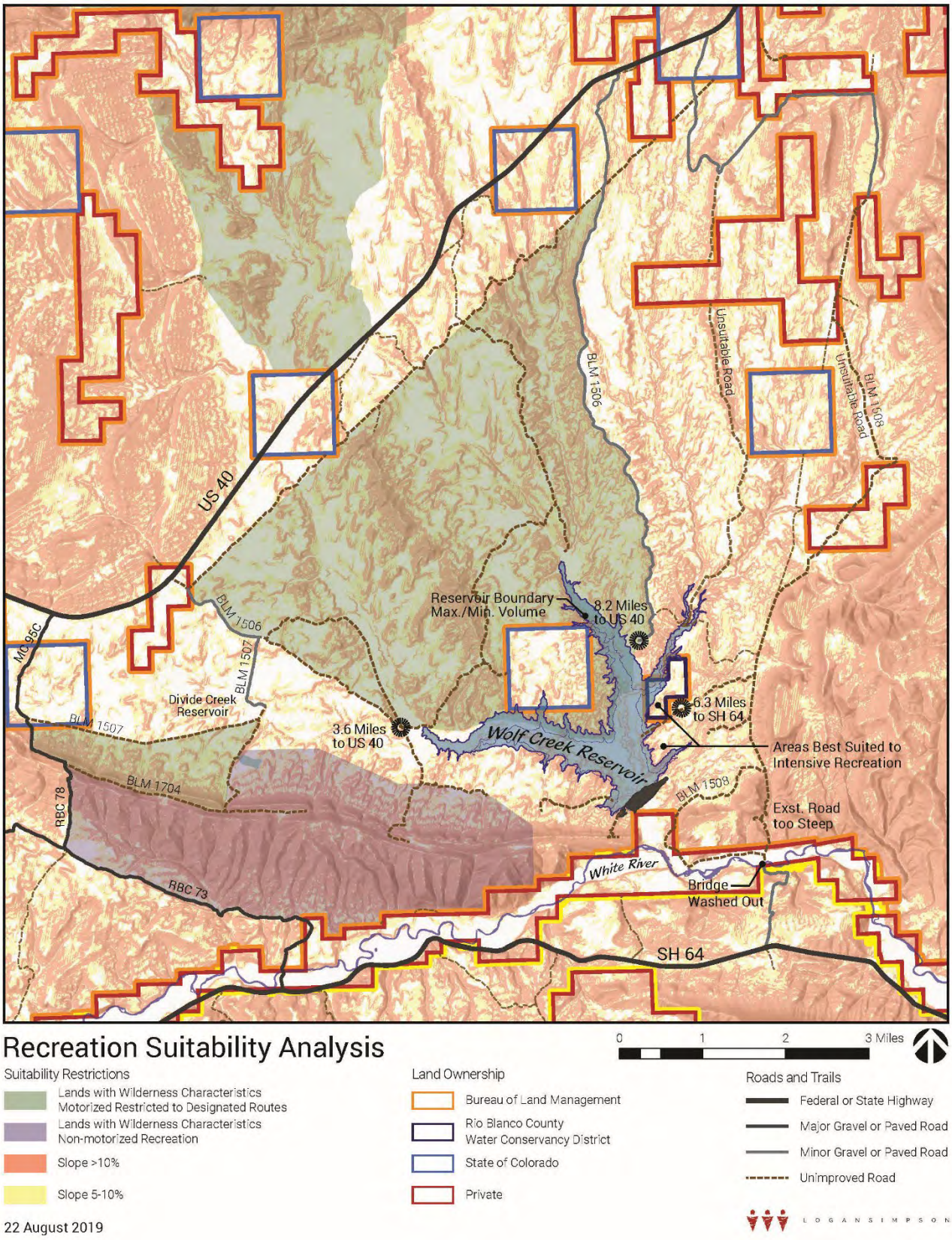
The proposed project would store 20,000 acre-feet of water and would have a minimum storage pool for recreational purposes. The boundary lines for both of these areas are shown on Figure 10. A combination of gentle slopes adjacent to the reservoir, with deeper water nearby is the best scenario for boat ramps, marinas, parking lots, campgrounds, and day-use areas because the land could be easily developed and recreational users would be in close proximity to the edge of the water. The land that would be inundated by the reservoir has drainages that are relatively flat at their bottoms, which would result in long distances of shallow water in the upper ends of the reservoir arms when water levels are high, and mud flats and barren earth as water levels recede. These areas are not suitable for marina or boat ramps. Much of the land surrounding the proposed reservoir has topography that is too steep (i.e., greater than 5% slope) for cost-effective development of facilities like campgrounds and large parking lots.

Much of the land that is owned by Rio Blanco Water Conservancy District has relatively gentle topography that is suitable for development of a large campground that can accommodate large RVs. It is also relatively close to land with topography that is conducive for parking and a boat ramp, reducing the travel distance between the two destinations. To access these locations from BLM Road 1508, existing routes would need to be improved and new roads would need to be constructed to the shoreline.

Upstream of the west arm of the proposed Wolf Creek Reservoir site, there is a very small reservoir named Divide Creek that has evolved into a high quality wildlife habitat. It is located between two areas designated as LWCs, and was previously managed for primitive camping by the BLM. The main access to Divide Creek Reservoir is from U.S. Highway 40 via BLM Road 1506/1507, which is a minimally maintained, one-lane gravel road.

The land adjacent to the north arm of the reservoir is gently sloping and could also be accessed from U.S. Highway 40 via BLM Road 1506. The drive from the highway is approximately 8.2 miles. Minimal or no recreational facilities should be developed in this area due to its location in a LWC area.

Figure 10. Recreation Suitability Analysis



Potential Recreation Zones, Access Roads, and Trails

Based on the suitability analysis, recreation zones of varying intensities were preliminarily identified for the land around the reservoir and the water surface.

Figure 11 shows the potential extents of the recreation zones, and conceptual locations of road connections and trails. Tables 5 and 6 describe the physical and social qualities of the land and water-based recreation zones. These correspond closely with the methodology and terminology used by the BLM in order to expedite the NEPA process that will be required.

It appears as though the best location for a marina, boat ramp, and parking lot is northeast of the proposed dam, on the northern edge of the east arm of the proposed reservoir. Campsites could be north, or possibly southeast, of that area. Day-use facilities could also be developed in this area. A High Intensity Recreation Zone covers this entire area because there would likely be trails between the developed use areas, and the actual extent of development has not yet been defined. To get to the High Intensity Recreation Zone, BLM Road 1508 from State Highway 64 would need to be upgraded, and a new bridge over the White River would need to be constructed.

Figure 11. Potential Recreation Zones, Access Roads, and Trails

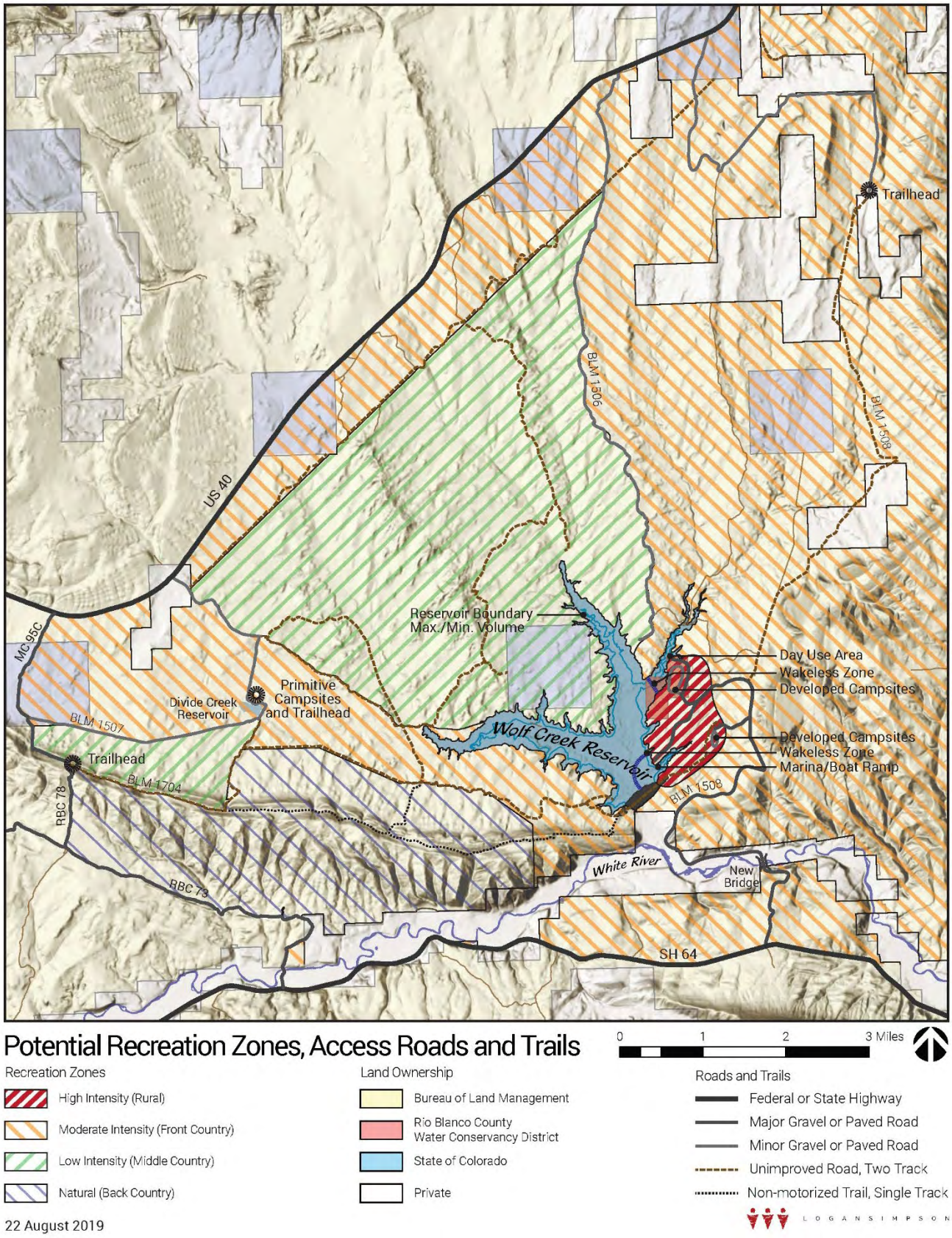


Table 5. Land-based Recreation Zones

	Natural (Back Country)	Low Intensity (Middle Country)	Moderate Intensity (Front Country)	High Intensity (Rural)
PHYSICAL QUALITIES OF THE LANDSCAPE	Developed trails made mostly of native materials such as log bridges; structures are rare and isolated. Few other facilities, if any. Natural landscape with modifications in harmony with surroundings and not visually obvious	Low-density recreation: Developed trails made of native materials such as log bridges; structures are rare and isolated. Maintained and marked trails; simple trailhead developments. Within ½ mile of four-wheel-drive, all-terrain vehicle (ATV), and motorcycle routes Character of the natural landscape retained; a few modifications contrast with character of the landscape (e.g., fences for grazing leases, oil and gas facilities, and utility lines). If a conflict arises between a natural or cultural resource and a competing recreational use, it will be resolved in favor of the protected resource.	Medium-density recreation: Maintained but lightly used narrow gravel roads. Primitive campsites without utility hook-ups. Trails and interpretive facilities, vault restroom, individual picnic areas, and potable water. Within ½ mile of low-clearance or passenger vehicle routes (e.g., unpaved county roads and private land routes) Character of the natural landscape is partially modified but development (e.g., structures, utilities) does not overpower natural landscape. Protection of resources remains a priority; however, conflicts between recreational use and resource protection will be resolved on a case-by-case basis.	High-density recreation: Paved or stabilized gravel parking areas, full-width roads, and paths/trails. Paved boat ramps. Stabilized hand-carried boat access. Marinas, picnic areas, restrooms, showers, concessions, interpretive facilities, swimming access, and camping areas/cabins with water and electricity. Within ½ mile of paved/primary roads. Character of the natural landscape is considerably modified, yet still considered a natural setting. Public use is the dominant management consideration and resource conflicts will generally be resolved in favor of public recreational needs.

	Natural (Back Country)	Low Intensity (Middle Country)	Moderate Intensity (Front Country)	High Intensity (Rural)
SOCIAL QUALITIES ASSOCIATED WITH USE	Low social interaction with high opportunity for solitude. Emphasis on trail activities, wildlife observation, and nature study. 2 to 15 encounters/ day on travel routes. Areas of alteration uncommon; little surface vegetation wear observed; infrequent sounds of people.	Emphasis on trail activities, wildlife observation, and nature study. Low to moderate social interaction with moderate opportunity for solitude. 0 to 29 encounters/ day on travel routes. Small areas of alteration; surface vegetation showing wear with some bare soils; fire rings in dispersed areas; occasional sounds of people.	Day-use or overnight recreation activities with emphasis on trail-based activities (ATV, hiking, mountain biking, shoreline fishing, equestrian use, etc.), picnicking, watchable wildlife, and access for motorized and non-motorized boating. Moderate social interaction/low opportunity for solitude. May be 30 or more encounters per day at recreation sites, edge of water, and travel routes. Small areas of alteration prevalent; surface vegetation gone with compacted soils observed; sounds of people regularly heard.	Emphasis on providing recreational opportunities that rely heavily on motor vehicle access via roads, such as picnicking, camping, and shoreline facilities needed to support both motorized and non-motorized boating and swimming. High social interaction. Low opportunity for solitude. Frequent interactions with other people. A few large areas of alteration; surface vegetation absent with hardened soils; sounds of people and vehicles frequently heard.

Table 6. Water-based Recreation Zones

	Motorized Multiple-Use	Wakeless
PHYSICAL QUALITIES OF THE WATER SURFACE AND RELATED FACILITIES	Motorized boats for waterskiing and fishing, sailboats, and docks at boat ramps and passenger loading access points. May have hand-carry boat access points. Buoys to delineate wakeless boating area.	Typically applied to areas near boat ramps, congested areas, along sensitive shorelines, in narrow coves, shallow/dangerous underwater conditions, quiet zones, swimming areas, or areas specifically designated for human-powered boats (e.g. stand-up paddleboards, canoes, kayaks, etc.)
SOCIAL QUALITIES ASSOCIATED WITH USE	Moderate to high social interaction. Group size varies from 2 to 8 people per boat, and sometimes more if multiple boats are recreating or boat camping together. Low opportunity for solitude due to engine noises.	Low to high social interaction depending on location, purpose, and size of the wakeless zone. Group size varies from 1 to 8 people per boat. Low to high opportunity for solitude depending on location, purpose, and size of the wakeless zone.

The existing BLM Road 1506/1507 could provide access to a more primitive campground and a trailhead at Divide Creek Reservoir if it was upgraded to a 20-foot-wide gravel road that was maintained more frequently. People driving OHVs or riding mountain bikes could use Divide Creek Reservoir as a staging area, and use existing travel routes, plus a relatively short section of a new route west of the proposed dam, to complete a 32-mile loop around the reservoir. Additional trailheads could be developed along the loop; one is shown on BLM Road 1508 at the north end of the study area. A non-motorized trail starting at RBC 78 south of Divide Creek Reservoir could travel the length of the valley between the ridges of Coal Ridge, and terminate at the proposed dam.

A conceptual plan was prepared to further evaluate the feasibility of developing facilities within the High Intensity Recreation Zone. As shown on Figure 12, a boat ramp and marina with a large parking area can be accommodated just northeast of the dam, and a large campground and day-use area would fit well on a combination of the Rio Blanco Water Conservancy District property and adjacent BLM land. A smaller campground may be feasible to the east of where the marina is shown, on the opposite side of the eastern arm of the reservoir. The number of parking spaces and campsites shown on this conceptual plan correspond closely to the demand for facilities presented in Section 6, demonstrating that the demand for major recreational facilities could be met in this location. Non-motorized hiking trails could connect the use areas, and motorized trails could link to the loop trail around the reservoir.

Figure 12. Conceptual Plan for the High Intensity Recreation Zone

8. Enhanced White River Boating and Riverfront Recreation for the Town of Rangely

The demand for recreation at the proposed Wolf Creek Reservoir could grow beyond what is normally associated with a remote camping, boating, hiking, and fishing destination if the Rangely area becomes a multiple day destination, like Ridgeway State Park has become in Montrose County. Across Colorado and the United States, communities are capitalizing upon their riverfronts to create cities that have a high quality of life, retain residents, and attract visitors and employers. Creating developed access points to the White River within the Rangely area, and developing public spaces and parks where people could experience the river and enjoy its natural beauty would increase the town's attractiveness as a tourist destination, as well as provide a great amenity for local residents.

Examples of leveraging multiple resources include the cities of Fruita, Buena Vista, and Montrose in Colorado, and Moab in Utah. These communities have greatly increased tourism over the past 10 years through marketing their numerous outdoor recreation resources and providing support services. These include expansion of dining and lodging options, development of trails that connect key attractions together, and improving access to and use of rivers that run through their communities. The economic benefits are great for these communities because of increased tourism, as well as growth in jobs and population because the area has improved its quality of life for residents. The City of Delta hopes to capitalize upon its riverfront to stimulate economic development by improving public access, as well as incentivizing private investment in development that provides restaurants, lodging, and public trails along the river. Figure 13 below is an example of a riverfront area in an existing park that the City of Delta hopes to improve, which is similar to what could be implemented in Rangely.

Figure 13. Example of Potential Riverfront Improvements

Source: Concept Plan for the City of Delta, Logan Simpson, 2018.

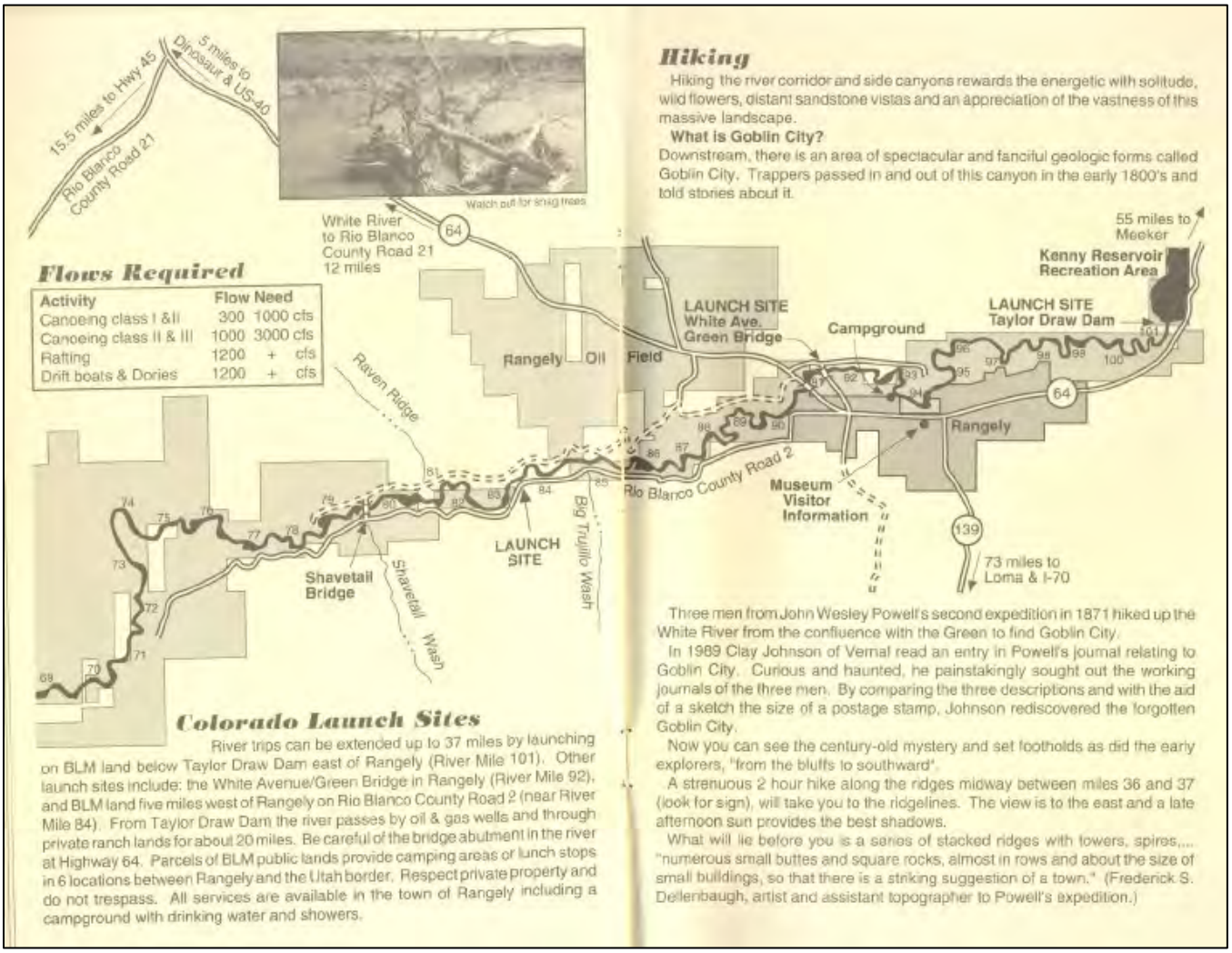
Providing a variety of experiences on and along the White River through Rangely will be important to creating a destination that appeals to a large segment of the local residents and tourists. These experiences could include riding or walking along the river through town, fishing, picnicking in a park, playing beside or in the river, observing wildlife and their habitat, enjoying community events and concerts, and canoeing/tubing on the river itself.

Canoeing and Tubing Potential

The White River through the Town of Rangely does not have a steep gradient and usually does not have enough water in it to be a whitewater rafting or kayak experience. However, it is suitable for canoeing, flat water kayaking, and tubing when the flows in the river are sufficient. According to an undated BLM brochure (Figure 14), the river can be navigated by canoe until the flows drop below 300 cubic feet per second (cfs).

The flows in the White River vary greatly, and sometimes are too high to be safe for Class I or Class II canoeing (e.g., above 1,000 cfs); however, this typically occurs in late spring or early in the summer, and lasts only for a short period of time. The larger issue is that the flows can drop dramatically in mid- to late July, making the river unsuitable for canoeing, flat water rafting, or tubing. If the proposed Wolf Creek Reservoir could store water and release it later for recreational purposes, the season for canoeing, rafting, and tubing could be more predictable, and possibly be extended through the summer. It should be noted that each year varies in terms of snowfall and precipitation, and some years may be so dry that is it not feasible to keep flows higher in the river.

Figure 14. Minimum Flows Required for Canoeing

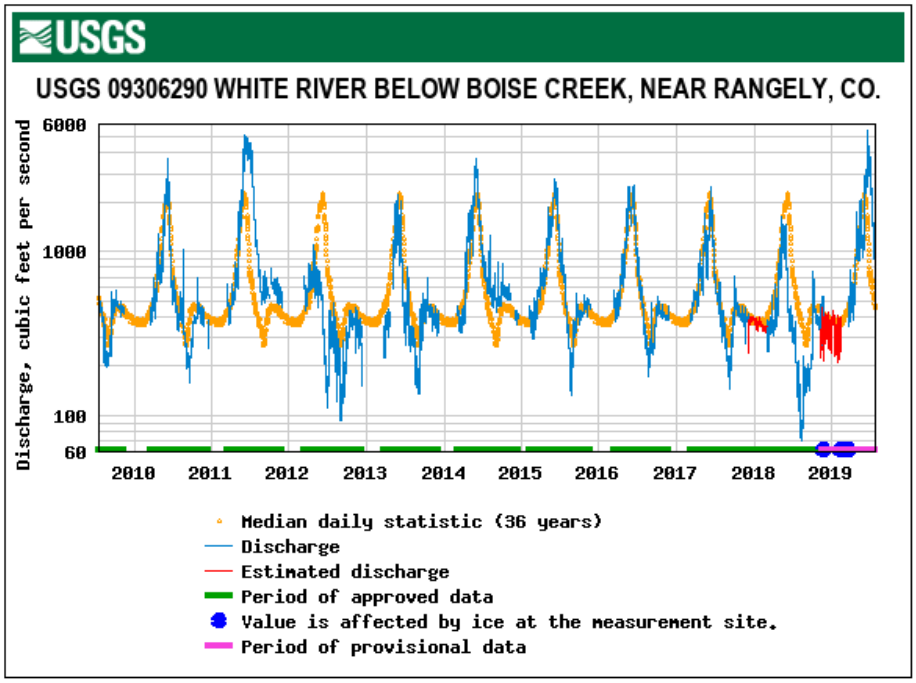


Source: U.S. Department of the Interior, Bureau of Land Management. n.d. *Floating the White River*. http://action.suwa.org/site/DocServer/Floating_the_White_River.pdf?docID=2061.

The White River has a U.S. Geological Survey (USGS) stream gauge that is located approximately three miles downstream of the proposed Wolf Creek Reservoir Dam. Figure 15 shows the 36-year average (orange line) superimposed over the actual flows that have occurred over the past 10 years (blue line). The data show that, on average, the river flows have dropped below 300 cfs in July or August. The actual data for each year over the last 10 years show that there are yearly fluctuations. The years 2012, 2013 and 2018 had very low flows in July and August. This year (2019) represents an atypical year, with flows in late July at almost 500 cfs.

There are irrigation ditch diversions and a reservoir (Kenney Reservoir) downstream of the USGS stream gauge that affect flow rates through the Town of Rangely, so a more detailed analysis would need to be performed to determine more accurately what the historic flows have been through the town. The target for minimum flows should be higher than 300 cfs since that is when the river becomes unsuitable for canoeing, rafting, and tubing. At this stage of planning, it may be reasonable to target 350 cfs to be conservative since there has not been more detailed study of the specific reach through the Town of Rangely. The actual target for the minimum flow should be determined through additional study of the river channel.

Figure 15. White River Stream Gauge Data Upstream of Rangely, Colorado



Source: USGS. 2019. *National Water Information System: Web Interface, USGS 09306290 White River Below Boise Creek, Near Rangely, CO.* https://nwis.waterdata.usgs.gov/co/nwis/uv/?cb_00060=on&cb_00065=on&format=gif_stats&site_no=09306290&period=&begin_date=2009-07-19&end_date=2019-07-26.

River Access and Public Use Areas Potential

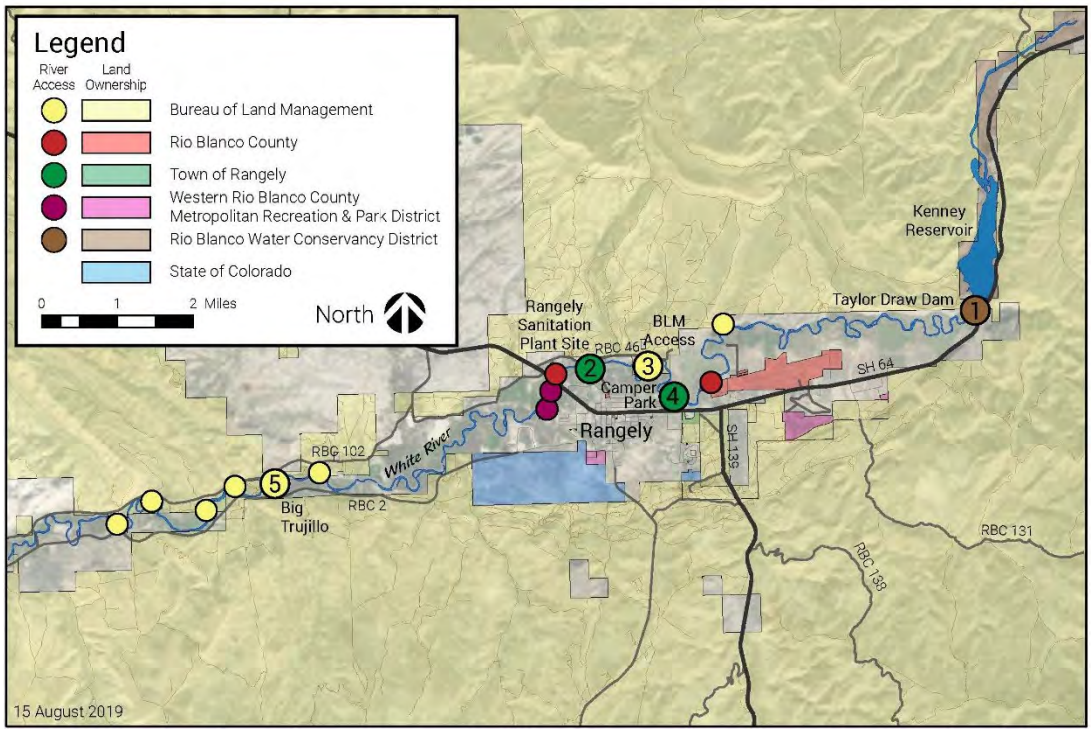
Currently, there are just a few developed access points on the White River between Taylor Draw Dam and the BLM land west of the Town of Rangely, which is a distance of approximately 20 miles via the river. Ideally, these existing access points would be improved and new access points developed to create opportunities for various 30-minute to 2-hour (1- to 4-mile) rafting/canoeing/tubing experiences through the town. All of these access points should provide parking, a small boat ramp for trailered rafts or hand-carried boats and tubes, a staging area where people can gather, a toilet, and potable water. Picnic tables, shade, and landscaping (native or park-like) would be desirable as well. Grading of the riverbank and stabilization may be required at some locations to facilitate safe access and prevent erosion.

The more developed access points are:

1. Rio Blanco Water Conservancy District property just below the Taylor Draw Dam
2. Camper Park on the east side of Rangely
3. Unnamed BLM access on Rio Blanco County Road 46 (RBC46)
4. Town of Rangely Sanitation Plant property adjacent to the White Avenue bridge
5. BLM Big Trujillo access on RBC2 approximately 4 miles west of Rangely

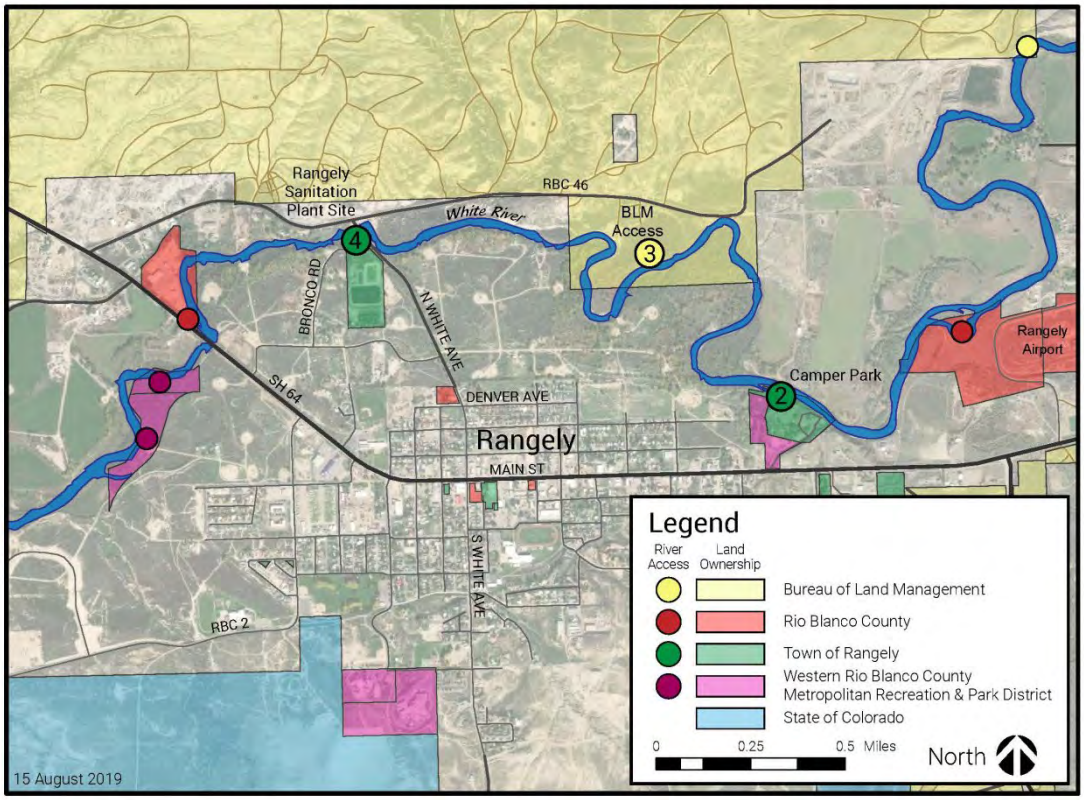
There are additional informal access points on public lands that are sometimes used, but they are not named and have no boat ramps or facilities. Some are only accessible by walking from the nearest county road. Figure 16 and Figure 17 show the locations of these sites and the color-coding indicates the public agency that owns the land. The developed access points are numbered according to the list above, and are described in the pages that follow.

Figure 16. Developed and Informal White River Access Points in the Rangely Region



Source: Logan Simpson 2019.

Figure 17. Property Ownership and River Access Points in Rangely



Source: Logan Simpson 2019.

The Rio Blanco Water Conservancy District river access point, which is just below Taylor Draw Dam on State Highway 64, is minimally developed with a basic unpaved ramp, gravel parking area, and small shade structure. An aerial photo of the site is shown below in Figure 18.

Figure 18. Rio Blanco Water Conservancy District River Access Point

Photo Credit: Google Earth™ mapping service. 2015. Aerial Image of 40.105222°, -108.713008°. Imagery date October 2015.

Camper Park is an approximately 8-mile-long float downstream from the Rio Blanco Water Conservancy river access point below Taylor Draw Dam (Figure 19), and a 4.6-mile drive via State Highway 64 to Rangely. Camper Park is operated by the Western Rio Blanco Metropolitan Recreation and Park District, and has 26 campsites, showers, restrooms, and potable water. It is located adjacent to a small park owned by the Town of Rangely that has a large group shelter, horseshoe pits, sand volleyball court, and a fishing pond. The public properties have approximately 1,800 linear feet of riverfront and tremendous potential to become the jewel along the White River within Rangely. To fully realize its potential, the site's relationship to the river needs to be improved by creating more visibility and access to the water. A boat ramp that is designed to prevent erosion and provide safe put-in and take-out of tubes, rafts, and canoes is needed, as well as parking near the river. A wider and stabilized multi-purpose trail along the length of the property and as a loop around the park would be well used. This trail should ideally be extended through the town to other river access points.

Figure 19. Camper Park

Photo Credit: Google Earth™ mapping service. 2015. Aerial Image of 40.089899°, -108.788481°. Imagery date October 2015.

The unnamed BLM access on RBC46 is 0.75 mile east of the county road's intersection with White Avenue, and is approximately 1.4 miles downstream of Camper Park on the opposite side of the river. Community volunteers recently cleaned up debris on the site, removed invasive species, and added stabilization to the banks. Figure 20 shows the site prior to these improvements. Because the access point is located on the outside curve of the river where water velocities are higher, the banks will always be more prone to more erosion than access points that are located on a straight stretch, or the inside bank of the river. At high flows and velocities, users of this access point should exercise caution because there would be no areas where the water is calm and slow moving next to the bank.

Figure 20. BLM River Access on RBC46

Photo Credit: Google Earth™ mapping service. 2015. Aerial Image of 40.096899°, -108.796123°. Imagery date October 2015.

The Town of Rangely Sanitation Plant access site (Figure 21) also does not have a name and is not located on published maps for the town. It is 0.8 mile downstream of the BLM access on RBC46, and is located between Bronco Road and the White River west of the White Avenue Bridge. There is a small shade/picnic shelter and a gravel parking lot adjacent to Bronco Road, but no other amenities or improved river access point. The 0.5-mile Radino Walking Trail connects the site to the neighborhoods to the south. This site has great potential to attract more local and tourist users if it is improved to make the river more accessible, and if it is connected to a town-wide trail system.

Figure 21. Town of Rangely Sanitation Plant Site

Photo Credit: Google Earth™ mapping service. 2015. Aerial Image of 40.096962°, -108.809175°. Imagery date October 2015.

The BLM's Big Trujillo River access point is approximately 7.2 miles downstream of the Sanitation Plant site, and approximately 4 miles via RBC2 from the west edge of the Town of Rangely. The road into the access point is a rough and eroded dirt two-track road without an official turnaround or parking area, and there are no facilities provided for users (Figures 22–24). The more than 7-mile float from the Sanitation Site access point could take 4 to 6 hours if the river has low flows; therefore, another one or two access points in between would be ideal so that boaters could have fun on the river for a few hours at a time, rather than devoting an entire day to the trip.

Figure 22. Big Trujillo River Access Sign on RBC2

Photo Credit: Jana McKenzie

Figure 23. Big Trujillo River Access Point

Photo Credit: Jana McKenzie

Figure 24. BLM Big Trujillo River Access Point

Photo Credit: Google Earth™ mapping service. 2015. Aerial Image of 40.074981°, -108.887631°. Imagery date October 2015.

There are four good opportunities for improvements to existing informal access points that are upstream or downstream of the main core of the town. Rio Blanco County owns land 0.75 mile upstream of Camper Park that is associated with the Rangely Airport, and which can be easily developed as a public park. Rio Blanco County also owns two parcels that are 0.8 mile and 1.2 miles, respectively, downstream of the Sanitation Plant site that appear to be easily developed as river access points. Developing one of these two as a small park with more amenities would provide a great destination for boaters who float through Rangely.

Potential Trail Connections along the White River

Trails also have many community benefits, including economic development. [16] They are well documented as features that people use more than any other recreational facility, and what people look for when factoring in where to live and work. They increase the value of adjacent property and stimulate tourism. Constructing a multi-purpose trail through Rangely that connects the existing trail east of town to river access points within the town, and ultimately to the Big Trujillo River access point, would greatly increase the appeal of the community for river-related recreational activities.

[16] *Source:* Pennsylvania Land Trust Association. 2019. *Economic Benefits of Trails.* https://conservationtools.org/guides/97-economic-benefits-of-trails.

There is currently a gravel trail that is 5 miles long called “Way to the Water Bicycle Trail,” which runs parallel to State Highway 64 along the south and east side (Figure 25). This trail connects the east end of the Town of Rangely to Kenney Reservoir. There is also a short trail segment called the “Radino Walking Trail,” which parallels North White Avenue, starting at Denver Avenue and ending at Bronco Road and the Sanitation Plant river access site (Figure 26). A non-motorized, multi-purpose trail that continues The Way to the Water Bicycle Trail through Rangely would greatly enhance the community’s quality of life and become a favorite activity for tourists. The trail should connect Camper Park, the Sanitation Plant site, and public lands further downstream on the White River. The trail would be most enjoyable if it were located near the White River and its large cottonwood trees, which provide shade and an attractive setting. The alignment could continue through the public lands and in easements that may be granted or purchased from willing property owners. However, if that was not possible, the trail could be on a roadway in a designated or protected lane, or parallel to the street within the transportation right-of-way.

Figure 25. Way to the Water Bicycle Trail Sign at Kenney Reservoir

Photo Credit: Jana McKenzie

Figure 26. Sign at Beginning of Radino Walking Trail

Photo Credit: Jana McKenzie

9. Leveraging Other Recreational Attractions in the Rangely Region

In addition to improving trail connections and opportunities for recreation associated with the White River, Rangely has many attractions that could be leveraged:

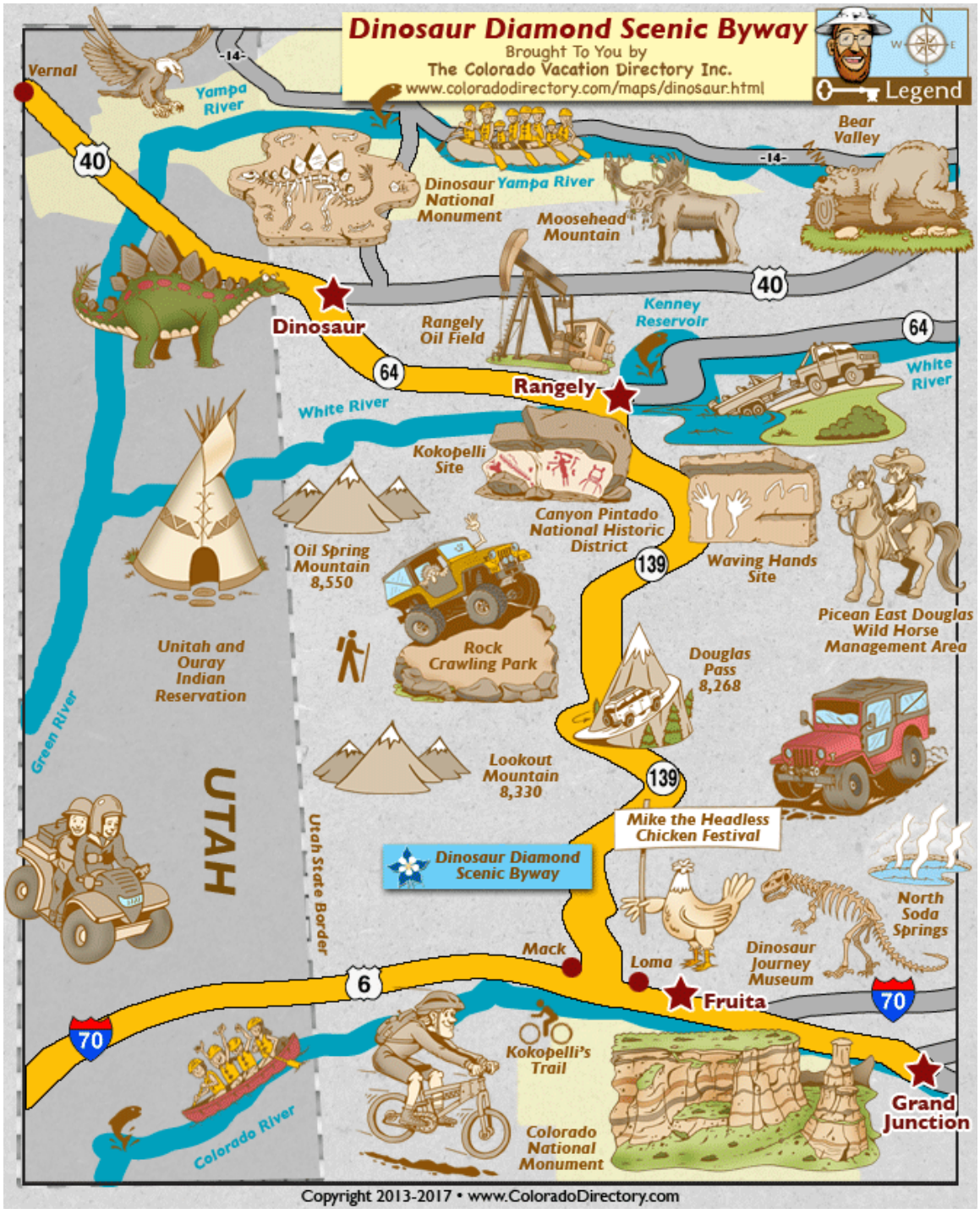
1. **Dinosaur National Monument**.[17] This unique national monument is just 20 miles away and attracted more than 300,000 visitors in 2017.
2. **Dinosaur Diamond Scenic Byway**.[18] This Scenic Byway begins in Loma, Colorado at Interstate 70, and ends in Vernal, Utah, passing through Rangely on the way. Figure 27 shows its route and attractions.
3. **The Canyon Pintado National Historic District.**[19] This site is listed on the National Register of Historic Places and is located between Rangely and Fruita on State Highway 139 (the Dinosaur Diamond Scenic Byway). It was occupied by prehistoric people for as long as 11,000 years and contains many rock art sites.

[17] *Source:* NPS. 2019. *Annual Park Recreation Visitation (1904 - Last Calendar Year), Dinosaur NM*. https://irma.nps.gov/Stats/SSRSReports/Park%20Specific%20Reports/Annual%20Park%20Recreation%20Visitation%20(1904%20-%20Last%20Calendar%20Year)?Park=DINO

[18] *Source:* Colorado Vacation Directory. 2017. *Colorado Scenic Byways Map, Dinosaur Diamond Scenic Byway*. https://www.coloradodirectory.com/maps/dinosaur.html

[19] *Source:* BLM. 2019. *Canyon Pintado National Historic District.* https://www.blm.gov/visit/canyon-pintado-national-historic-district.

Figure 27. Dinosaur Diamond Scenic Byway Map



4. **Rangely Driving Tour of historic sites and petroglyphs.**[20] There are other rock art and historic sites that are located both East and West from Rangely on Highway 64, and are all readily accessible by car.
5. **White River and Kenney Reservoir fishing and wildlife observation.** The lower White River and Kenney Reservoir are known for their warm-water fishery (channel catfish, largemouth bass, smallmouth bass, northern pike, walleye, green sunfish, bluegill, bullhead, yellow perch, or crappie).[21] Kenney Reservoir will continue to be an impounded body of water that could continue to offer camping, boating, and day-use recreation. It could also be further enhanced as a wildlife habitat area that could attract bird and wildlife watchers.
6. **Rock Crawl Park.**[22] This unique park is used by four-wheel drive vehicles that are sometimes specially modified to scale rocks.
7. **BLM and USFS Lands.** There are abundant Federal lands in the Rangely area, and with them, many diverse opportunities for hiking, mountain biking, OHV use, and hunting.
8. **Campgrounds in Town of Rangely.** These include:
    a. *Buck N Bull.*[23] This private RV park has approximately 17 spaces with hookups, and is located at the east edge of Rangely in an industrial park.
    b. *Rangely Camper Park.*[24] Operated by Western Rio Blanco Recreation and Park District, this park has 23 camping spaces, with electrical hookups at seven of them, restrooms, showers, a gazebo, sand volleyball, horseshoe pits, fishing ponds, and river access.

[20] *Source:* Town of Rangely. n.d. *Rangely's Self-Drive Rock Art Tour*. http://siterepository.s3.amazonaws.com/00198200911171204010648.pdf.
[21] *Sources:* State of Colorado. 2019. *Rangely Colorado, Fishing.* https://www.colorado.gov/pacific/townofrangely/fishing and CPW. 2019. *2019 Colorado Fishing.* https://cpw.state.co.us/Documents/RulesRegs/Brochure/fishing.pdf.
[22] *Source:* State of Colorado. 2019. *Rangely Colorado, Rock Crawl Park and Trails.* https://www.colorado.gov/pacific/townofrangely/rock-crawl-park-trails.
[23] *Source:* Colorado Vacation Directory. 2019. *Buck 'N' Bull RV Park and Campground in Rangely.* https://www.coloradodirectory.com/bucknbullrv/.
[24] *Source:* Facebook. 2019. Rangely Camper Park homepage. https://www.facebook.com/RangelyCamperPark/?utm_source=campgroundreviews.com&utm_campaign=RVLife_Campgrounds&utm_medium=referral

Wolf Creek Reservoir Recreation Sites, Vehicular Access, and Trails Analysis

Logan Simpson *March 14, 2022*

Overview

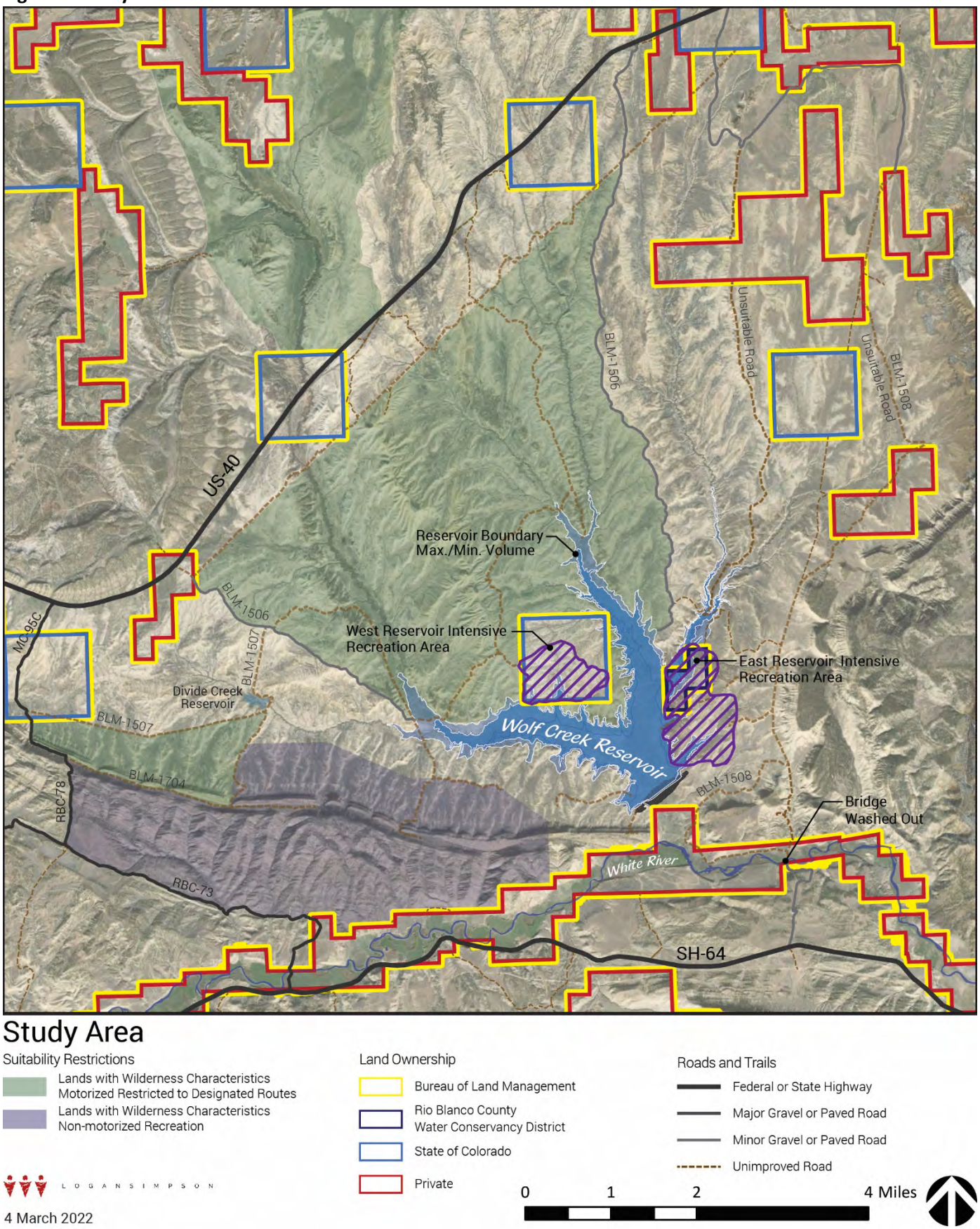
This report and its supporting analyses were produced to further develop and expand on recreation opportunities identified in the 2019 *Wolf Creek Reservoir Recreation Potential Report.* The findings of the 2019 report broadly supported the development of land and water-based recreation facilities at the proposed Wolf Creek Reservoir. The continued growth of Colorado's population and the participation of that population in outdoor activities, both water and land based, were the major factors leading to this conclusion.

The 2019 report identified recreation development zones, potential vehicular access roads from US-40 and SH-64, and trails. *Figure 1. Study Area* shows the proposed reservoir, land ownership, BLM lands with wilderness characteristics, roads and trails, and steep slopes. In the 2019 report Intensive recreational development was focused on using a parcel owned by the Rio Blanco Water Conservancy District (RBWCD) on the east side of the proposed reservoir and adjacent Bureau of Land Management (BLM) property. Access to that location was not analyzed in detail, but a route from the north appeared to be the most feasible because the bridge over the White River from the south no longer exists and the road would require securing easements across private property. This report looks at the southern access via BLM-1508 in more detail to confirm this conclusion, as well as a route from the north on BLM-1506.

In 2021 a square mile of land owned by the Colorado State Land Board (SLB), which is further west and on the other side of one of the north-south arms of the proposed reservoir, was added for consideration for recreational facility development. After the analysis, it was determined that this parcel has good potential for campsites, a marina, day use activities, and trails that connect to routes on BLM land. It also has the shortest vehicular access route using BLM-1506 from the west.

The remainder of this report includes more detail on the analyses and is organized into three subsections: Recreation Sites, Vehicular Access, and Trails.

Figure 1. Study Area



Recreation Sites

This section describes two potential options for development of intensive recreational facilities adjacent to the proposed Wolf Creek Reservoir: East Reservoir Option and West Reservoir Option. Facility location and site layouts were determined by functional relationships between various program elements, topography, and proximity to the reservoir. To reduce costs and the environmental impact associated with grading activities, camp sites for large recreational vehicles and parking lots should be developed on land that has a slope less than 5% but could have limited areas up to 10% slope. Boat in campsites were not evaluated but could be added to the suite of recreational amenities if the manager of the recreation area had the capacity to patrol and clean vault toilets and the sites. Ad hoc camping along the shoreline is a possibility, but capacity to manage this use, the potential impacts to natural and cultural resources and water quality, and potential for wildfires should be evaluated.

Because this is a remote site that requires up to an hour to access from Rangely, the agency that manages the recreation may need to provide on-site housing for a resident caretaker or manager, and possibly a few other key personnel. These facilities have not been sited on either the East or West Reservoir Recreation Area conceptual plans.

Boat ramps are typically constructed at a 14% slope so existing areas at the edge of the proposed reservoir were identified and the feasibility of access and parking was evaluated. The boat ramps will need to be a minimum of 135-feet in length below the high-water line to allow them to be used at the projected low water level. Additional length is required to back down to the water, which will vary depending upon the specific site. Marinas are typically near boat ramps and located in coves that offer protection from wind, which creates waves over long distances. The marina slips must be able to be in water as it recedes so they must be in areas wide and deep enough to accommodate them. Moorings that are anchored to the bottom of the reservoir should be in protected areas near the marina and accessed by small motor or hand-powered boats. Moorings are not shown on the concepts. The location for day-use areas for paddle sports and other hand-launched watercraft considered minimizing conflicts with high-speed boats and were located in coves to avoid large waves and wind.

Figure 2. Wolf Creek Reservoir Potential Recreation Zones shows the location and approximate limits of the East and West Reservoir options as well as the potential Divide Creek Campground and Trailhead, which was discussed in the 2019 report. Recreation zones are based on the BLM's classification system and their physical and social qualities are described in Tables 1 and 2.

Figure 2. Wolf Creek Reservoir Potential Recreation Zones, Access Roads, and Trails

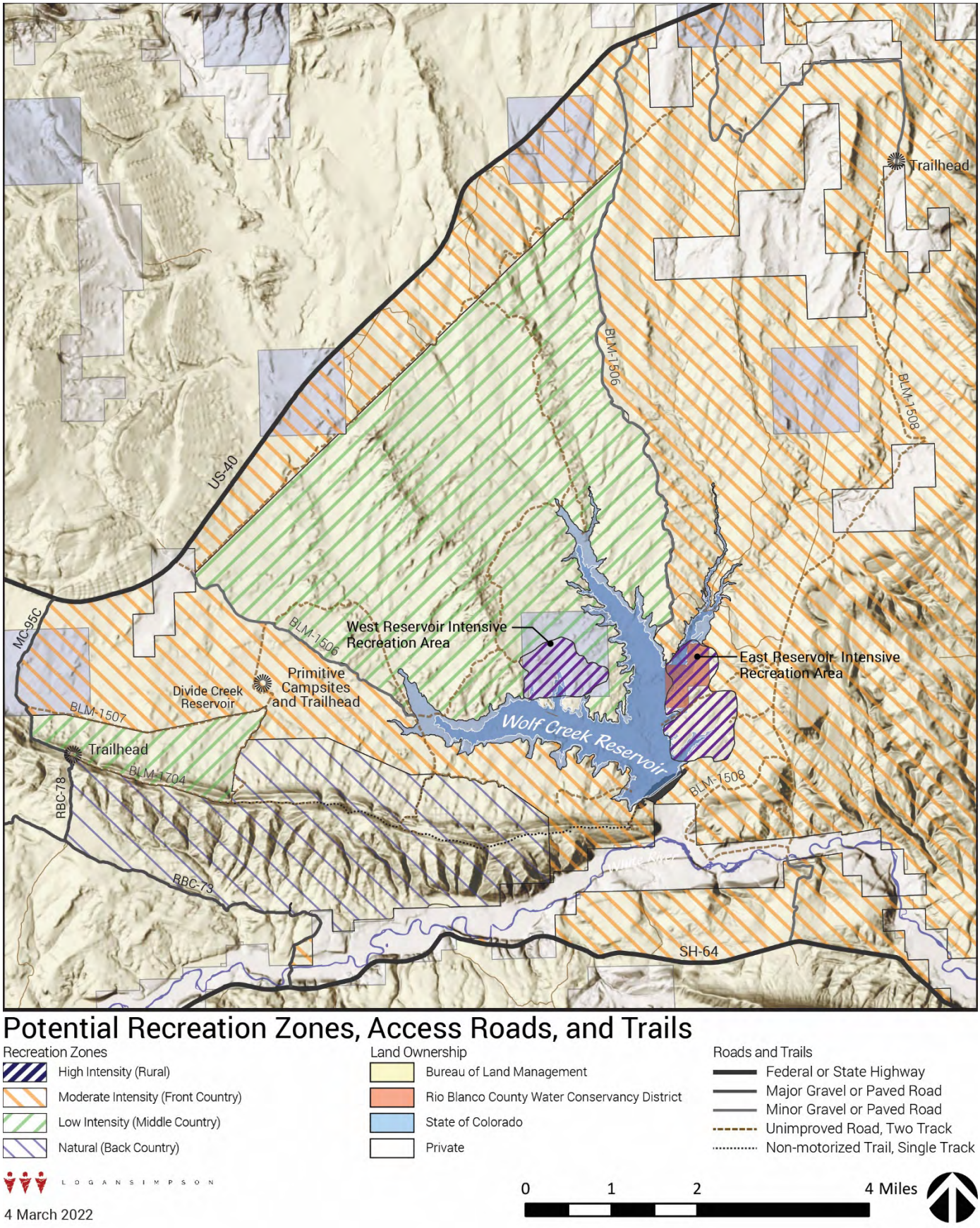


Table 1. Land-based Recreation Zones

	Natural (Back Country)	Low Intensity (Middle Country)	Moderate Intensity (Front Country)	High Intensity (Rural)
PHYSICAL QUALITIES OF THE LANDSCAPE	Developed trails made mostly of native materials such as log bridges; structures are rare and isolated. Few other facilities, if any. Natural landscape with modifications in harmony with surroundings and not visually obvious	Low-density recreation: Developed trails made of native materials such as log bridges; structures are rare and isolated. Maintained and marked trails, simple trailhead developments. Within ½ mile of four-wheel-drive, all-terrain vehicle (ATV), and motorcycle routes Character of the natural landscape retained; a few modifications contrast with character of the landscape (e.g., fences for grazing leases, oil and gas facilities, and utility lines). If a conflict arises between a natural or cultural resource and a competing recreational use, it will be resolved in favor of the protected resource.	Medium-density recreation: Maintained but lightly used narrow gravel roads. Primitive campsites without utility hook-ups. Trails and interpretive facilities, vault restroom, individual picnic areas, and potable water. Within ½ mile of low-clearance or passenger vehicle routes (e.g., unpaved county roads and private land routes) Character of the natural landscape is partially modified but development (e.g., structures, utilities) does not overpower natural landscape. Protection of resources remains a priority; however, conflicts between recreational use and resource protection will be resolved on a case-by-case basis.	High-density recreation: Paved or stabilized gravel parking areas, full-width roads, and paths/trails. Paved boat ramps. Stabilized hand-carried boat access. Marinas, picnic areas, restrooms, showers, concessions, interpretive facilities, swimming access, and camping areas/cabins with water and electricity. Within ½ mile of paved/primary roads. Character of the natural landscape is considerably modified, yet still considered a natural setting. Public use is the dominant management consideration and resource conflicts will generally be resolved in favor of public recreational needs.

	Natural (Back Country)	Low Intensity (Middle Country)	Moderate Intensity (Front Country)	High Intensity (Rural)
SOCIAL QUALITIES ASSOCIATED WITH LAND-BASED USE	Low social interaction with high opportunity for solitude. Emphasis on trail activities, wildlife observation, and nature study. 2 to 15 encounters/ day on travel routes. Areas of alteration uncommon; little surface vegetation wear observed; infrequent sounds of people.	Emphasis on trail activities, wildlife observation, and nature study. Low to moderate social interaction with moderate opportunity for solitude. 0 to 29 encounters/ day on travel routes. Small areas of alteration; surface vegetation showing wear with some bare soils; fire rings in dispersed areas; occasional sounds of people.	Day-use or overnight recreation activities with emphasis on trail-based activities (ATV, hiking, mountain biking, shoreline fishing, equestrian use, etc.), picnicking, watchable wildlife, and access for motorized and non-motorized boating. Moderate social interaction/low opportunity for solitude. May be 30 or more encounters per day at recreation sites, edge of water, and travel routes. Small areas of alteration prevalent; surface vegetation gone with compacted soils observed; sounds of people regularly heard.	Emphasis on providing recreational opportunities that rely heavily on motor vehicle access via roads, such as picnicking, camping, and shoreline facilities needed to support both motorized and non-motorized boating and swimming. High social interaction. Low opportunity for solitude. Frequent interactions with other people. A few large areas of alteration; surface vegetation absent with hardened soils; sounds of people and vehicles frequently heard.

Table 2. Water-based Recreation Zones

	Motorized Multiple-Use	Wakeless
PHYSICAL QUALITIES OF THE WATER SURFACE AND RELATED FACILITIES	Motorized boats for waterskiing and fishing, sailboats, and docks at boat ramps and passenger loading access points. May have hand-carry boat access points. Buoys to delineate wakeless boating area.	Typically applied to areas near boat ramps, congested areas, along sensitive shorelines, in narrow coves, shallow/dangerous underwater conditions, quiet zones, swimming areas, or areas specifically designated for human-powered boats (e.g., stand-up paddleboards, canoes, kayaks, etc.)
SOCIAL QUALITIES ASSOCIATED WITH WATER-BASED USE	Moderate to high social interaction. Group size varies from 2 to 8 people per boat, and sometimes more if multiple boats are recreating or boat camping together. Low opportunity for solitude due to engine noises.	Low to high social interaction depending on location, purpose, and size of the wakeless zone. Group size varies from 1 to 8 people per boat. Low to high opportunity for solitude depending on location, purpose, and size of the wakeless zone.

East Reservoir Option

The East Reservoir Option is centered around a campground on a portion of the 160-acre parcel owned by the RBWCD, which is adjacent to an arm on the east shore of the main body of the proposed reservoir. The character of that landscape is shown in the photo below.

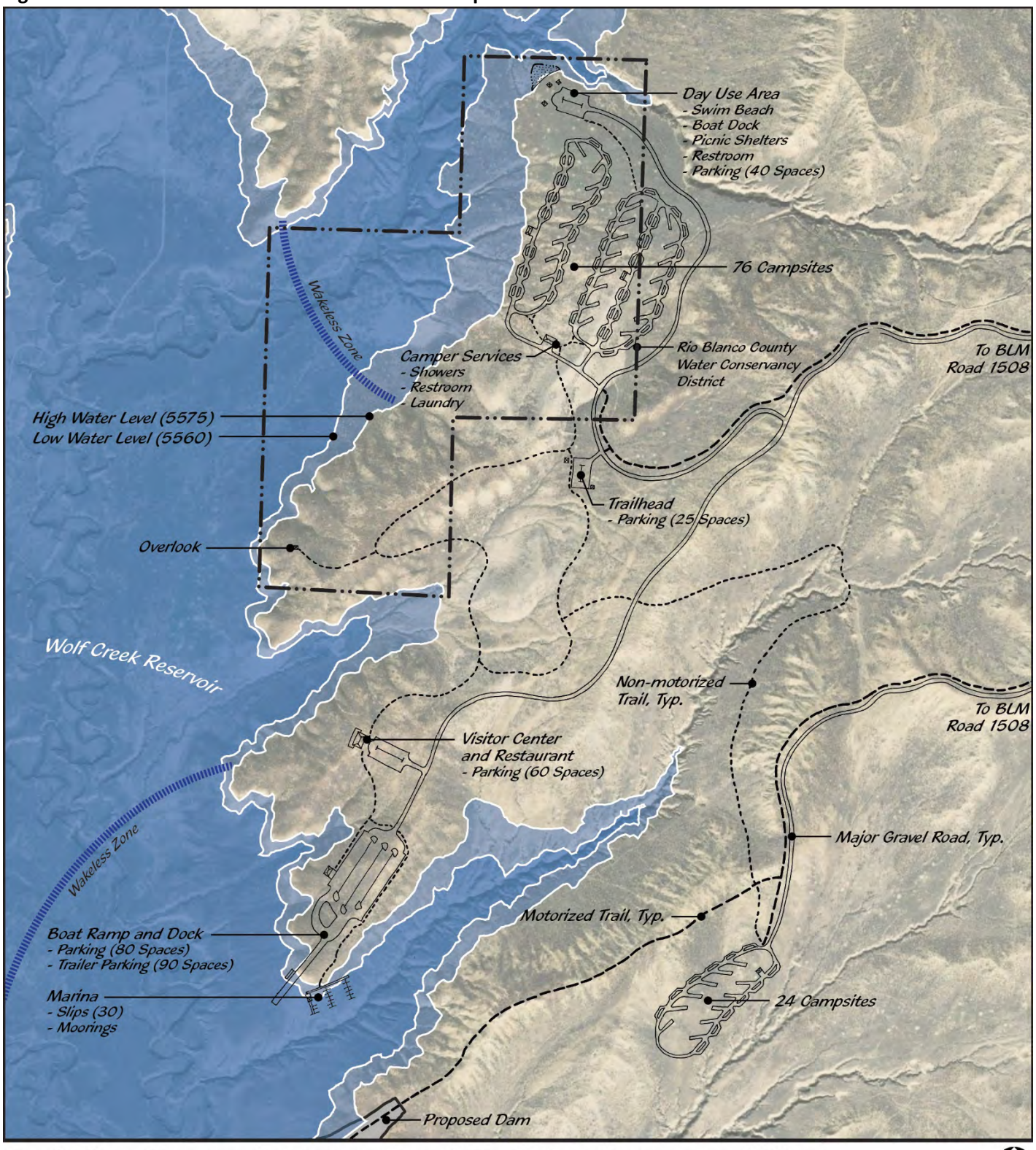
Rio Blanco Water Conservancy District Property looking west/northwest.

After the 2019 report was completed the proposed high and low water elevations for the proposed reservoir were refined to correspond to 39,000 and 66,720 acre/feet respectively. *Figure 3. East Side Recreational Facilities Conceptual Plan* shows potential development areas and facilities. The campground is largely contained within the RBWCD property boundaries, but to create enough sites to warrant staffing to operate and maintain the facility, 85 to 100 sites are necessary. The plan shown includes 76 sites that are on RBWCD and BLM property and an additional 24 sites could be accommodated in a separate loop on BLM land that is further south, totaling 100 campsites. A camper services building would support the large campground with showers, restrooms, and possibly laundry facilities and vending machines. Walk-in tent sites could be added near the RV camping loops but they were not evaluated for this level of analysis, nor were large group campsites.

A marina with 30 slips and a boat ramp are shown at the end of a peninsula near the dam. Parking for 90 vehicles attached to trailers and 80 additional vehicles could potentially be accommodated by leveling the top of the peninsula. Other potential recreational features include a visitor center and restaurant with views over the reservoir, a trailhead, and various trails for motorized and non-motorized recreation.

Constructing facilities as shown on Figure 3 results in a high intensity recreation area zone of 412 acres on BLM land, which is shown on *Figure 2. Potential Recreation Zones, Access Roads, and Trails*.

Figure 3. East Reservoir Recreational Facilities Conceptual Plan



Draft East Reservoir Recreational Facilities Conceptual Plan

LOGAN SIMPSON

2 March 2022

0 500 1,000 2,000 Feet

West Reservoir Option

The West Reservoir Option is located along the northern edge of the western arm of the proposed reservoir. The recreation facilities are located on a parcel owned by Colorado State Land Board (SLB), which would likely require easements, land ownership transfer, or purchase by Colorado State Parks to be developed as a State Park. Depending on the water level, several small drainages on the SLB property would be inundated permanently or intermittently. A prominent drainage in the middle of the site forms a valley that runs north to south across the southern portion of the parcel. This valley is the best location for a marina and boat ramp because it is wide enough and deep enough to have adequate surface area at low water levels, as shown on *Figure 4. State Land Board Property Recreational Facilities Conceptual Plan*. The photo below shows this valley and the character of the landscape on the SLB parcel. Campgrounds could be located on either side of this valley.

State Land Board Property – view south/southwest towards Coal Ridge. The water of the reservoir would inundate the bottom of the valley. The potential marina site is on the far side of the draw near the center of the photograph.

Figure 4. West Reservoir Recreational Facilities Conceptual Plan

Draft West Reservoir Recreational Facilities Conceptual Plan

LOGAN SIMPSON

2 March 2022

0 500 1,000 2,000 Feet

The topography in the northern portion of the SLB parcel has many deep ravines with bands of shrubs, which would require extensive clearing, grading, and drainage culverts to construct campsites. Therefore, campgrounds are shown south of an existing two-track road that runs along the east-west ridge. The entrance with a fee collection station is shown on the west edge of the property. A short segment of new road may be required to a location that could accommodate its footprint. An RV dump station and camper services building with laundry, showers, and vending could also be in this vicinity, as well as a maintenance shop, if desired. Approximately 140 to 160 large recreational vehicle campsites could be accommodated in a variety of locations. The conceptual plan shows 153 campsites.

The marina could easily accommodate 60 or more slips plus moorings. Its parking lot is currently shown with 80 vehicle/boat trailer spaces and 60 single vehicle spaces. A visitor center with a restaurant could be developed in the vicinity of the marina parking lot at the south end of the ridge, which could be a wonderful place to overlook the reservoir. In the southwest corner of the parcel, on the other side of the ridge west of the marina, another smaller valley could become a day use area for paddle sports and other hand-launched watercraft. A new day use area on BLM land on the major arm of the reservoir to the east of the SLB property could also be accessed by improving the existing, but steep, two-track dirt road. This road could be designed to be steeper than the primary access roads if restrictions were posted on the maximum length of vehicles allowed.

Vehicular Access

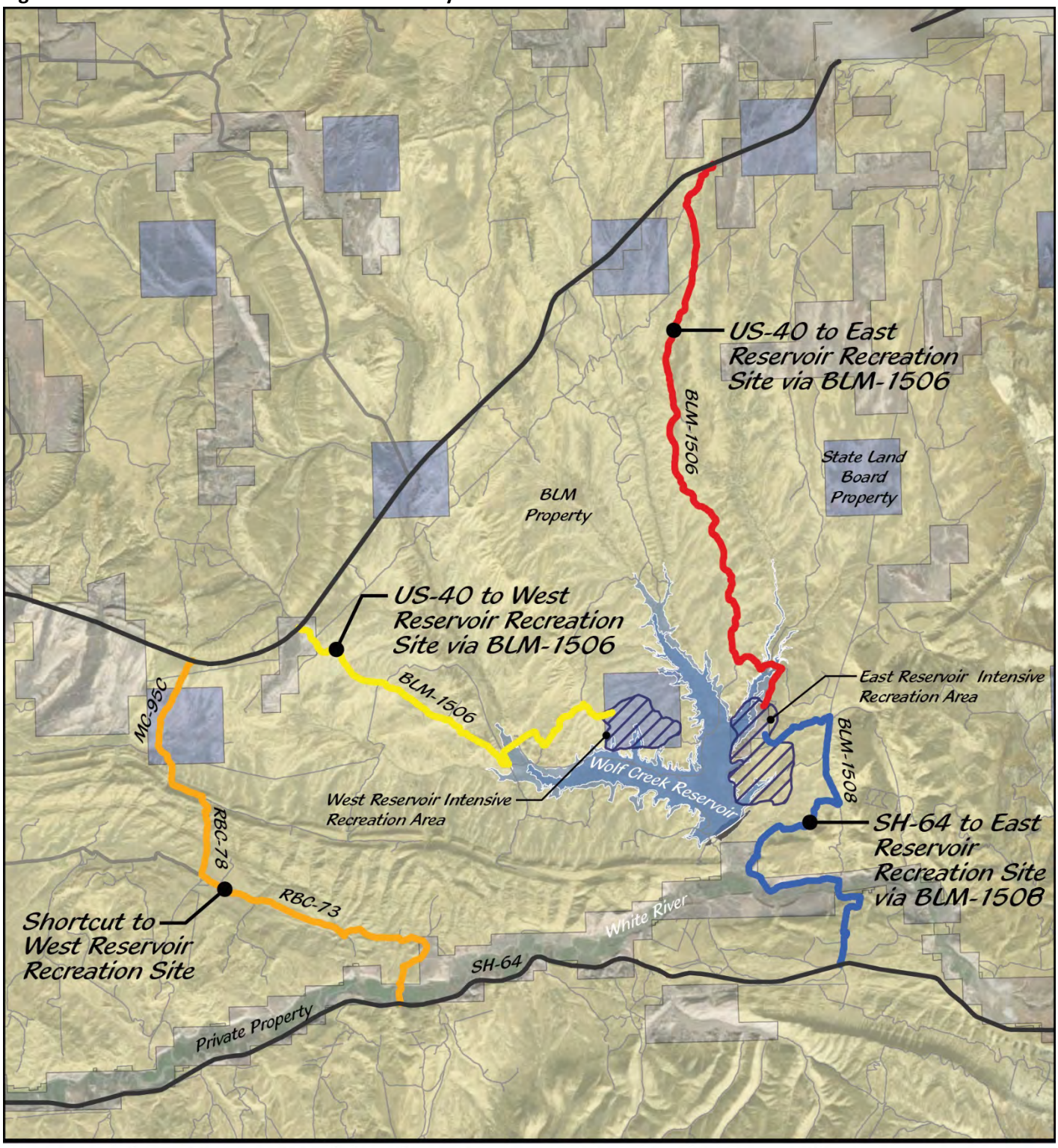
The feasibility of providing safe access from US-40 and SH-64 to the two potential recreation sites for large recreational vehicles pulling boats or UTVs, or trucks pulling long trailers was evaluated. These vehicles could be 55 feet long, which is similar to the length of a semi-truck. The shortcut from SH-64 over Coal Ridge via RBC-73, RBC-78, and MC-93 was also studied because it is a shorter distance for visitors coming from the east, where most people in Colorado live. A new bridge was also recently constructed across the White River on RBC-73.

The design criteria for access roads included:

- Slope 6% or less for extended lengths and up to 10% where steep existing slopes for extended distances made the disturbances required to accommodate shallower slopes impractically extensive.
- Two, 12-foot-wide travel lanes with three-foot shoulders, for a total width of 30 feet.
- Centerline radius minimum 60 feet on tight corners to reduce grading and environmental impacts, and much larger radii for the majority of the road.
- Surfaced with Class 6 ABC.
- Use existing designated routes where feasible.
- Revegetate abandoned routes, if any, or use for UTV, biking, or hiking trail connection.

The routes that were analyzed are shown on *Figure 5. Recreation Areas Vehicular Access Analysis Overview*. Each route is shown in more detail on Figures 6 through 9 with areas indicated that require more significant grading or realignment to meet the design criteria.

Figure 5. Recreation Areas Vehicular Access Analysis Overview



US-40 to West Reservoir Recreation Site via BLM-1506

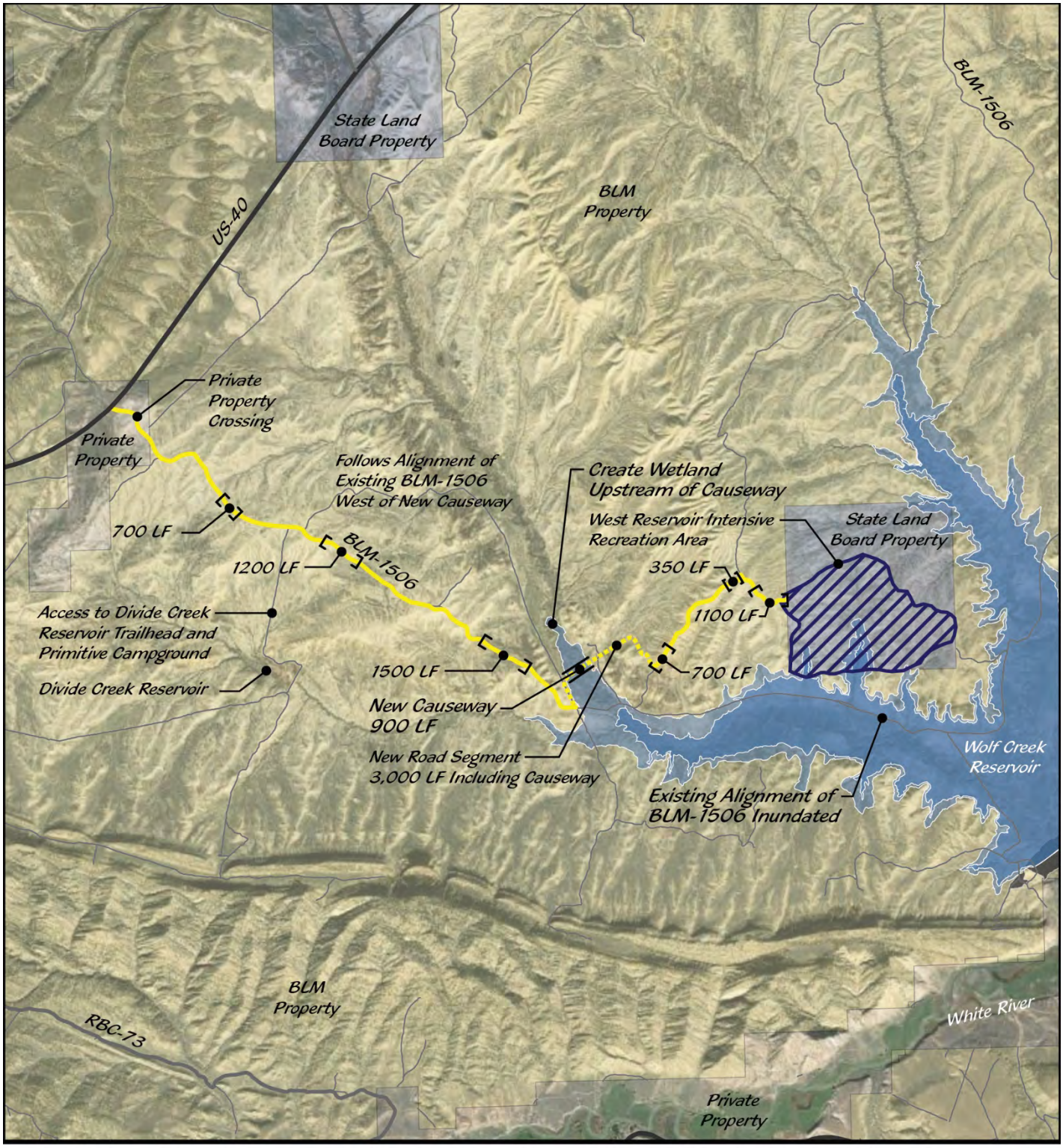
This route begins at US-40 approximately 14.8 miles east of Blue Mountain Rd/MC-134/RBC-1 and approaches the West Reservoir Recreation Site from the Northwest. It has a total distance of 5.6 miles, 5.2 of which are on BLM property. Immediately after leaving the US-40 the route crosses a privately owned parcel with an existing right-of-way. For the next 3.6 miles the alignment follows existing BLM-1506 as it descends into the Wolf Creek Drainage, requiring widening and minor regrading, and more extensive grading of approximately 3400 LF of BLM-1506 in sections of 700, 1200, and 1500 LF to meet design criteria slopes. At mile 3.6 the existing road turns north at the intersection of BLM 1506 and an unnamed existing unimproved route because BLM-1506 will be inundated from this point on until it reemerges on the other side of the reservoir and heads back north. That northern segment of BLM-1506 is discussed later as an alternative access to the East Reservoir Recreation Site.

At 1500' north on the new road alignment the route turns east to cross the western arm of the reservoir via a causeway, bridge, or combination structure. This location was selected for the crossing because it would require the shortest bridge or causeway, and it aligns with the best place to climb out of the drainage on the opposite side. Upstream of the crossing a wetland and wildlife habitat could be created by controlling the amount of water that flows through the road crossing from the reservoir or storm events.

From the reservoir crossing the route heads northeast and then turns southeast, skirting the south edge of Lower Wolf Creek Reservoir Number 3 (which appears to be dry) on an existing primitive road alignment. It then turns northeast on a new alignment to climb up the slope to the ridge where it joins an existing primitive road that runs along the ridge. Creating a new alignment is necessary because the segments of an existing primitive road further south that is too steep as it climbs up the ridge. The total distance of new road alignment constructed for this section is approximately 3000 LF.

The route then follows the existing unnamed primitive road alignments until it nears the State Land Board Parcel, where it may be beneficial to realign the route to a location where an entrance station can be constructed. All the primitive roads will require widening and grading to meet the design criteria and the locations where more substantial grading is required are shown on *Figure 6. US-40 to West Reservoir Recreation Site via BLM-1506*.

Figure 6. US-40 to West Reservoir Recreation Site via BLM-1506



US-40 to West Reservoir Recreation Site via BLM-1506

LOGANSIMPSON

4 March 2022

0 0.5 1 2 Miles

Shortcut to West Reservoir Recreation Site from SH-64 via RBC-73. RBC-78, and MC-95C

A shortcut from SH64 to US-40 would use RBC-73, RBC-78, and MCR-95C and be approximately 7.7 miles long. The route begins at the intersection of SH-64 and RBC-73 approximately 16.3 miles east of Rangely. For visitors from the Grand Junction area improvements route to the would reduce travel distance to the West Reservoir Recreation Site by approximately 3.1 miles, for visitors from the southeast the travel distance reduction would be approximately 27.8 miles.

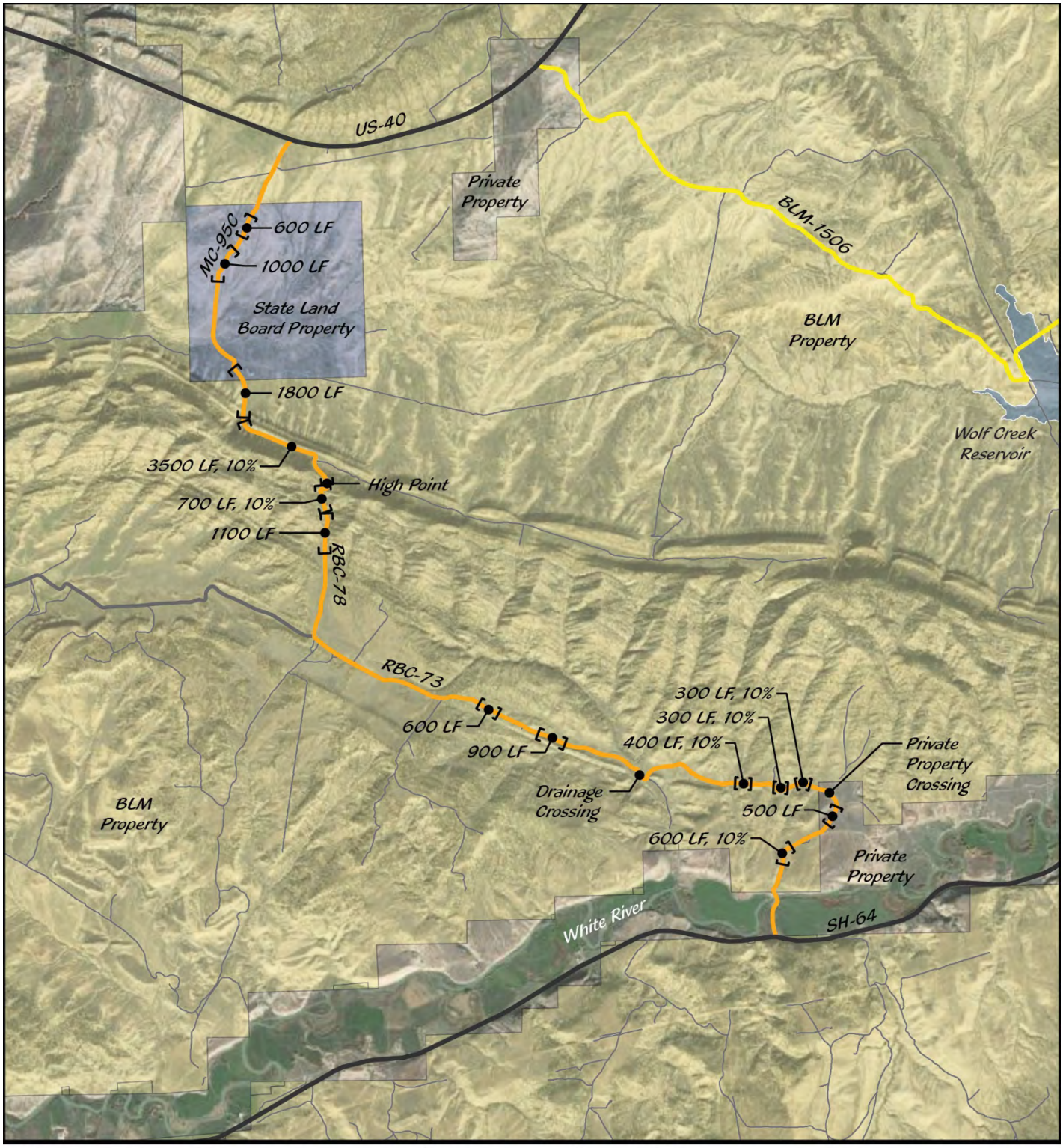
After departing SH-64, RBC-73 crosses the White River on a new bridge .2 miles to the north and climbs out of the river bottom to travel west along the southern edge of Coal Ridge. The climb from the river using the existing alignment of RBC-73 would require the grading of approximately 700 LF to reduce the current maximum slope to 10%. Before turning back to the west, the route crosses private property in a location where grading of approximately 500 LF of existing alignment would be required to meet the 6% slope design criteria. Impacts due to grading on private property could be reduced by relaxing design criteria to 10% slope for this segment of road. Over the next mile three areas with existing slopes of greater than 10% could be reduced to meet the 10% slope criteria without substantially extending the length of the slope. At 2.2 miles from SH-64, RBC-73 crosses a deep, incised drainage. A more robust permanent crossing of the drainage would likely require a large culvert or short bridge. The slopes to enter and exit the drainage are very steep but would be addressed with the construction of a crossing level with surrounding grade. Before intersecting with RBC-78 there are two more major grading areas of 600 and 900 LF as well as several smaller areas where minor grading would be required.

From the intersection with RBC-73, RBC-78 heads north to climbs over Coal Ridge. The first .5 miles RBC-78 are within design criteria for grade but would require widening. As the route approaches the top of Coal Ridge existing slopes approach 20% requiring substantial grading or construction of additional road length in the form of switchbacks to reduce slope. The steep slopes of the surrounding landscape would complicate construction and could result in necessary retaining walls and extensive drainage features, all increasing cost. The BLM property to the east of this segment of road is part of the Coal Ridge designated Wilderness Area. Descending the north side of coal ridge CR-78 follows the bottom of a narrow valley at an average of slope of 10% for two-thirds of a mile. Opportunities to reduce the descending slope by increasing road length are limited by the steep side slopes of the valley. Regrading 3500 LF of the existing alignment of RBC-78 to 10% is the best option for limiting impact area while still meeting the design criteria. The BLM property to the northeast of this segment of road is part of the Coal Ridge designated Wilderness Area. Exiting the northwest end of the valley an additional 1800 LF of existing alignment with an average slope of 6% could be smoothed remove steep spots and meet design criteria.

6.0 miles from SH-64 the route crosses the Rio Blanco/Moffat County line and RBC-78 becomes MC-95C. Between the county line and US-40 there are two areas of 1000 LF and 600 LF requiring minor grading to reduce slopes to 6% on the existing alignment of MC-95C.

The Shortcut to West Reservoir Recreation Site route and grading areas are shown on *Figure 7*. *Shortcut to West Reservoir Recreation Site*.

Figure 7. Shortcut to West Reservoir Recreation Site



Shortcut to West Reservoir Recreation Site

LOGANSIMPSON

4 March 2022

0 0.5 1 2 Miles

US-40 to East Reservoir Recreation Site via BLM-1506

This route runs roughly north to south for approximately 8.8 miles, connecting US-40 to the East Reservoir Recreation Site. The route largely follows the existing alignment of the northern end of BLM-1506. The western segment of BLM-1506 was discussed earlier as part of the access route from US-40 to the West Reservoir Recreation Site. This route is exclusively on BLM property from US-40 until it reaches the RBWCD parcel on the east shore of the reservoir. The implementation of the RBC-73/ RBC-78/MC-95C Coal Ridge shortcut would reduce travel distance to the beginning of this route by 3.1 miles from the south and east and by 11.0 miles from the southeast.

The route starts approximately 23.2 miles east of Blue Mountain Rd/MC-134/RBC-1. Immediately south of the intersection the route goes through 2 sharp turns and a section of steep grades. The radii of the turns should be increased to accommodate larger vehicles and the steep grades can be made to meet the 6% design criteria with 350 LF of grading. Over the next several miles of route there are numerous locations that would require minor grading but none exceeding 350 LF. The next major grading would occur at 3.2 miles from US-40. Slopes over the top of a small knoll would need to be extended to approximately 1200 LF along the existing alignment to reduce the slope to 6%. At 3.6 miles another steep slope would need to be extended to 700 LF to meet the design criteria. There are several more locations requiring minor grading between the bottom of this slope and mile 7.5.

At mile 7.5 BLM-1506 intersects with BLM-1705. Significant grading and some deviations from existing alignments occur after this point. The access route turns east onto BLM-1705 and descends into the Coal Creek drainage for approximately .4 miles. Along this segment two steep sections can be improved from their current condition with a 350 LF section graded to 6% and a 1000 LF section graded to 10%. At .4 miles east of the intersection with BLM-1506 the alignment of the route deviates from the existing alignment of BLM-1705 to stay above the high-water line of the proposed reservoir and approach a narrow portion of the drainage better suited to the construction of a series of 2 causeways crossing Coal Creek and one of its tributaries. The total distance of this segment of new road, including over the causeways, is 1400 LF. On the east side of the Coal Creek drainage the new road briefly reconnects with BLM-1705 at mile 8.2 before turning south to follow east shore of the reservoir to the south. There are several existing 2-track trails in this area, but none appear to be deeply established enough to use as the alignment for the access route and many will be below the high-water line of the potential reservoir. There also appears to be a prairie dog colony in this area. Immediately before entering the RBWCD property and East Reservoir Recreation Site the route crosses another drainage that would require the construction of a third causeway 200 feet in length. 2600 LF of new road on a new alignment would need to be constructed to connect from BLM-1705 to the recreation site, including 200 LF over the causeway. The total distance of new road alignment for this access option is 4000 LF with 950 LF of causeway. As with the US-40 to West Reservoir Recreation Site access the causeways could be used to created wildlife habitat upstream of the crossings.

Portions of the alignment that follow existing primitive and 2-track roads will require widening and grading to meet the design criteria. Locations where more substantial grading is required are shown on *Figure 8. US-40 to East Reservoir Recreation Site via BLM-1506*.

Figure 8. US-40 to East Reservoir Recreation Site via BLM-1506

US-40 to East Reservoir Recreation Site via BLM-1506

LOGAN SIMPSON

4 March 2022

0 0.5 1 2 Miles

SH-64 to East Reservoir Recreation Site via BLM-1508

This route is approximately 7.1 miles long and connects SH-64 to the East Reservoir Recreation Site via the existing alignment of BLM-1508. The route begins approximately 22.5 miles west of Rangely, where BLM-1508 begins and travels north from SH-64.

The first .5 miles follow the existing alignment of BLM-1508 and would require widening and smoothing to meet design criteria but no additional grading or new road alignment. At .5 miles a steep descent requires 600 LF of grading to reduce the slope to 10%. At .8 miles from SH-64 3500 LF of grading are required to reduce the slope of the descent into the river bottom to 10%. In addition to grading adjustments along the alignment modifications to this section of road would require substantial additional cut, fill, and possibly rock blasting up and downhill of the road to create a wider bench for it sit on. There is an existing bridge where the route crosses the White River but, the northern approach to this bridge is washed out and is a significant barrier to the viability of this route.

From mile 1.4 (approximately 200 feet south of the existing bridge) to mile 3.3 the route crosses private property with a few short sections crossing onto BLM property. After crossing the White River, the route travels generally west for the next 1.5 miles, no grading would be required beyond widening and smoothing the existing road alignment in this area but the width of the right-of-way across private property could be restrictive. At mile 2.9 the route turns north and begins to climb quickly out of the river valley. Reducing this slope to 6% would require 1100 LF of grading, almost exclusively on private property. After crossing back onto BLM property, the route turns to the northeast and passes two more sections of steep road that would require grading two sections of 1000 LF and 600 LF to reduce slopes to 6%.

At mile 4.8 the route turns to the left and follows the base of a ridge to the north. Over the next 1.1 miles it crosses two smaller ridges requiring grading adjustments over segments of 700 and 400 LF. At mile 5.9 the route turns back to the west and begins its descent to the East Reservoir Recreation Area. Immediately after turning the west, departing from BLM-1508 and now following a 2-track road instead of primitive road, the crossing of a small drainage would require 400 LF of grading or a road realignment of similar length to meet design criteria. For the next .8 miles the route descends to the west following the existing 2-track and requiring only smoothing and widening. As the route meets the approximate boundary of the East Reservoir Recreation Area the existing topography steepens and would require 1300 LF of grading to meet design criteria and connect to the East Reservoir Recreational Facilities Conceptual Plan as it shown Figure 3. Adjustments to layout of recreational facilities could impact the location and extent of grading impacts required to access them.

The route and locations where substantial grading is required are shown on *Figure 9. SH-64 to East Reservoir Recreation Site via BLM-1508.*

Figure 9. SH-64 to East Reservoir Recreation Site via BLM-1508

SH-64 to East Reservoir Recreation Site via BLM-1506

LOGAN SIMPSON

4 March 2022

0 0.25 0.5 1 Miles

Budgetary Costs

Construction costs of the access roads are estimated to be approximately 1.5 million dollars per mile of road constructed. The cost per mile estimate was developed using concept plan design criteria and unit costs from the 2021 Colorado Department of Transportation 2021 Cost Data Book. Approximate costs for each potential access option are shown in Table 3.

Table 3. Estimated Budgetary Costs for Access Routes

US-40 to West Reservoir Recreation Site via BLM-1506	Shortcut to West Reservoir Recreation Site via Shortcut to West Reservoir Recreation Site	US-40 to East Reservoir Recreation Site via BLM-1506	SH-64 to East Reservoir Recreation Site via BLM-1508
5.6 Miles	**7.7 Miles**	**8.8 Miles**	**7.1 Miles**
$8 to $10 Million	**$12 to $14 Million**	**$13 to $15 Million**	**$11 to $13 Million**

The cost per mile estimate does not include the following:

- Replacement or repair of the bridge over the White River on BLM-1508
- Rock blasting
- Retaining walls or fencing
- Geotechnical, cultural resources, or hazardous materials studies
- Surveying
- Design and engineering fees
- Permitting

Trails

Trails around the proposed Wolf Creek Reservoir would provide additional recreational experiences to campers and day users. Currently Off-highway Vehicles (OHVs) are the primary users, with little bicycle or hiking. Backcountry hiking and mountain biking trails that are separate from the OHV routes and that loop around the recreational development sites and the reservoir are recommended.

Appendix F

Scope of Work –

White River Management Plan

Exhibit A
Scope of Work
White River Management Plan

I. Introduction

The Colorado Water Conservation Board (CWCB), in cooperation with the Upper Colorado River Endangered Fish Recovery Program (Recovery Program or Program), is currently developing a Management Plan for the White River basin. The White River Management Plan (WRMP or Management Plan) will characterize current and reasonably foreseeable future water use within the basin and its possible impacts to endangered fish, including impacts to endangered fish life stages and habitat in the White and Green River basins. The Management Plan will help identify necessary Recovery Program activities in the White and Green River basins that will provide Endangered Species Act (ESA) compliance for water depletion impacts in the basin. The Management Plan will include a programmatic biological assessment (PBA or BA) to provide the basis for development of a Programmatic Biological Opinion (PBO) by the U.S. Fish and Wildlife Service (USFWS).

The CWCB requests assistance with conducting public meetings, developing and drafting of the Management Plan, conducting National Environmental Policy Act (NEPA) compliance, and developing accompanying NEPA documentation. ERO will assist, in cooperation with local, state, tribal, and federal stakeholders, in the determination of necessary recovery actions to be completed by the Recovery Program for current and future water demands and associated impacts, evaluation of impacts to recommended flows, development and drafting of the Management Plan, and drafting of necessary NEPA documents.

II. Background

The Endangered Fish Recovery Program was initiated in 1988 with the signing of a cooperative agreement by the Department of Interior, Western Area Power Administration, and the states of Colorado, Utah, and Wyoming. Participants in the Recovery Program include states, federal agencies, water users, water development interests, power customers, and environmental organizations. The goal of the Recovery Program is to allow water use and development to occur while recovering four endangered fish species (humpback chub, bonytail, Colorado pikeminnow, and razorback sucker) in the Upper Colorado River basin. Species information including life stages and habitat descriptions can be found on the Program's website (http://www.coloradoriverrecovery.org/) or in the documents included in the reference section. Program activities focus on the following elements:

- Identification and protection of instream flows
- Restoration and protection of habitat
- Reduction of negative impacts of nonnative fishes and sportfish management activities
- Conservation of genetic integrity and augmentation or restoration of populations
- Monitoring and research of populations, habitat, and recovery actions
- Education to increase public awareness and support
- Program planning and management

In 2001, Tyus and Saunders (2001) determined that indirect contributions (flow, sediment, and water quality) from the White River to endangered fish recovery in the Green River sub-basin were second only to those of the Yampa River. The authors recognized that the White River also provided direct habitat contributions to endangered fish recovery based on abundant captures of adult Colorado pikeminnow, and the occasional capture of young-of-the-year Colorado pikeminnow and adult razorback sucker. Researchers have documented spawning of Colorado pikeminnow and razorback sucker in the White River (Bestgen et al. 2012). These important findings, coupled with the relatively intact native fish populations, have highlighted the value of the White River to endangered fish recovery in recent years.

A 2002 Recovery Program Project 114 Annual Report, *Tributary Basin Management Plans*, recommended that a PBO be developed for the White River. This PBO would be similar in scope and function to those developed for the 15-Mile Reach of the Colorado River, the Yampa River, and the Gunnison River (USFWS 1999, 2005, 2009) (http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/section-7-consultation.html). Currently, the flows in the White River are believed to be sufficient for a sustainable population of endangered fish. The USFWS will use information in the Management Plan to develop the final PBO.

In 2016-2019, the Recovery Program updated its draft White River recommendations for endangered fish in coordination with the White River Planning Team (the Planning Team)[1] and the White River Work Group (WRWG)[2] (USFWS 2019). The interim flow recommendations considered Recovery Program-approved base flow recommendations for endangered fish in the White River (Haines et al. 2004), channel maintenance flow recommendations (i.e., spring peak flows) based on a geomorphic analysis drafted for the Recovery Program but never approved as final (Schmidt and Orchard 2002), new biological information, and a detailed hydrologic analysis of the current White River flow regime. The interim flow recommendations provide a basis for analyzing the impacts of water development on the endangered species pursuant to the White River Management Plan.

[1] *The White River Planning Team consists of Tom Pitts for Upper Colorado River basin water users; Tom Chart, Don Anderson, and Tom Econopouly, for the USFWS Program Director's Office; Jojo La and Michelle Garrison for the Colorado Water Conservation Board, James Greer for Utah Division of Water Rights; Jennifer Wellman and Nancy Smith for The Nature Conservancy; Alden Vanden Brink for the Rio Blanco Water Conservancy District; and Duane Moss for the Ute Indian Tribe.*

[2] *The White River Workgroup consists of the Yampa/White Basin Round Table, including Rio Blanco Water Conservancy District, Ute Indian Tribe of the Uintah/Ouray Reservation, Bureau of Land Management, Colorado River Water Conservation District, Uintah Water Conservancy District, and Utah Division of Water Resources.*

The Management Plan will recognize (1) current and a specified amount of future water development in the White River drainage basin (provided by the Planning Team), and (2) the recovery actions (e.g. implementation of endangered fish habitat improvements and other activities) needed to recover endangered fish and provide ESA compliance for the impact of depletions on endangered fish. In 2015, the Rio Blanco Water Conservancy District (RBWCD), the CWCB, and the Planning Team investigated existing and possible future water use in the White River basin. The Planning Team elected to use this information in support of the development of the Management Plan. StateMod was used to model current and possible future water use and possible streamflow impacts in the White River basin. The results and documentation of the Planning Team's modeling efforts (performed by Wilson Water Group as directed by the Planning Team) will be provided to ERO and will be used to develop the Management Plan. ERO will not be responsible for hydrologic modeling.

The Management Plan will serve as the basis for a White River PBO, and will include the elements of a biological assessment that are essential for a Section 7 ESA consultation. The U.S. Fish and Wildlife Service Ecological Services will serve as the lead federal agency for compliance with Section 7 of the ESA and will be developing a PBO that assesses depletion impacts to the endangered fishes and Recovery Program action, based on the biological assessment developed by ERO. The purpose of the Management Plan is to describe how streamlined ESA compliance would be provided for existing water-related activities in the basin and for some level of future water development, while implementing recovery actions on the White River and Green River to assist in the recovery of the endangered fish species. The PBO will specify the terms of compliance with the ESA for existing and some level of future depletions.

III. Goals, Objectives, Deliverables

A. Goals:

(1) Develop and write a Management Plan that:

(a) documents the current and a future depletion scenario;

(b) uses the Recovery Program's endangered fish flow recommendations and current hydrology to identify the effects of current and the selected projected future water development on endangered fish habitat;

(c) identifies recovery actions needed to offset depletion effects (this will require close coordination with the USFWS and the Planning Team);

(d) provides a draft a federal-state-local-tribal cooperative agreement framework or other agreement framework to implement the resultant Management Plan;

(e) drafts a Management Plan such that a distinct section of that Plan, or a separate standalone document based on the Plan, can serve as the biological assessment for the ESA Section 7 consultation and biological opinion; and

(2) Complete the necessary NEPA compliance documents.

B. Objectives:

The Planning Team has developed and documented a range of current and future water demand scenarios and has developed a monthly and disaggregated daily time-step model for evaluating the likely impact of those future scenarios on White River flows and the future ability to meet specified flow targets. The development of a White River Management Plan will involve coordinating with USFWS Ecological Services (representatives from the Utah Field Office, Salt Lake City, and the Western Colorado Area Office, Grand Junction) to identify recovery actions needed to offset depletion effects to the endangered fish resulting from current and future water demand. The depletion effects on flows will be provided to ERO by CWCB. The resultant recovery actions should then be identified and described by ERO and included in the Management Plan. Tasks that ERO will be required to complete under this effort include:

- Draft and revise a WRMP. Attached to this Scope of Work is a suggested outline for the document, as envisioned by the Planning Team. The outline of the WRMP may change as the project develops, subject to CWCB approval. This outline generally reflects CWCB's expectations for the content and format of a final Management Plan.
- Develop a federal-state-local-tribal framework agreement, which implements the WRMP. Examples of existing cooperative agreements will be provided by CWCB.
- Draft and finalize an environmental analysis document to satisfy the necessary level of NEPA compliance as specified by the USFWS Regional Office and the Recovery Program. USFWS will be the lead agency for NEPA compliance.
- Define and implement an outreach plan throughout this process for local water users, stakeholders, and other interests.
- Facilitate meetings of the White River Planning Team and Workgroup (e.g., schedule and facilitate Planning Team meetings and meet with the Ute Indian Tribe). Typically, the White River Planning Team meets every other month. However, meetings should be scheduled as needed.

C. Deliverables:

- Deliverables include a final White River Management Plan that includes identification of hydrologic impacts of various development scenarios, an assessment of the impacts of various development scenarios on affected endangered fish species life stages and habitat in the White and Green River basins, identification of actions that can be taken by the Recovery Program to mitigate those impacts and provide ESA compliance for depletions, a biological assessment, a draft cooperative agreement framework, and final NEPA compliance documentation.

IV. Study Area

The White River is an important component for the conservation of native fishes in the Upper Colorado River Basin and for the recovery of endangered Colorado pikeminnow and razorback sucker. In 1994, the USFWS designated 151 river miles of the White River (from the Green River confluence upstream to Rio Blanco Lake) as critical habitat for the Colorado pikeminnow, and a shorter reach (to river mile 18) at the boundary of the Uintah and Ouray Indian Reservation as critical habitat for razorback sucker (59 FR 13374).

The White River is the second largest tributary to the Green River. It is more than 200 miles long and drains some 5,120 square miles in western Colorado and eastern Utah. Median flows at the Watson gage vary from 385 cubic feet per second in late summer to well over 3,800 cubic feet per second during the spring snowmelt runoff. Most runoff is attributable to snowmelt from higher elevation areas. Average annual streamflow in the White River is about 480,000 acre-feet, based on measurements at the USGS gage at Watson, Utah, from 1975-2015 (missing 1980-1985). Taylor Draw Dam (river mile 104), a barrier to upstream fish movement, is a run-of-the-river project that passes large spring peaks. As it is the only major dam on the White River, the river retains relatively unaltered runoff characteristics. The hydrology of the White River is relatively unchanged by large storage projects or depletions.

The recent Yampa/White/Green Basin Roundtable Report indicates that an average of 22 percent of White River natural flow was depleted between 1997 through 2013 (Wilson Water Group, 2018). Colorado projects future depletions in the basin of around 46,700 acre-feet. In Utah there are currently 69,082 acre-feet of water rights from the White River and its tributaries with a potential depletion of 53,628 acre-feet (Adkins, G. 2012).

V. Methods/Approach

ERO will coordinate public outreach by conducting meetings for local water users, stakeholders, and other interests (as described by Task 2 below) and provide effective outreach communication to stakeholders. ERO will work closely with the CWCB, the Recovery Program Director's Office (PDO), the White River Planning Team, USFWS Utah Field office, and USFWS Grand Junction office in development of the Management Plan, the final cooperative agreement, and NEPA compliance documents.

It is anticipated that some recovery actions may be covered under a categorical exclusion or under the 1987 environmental assessment of the Recovery Program's Action Plan, however, preparation of a new environment assessment is likely. ERO will work with the USFWS Regional Office and the Recovery Program to determine the appropriate level of NEPA compliance, analysis, and documentation as outlined in Task 3 below.

The Management Plan will provide the biological assessment for a Section 7 ESA consultation. The biological assessment needs to include a description of:

- Current baseline conditions and status of the species;

- Anticipated changes to hydrology and the thermal regime associated with implementation of the Management Plan;
- Anticipated effects to hydrology associated with climate change;
- Anticipated effects on the federally listed fish from changes in hydrology;
- Anticipated effects on fish and fish habitat in both the White and Green rivers as the result of implementing the recovery actions;
- Adaptive management mechanisms included in the Plan and/or within individual recovery actions to allow adequate flexibility to changing conditions over time.

The biological assessment should be included as a distinct section of the Management Plan, or as a separate document (as guided by the Recovery Program Office).

The following table is the schedule as currently envisioned by the Planning Team. The ERO Team should expand upon the proposed schedule, the outlined tasks, and other existing planning materials provided by the Recovery Program to create a project work plan.

Task	Schedule	Description	Responsibility
1: Future Water Demand Model Results Incorporation	Spring 2020	Orientation Meeting	ERO Team and USFWS, CWCB, Planning Team
		Understand the current and future water demand scenarios as developed by Wilson Water Group and by the White River Planning Team.	ERO Team and Wilson Water Group, with oversight from the Planning Team
		Incorporate modeling results, to be provided to ERO, into the Management Plan.	ERO Team, working with Wilson Water Group, with oversight from the Planning Team
		Conduct a literature review and evaluate the implications of the latest climate research on relevant hydrology and habitat conditions. Review the Yampa/White/Green Basin Roundtable Basin Implementation Plan Modeling Phase 3 Final Report, the Colorado Water Conservation Board's 2019 Technical Update to the Colorado Water Plan, and the Colorado River Water Availability Study to help inform an evaluation of climate change impacts.	ERO Team, working with USFWS and CWCB
		Review and approve scenario analysis with future water demands and flow recommendations. Use ERO Team's literature review conclusions to evaluate a range of potential changes to flows.	Planning Team, WRWG, and Wilson Water Group
2: Management Plan Development	Spring 2020/ Winter 2021	Write a draft Management Plan including a suite of recovery actions needed to offset depletion effects.	ERO Team (Planning Team, working with USFWS, will review and comment on draft plan)
		Evaluate and recommend management actions for the Recovery Program, including developing a timeframe.	ERO Team (Planning Team in coordination with Recovery Program)
		Distribute draft Management Plan and conduct public meetings with public, Yampa/White/Green Basin Roundtable, Utah, and Ute Tribe, etc. to communicate content of the draft Management Plan; document results of public meetings and public input.	ERO Team, working with the Recovery Program PDO

	Summer 2021	Based on public input, revise the draft plan for review by CWCB, PDO, Planning Team, and WRWG; following review, finalize Management Plan, including the biological assessment.	ERO Team
3: Environmental Compliance	Spring 2020/ Winter 2021	Develop a draft cooperative agreement framework. Initiate NEPA compliance (USFWS drafts PBO concurrently)	ERO Team
	Winter 2021/2022	Complete NEPA analysis	ERO Team working with USFWS Regional Office
	Summer 2022	Complete Section 7 consultation	ERO Team working with USFWS Ecological Services Field Offices
4: Project Management	2020-2022	Program Management	ERO coordinating with Planning Team and CWCB

The following further details the task descriptions included in Table 1 above. The following lists the minimum major steps required for each tasks but is not inclusive of all steps that could occur in the development of the Management Plan and NEPA compliance.

Task 1: Scenario and Project Planning

a. Meet with CWCB and Recovery Program staff. Initial meeting to discuss scope, schedule, budget, expectations and concerns.

b. Review flow recommendations for the White River. Devise plan for incorporation of flow modeling results. Note that modeling results will be provided to the ERO.

c. Stantec is responsible for incorporation of the water demand analysis into the Management Plan. ERO and GEI will participate in meetings to discuss the modeling and to allow for an understanding of the details and intricacies of the process for subsequent development of focused recovery actions that offset impacts and balance the important fishery considerations. Anticipated demand locations within the White River basin and the relationship of these demands to the critical habitat and depletions that impact the Green River will be assessed. Depletion timing and anticipated impacts of changing peak flows to important floodplain nursery habitat used by endangered fish fry as well as peak flow-associated geomorphology changes to endangered fish habitat are two specific examples that should be integrated into the Management Plan. The ERO Team will coordinate

with Wilson Water Group and the Planning Team on additional modeling needs (conducted by Wilson Water Group) and to assure a common understanding of the model assumptions and results.

d. The ERO Team will prepare a list of specific tables and charts needed for the Management Plan to characterize current conditions and to summarize the effects of the modeling scenarios. The list may include:

   i. Histograms of temporal distribution of annual maximum flows by time of year, and magnitude of annual maxima.
   ii. Plots of annual hydrographs for average flow for the period of record, and typical wet, dry, and average years.
   iii. Tables of current and future depletions by major water user sector (municipal, agricultural, industrial, environmental).
   iv. Tables of current and future depletions by calendar month, subbasin, and major water user sector.
   v. Plots of temporal distribution of current and future depletions by water user sector.
   vi. Comparison of daily streamflows to USFWS's 2019 interim flow recommendations and/or other flow thresholds, including statistics on deficits such as histograms of magnitude or distribution by month.
   vii. Plots of annual flows with and without augmentation to meet flow recommendations based on fishery needs.
   viii. Impacts of augmentation strategies on streamflows (baseflow, average annual flow, average monthly flows, peak flow magnitude and timing) and contents of reservoirs.

e. Review attached draft outline and Yampa River Management Plan (as well as other relevant Program Documents). Define a process that results in development of all the necessary components of a river Management Plan, and provides for public and management team input, builds on the strengths of the Yampa River Management Plan, seeks opportunities to shorten and streamline the WRMP, and suggests improvements to ensure the quality of the WRMP.

f. The potential effects of climate change on species recovery efforts will be addressed in the PBA. (As examples, see the climate change discussion included in the *2017 Programmatic Biological Opinion for Water Depletions Associated with BLM's Fluid Mineral Program within the Upper Colorado River Basin in Colorado*, or the 2018 *Species Status Report for the Razorback Sucker*). For that reason, ERO will undertake a literature review of documents provided by FWS and CWCB and evaluate the implications of the latest climate research on relevant hydrology and habitat conditions. Selected climate change scenarios were modeled at a monthly time-step for the White River in the 2018 *Yampa/White/Green Basin*

Roundtable Basin Implementation Plan Modeling Phase 3 Final Report, the Colorado Water Conservation Board's *2019 Technical Update to the Colorado Water Plan*, and the *Colorado River Water Availability Study*. There will be no "original research" required. The product of the literature review will not be a standalone document, but will guide MP scenarios, and BA/EA sections. ERO anticipates providing a "range of change" in river flows from climate change research to Wilson Water Group, who will conduct all modeling/quantification efforts. Meet with Planning Team, and collaborate with Wilson Water Group (the Consultant currently retained and contracted to assist with Task 1), to incorporate previously identified water development scenarios by river reach and flow recommendations and to assess management scenarios. Wilson Water Group will coordinate with the ERO Team to assure they have an understanding of StateMod operations and limitations, model scenarios and results. CWCB will provide the ERO with StateMod results documentation for incorporation into the Management Plan.

g. Work with the Planning Team, and Wilson Water Group (the Consultant currently retained and contracted to assist with Task 1), to fully understand the approach, assumptions, and results from the StateMod scenarios. The Planning Team will direct ERO on the future demand scenario(s) to be included in the Management Plan.

Materials and Support to be Provided to ERO:

- USFWS: 2019 *Review of Fish Studies with Interim Flow Recommendations for Endangered Fishes of the White River, Colorado and Utah,* and other relevant documents (e.g., Haines et al, 2004; Schmidt and Orchard, 2002).
- CWCB: Results from StateMod hydrologic model for the White River, Colorado and Utah, with associated documentation.
- CWCB/WWG: raw data for charts and tables listed above for Task 1
- CWCB: Yampa/White/Green Basin Roundtable Basin Implementation Plan Modeling Phase 3 Final Report.
- CWCB: 2019 Technical Update to the Colorado Water Plan.
- CWCB: Colorado River Water Availability Study.

Deliverables: Project work plan

Task 2: Draft and Finalize White River Management Plan

a. Work with Recovery Program staff, Planning Team, and CWCB to finalize the Management Plan outline that will also serve a biological assessment for ESA

compliance purposes. Begin writing a draft Management Plan. Coordinate with Planning Team.

b. ERO team will gather data on the status and distribution of the endangered fish in the White River basin; including habitat conditions and a hydrologic analysis of current regime. ERO team will document the importance of the White River basin to the recovery of the listed species.

c. Assess the hydrologic impacts of the specified water development scenario(s) on river hydrology and recommended flows. Document this analysis.

d. Conduct an assessment of impacts to changes in flows (based on modeled scenarios) on endangered species habitat of various life stages in the White and Green Rivers. Review with the Planning Team the likely impacts to endangered species, if not addressed with offsetting conservation actions.

e. Work with Recovery Program staff, Planning Team, and USFWS Ecological Services staff to determine, evaluate, and recommend a suite of recovery actions to be carried out by the Recovery Program in the White and Green River basins to offset depletion effects. A timeframe for recovery actions should also be developed.

f. The draft recovery actions will be integrated into the Management Plan/BA. Part of the refinement of the management actions will be based on the integrations of public engagement results. The ERO Team includes a facilitator in western Colorado and specific to the northwest basin, including the White River basin (the cost estimate includes Hannah Holm's participation in one public meeting).

g. Complete draft Management Plan. Note: A specific section of the Management Plan, or a separate document to accompany the Management Plan, will also serve as the Biological Assessment. The biological assessment needs to include impacts on the Green River, including a description of the impact on species and habitat downstream of the White River. These documents should also include any other threatened and endangered species that may be affected. ERO team will follow USFWS guidance on preparation of biological assessments in developing the Management Plan.

h. Prepare presentation on content of draft Management Plan. Present draft Management Plan to Planning Team, Yampa/White/Green Basin Roundtable members or subcommittee, Utah, CWCB, tribes, other interested stakeholders and the public, including holding local community public meetings (e.g., in Rangely, Meeker, Rio Blanco County Board of County Commissioners, Douglas Creek, and White River Conservation Districts). Work with Planning Team and others listed in the table under "Responsibility" to solicit and address questions, concerns, and

comments regarding the draft Management Plan. Revise draft Management Plan based on comments received.

i. Finalize White River Management Plan with Planning Team, Recovery Program staff, WRWG, CWCB, and Utah, including a biological assessment, and including an identification of key data deficiencies associated with existing flow recommendations that should be addressed under a future study plan. Finalize all documentation and disseminate.

Materials and Support to be Provided to ERO:

- CWCB: Roehm, G. W. 2004. *Management plan for endangered fishes in the Yampa River Basin and environmental assessment.* U.S. Fish and Wildlife Service, Mountain-Prairie Region (6). Denver.
- USFWS or CWCB: Will provide facilities for smaller meetings with the Planning Team, White River Workgroup, USFWS and/or CWCB staff. (Facilities for larger meetings involving multiple stakeholders within the river basin will need to be arranged by ERO).

Deliverables: Draft and Final White River Management Plan, including a biological assessment

Task 3: Initiate and Finalize NEPA Compliance

a. The NEPA compliance process should run in parallel with the Management Plan development and Endangered Species Act compliance effort, to the extent possible. For example, public meetings for the Management Plan could serve a dual purpose as NEPA scoping meetings to provide early public input. Work with Planning Team, Recovery Program staff, and USFWS Regional Office staff to develop a draft cooperative agreement framework to implement the White River Management Plan. The Yampa River Management Plan Sample Recovery Agreement can be used to draft the framework.

b. During the hydrology baseline review and development of recovery/management actions, ERO will draft the NEPA purpose and need statement. ERO will coordinate with agency resource specialists as needed, and complete a preliminary data gathering effort. Once a draft management plan is developed, ERO will use the results of that work to begin development of the alternatives analysis for the Environmental Assessment.

c. Initiate NEPA compliance based on the envisioned cooperative agreement. Work with USFWS staff to determine appropriate NEPA compliance, analysis, and documentation. Note: the USFWS Regional Office is the lead agency for NEPA

compliance and will be responsible for the NEPA process (e.g. public notices, scoping, etc.). However, ERO will play a key role in completing USFWS required NEPA compliance documentation. ERO will conduct all necessary analysis and draft documentation (Environmental Assessment or Environmental Impacts Statement).

d. Work with USFWS to conduct public meetings and receive public comments on NEPA documentation. Ensure all federal procedures are followed and all federal requirements are met. ERO assumes no unique public meeting materials will be needed, and that deliverables from other tasks developed to date would be sufficient. Although it may not be required, a meeting to solicit public input on the draft Environmental Assessment may be necessary to allow interested stakeholders to provide comments. Any additional EA meeting would be completed without ERO support, or would require an additional scope/budget be developed. An EA meeting is not included in the current budget. Public comment processing is expected to be limited to about 10-15 letters and about 20 substantive, unique comments. ERO anticipates that the public comment and outreach process will be summarized briefly for the EA, in a section not more than 5 pages long.

e. Address comments and revise NEPA documents as necessary. As NEPA progresses, hold follow-up meetings as necessary.

f. Work with Recovery Program staff, USFWS Regional Office staff, Planning Team, and WRWG to finalize NEPA compliance. Work with Recovery Program and USFWS staff to disseminate compliance documents as required.

g. ERO will create a legally defensible WRMP by implementing three primary elements: proactive stakeholder engagement, objective planning and analysis, and clear disclosure impacts:

    i. Proactive stakeholder engagement. A thorough stakeholder engagement process, coupled with the National Environmental Policy Act (NEPA) scoping phase, will be implemented which allows the planning team to fully understand the resource issues that need to be considered in the plan and in the NEPA analysis. The ERO team will work with the agencies and planning team to ensure that the stakeholder engagement is both thorough and meaningful. Proactive stakeholder engagement will be implemented to make the WRMP more defensible because it minimizes the potential for issues that may otherwise have been "overlooked" (or accusations thereof).
    ii. Objective planning and analysis. The assessment of impacts for NEPA and ESA compliance, technical resource analyses, plans, and decisions will be based on science and data. The ERO team will maintain the highest degree of scientific rigor and objectivity in analyzing and presenting technical

information. As the results support or challenge desired management scenarios, ERO will discuss them openly with the planning team, agencies, and public. Likewise, where data gaps and uncertainties exist, ERO will disclose and document those as well. This approach will result in a plan and compliance process that is both technically sound and legally defensible.

iii. Diligent NEPA and ESA documentation. Building on the previous two elements, the pinnacle of a process that is legally defensible is the development of NEPA and ESA compliance documents that are accurate, clear, concise, and direct. As the WRMP and compliance documents evolve from the concept, to written drafts, and final reports, ERO will carefully evaluate each aspect of WRMP, with respect to federal, state-wide and local regulations, adopting a risk management perspective as part of the quality control process. Impacts will be clearly and succinctly disclosed, as well as findings that are uncertain. In addition, ERO will meet or exceed the federal standards for NEPA and ESA analysis and streamlining, including the Department of the Interior and USFWS policies and guidance, while also working with the project team and agencies to ensure that the public and stakeholders have a fair opportunity to understand and provide input on the results of the analysis.

Materials and Support to be Provided to ERO:

- CWCB: Cooperative Agreement to implement the Yampa River Management Plan and Sample Recovery Agreement.
- CWCB: USFWS Final Programmatic Biological Opinion on the Management Plan for Endangered Fishes in the Yampa River Basin, 2005.
- USFWS Regional Office and Recovery Program PDO: Will provide guidance on the Department of Interior's NEPA compliance requirements and will serve as the lead entity for the NEPA process.

Deliverables: Draft and Final NEPA compliance documents and draft cooperative agreement framework. Note: USFWS will prepare a Programmatic Biological Opinion based on the compliance documents.

Task 4: Project Management

a. Conduct all necessary meetings.

b. Provide timely and close communication with CWCB project manager, Recovery Program Director's Office, White River Planning Team members, and the WRWG.

c. Provide proper oversight and management of the project including budget, invoicing, schedule, staffing and ensuring quality of all work products.

d. Implement quality control methods to assure that the project remains on time, on target, and on budget. ERO will:

   i. Assign a designated project coordinator who will assist the project manager and deputy project manager with the daily management of the project and ensure that final products meet CWCB standards;
   ii. Track and monitor project progress through ERO's project management and accounting tool, which will provide the ERO Team with real time access to review a variety of tracked project information, including detailed budget information, "work in progress," and upcoming tasks, to ensure that project milestones are met and that the budget is well managed;
   iii. Implement a Quality Assurance plan, ensuring the production of high-quality deliverables; and
   iv. Conduct a standing monthly meeting with the CWCB, including the Planning Team, if needed, to discuss project status. These meetings can be conducted via online conferencing/webinars. ERO's project structure will allow for the project coordinator to be involved in setting up and assisting with the meetings, completing and distributing meeting notes, and monitoring of schedule, budget, and deliverables.

Management Plan Partners

The following members of the Planning Team will collaborate with ERO, as outlined in Table 1, to develop and review the Management Plan.

- Colorado Water Conservation Board: Jojo La and Michelle Garrison
- Recovery Program Director's Office: Tom Chart and Don Anderson
- Utah Division of Water Rights: James Greer
- Colorado Parks and Wildlife
- Rio Blanco Water Conservancy District: Alden Vanden Brink
- Water Users Representative: Tom Pitts
- The Nature Conservancy: Nancy Smith and Jennifer Wellman
- U.S. Fish and Wildlife Service: Tom Econopouly
- Ute Indian Tribe: Duane Moss

Management and Project Work Plan

ERO's management approach to projects includes the following steps and methods:

- Development of a Project Work Plan, including detailed scope and responsibilities and
- Referencing ERO's company-wide QAQC Plan
- Evaluation of likely causes for deviations in schedule, quality and budget
- Integration of "cause" evaluation into monthly project review/reporting

- Monthly reporting on schedule and budget status
- Monthly or bi-monthly team meetings, depending on activity level of the project
- Weekly project leadership "scrums", including review of actions for the week and review of prior week's time (Deltek Ajera) and budget/schedule compliance review (internal, unless client wishes to participate)
- Daily scrums during critical times (e.g., prior to deliverables or important meetings) to resolve problems, answer team questions, and brainstorm about solutions/streamlining.
- Running "action items" list based on scrums and meetings

a. Keeping project "On Time" and "On Budget": Project Work Plan

Before the project starts, the ERO management team (including project manager Aleta Powers, deputy project manager Bill Mangle, technical advisors Ron Beane and Steve Dougherty, and subcontractor leads Chip Paulson and Don Conklin), will meet to briefly review the Project Work Plan and complete an evaluation of weaknesses in the schedule and budget. The preliminary causal analysis for schedule and budget overages are included in the table below.

b. Causal Analysis for Schedule and Budget Overages

Overage Cause	Project Management Response*
Delays in data acquisition	**Aleta Powers**: clear milestones and responsibilities for data acquisition integrated into schedule; coordination with client and Wilson Water Group **CWCB:** internal coordination and meeting internal deadlines
Delays in data processing	**Aleta Powers/Bill Mangle**: assignment of adequate staff for tasks; weekly and monthly scrums during critical project tasks; regular communication between team members **Chip Paulson**: assignment of adequate staff for tasks
Delays in scheduling meetings	**Aleta Powers/Bill Mangle**: Project manager/deputy project manager essentially interchangeable to allow flexibility **CWCB:** Jojo La will serve as the single point of contact and Michelle Garrison will serve as the alternate contact. This allows for responsiveness in meeting schedule; The single point of contact for entire Planning Team is Don Anderson with the Program Director's Office **Agencies**: ERO will request internal single point of contact and alternates
Multiple document edits and rounds of review	**Aleta Powers/Bill Mangle**: Implement QAQC plan; technical editors integrated into project schedule; project coordinator assists in documenting compliance; document review meetings to ensure that comments are understood and handled **CWCB, agencies:** ERO will request a single decision-maker for the different tasks. Jojo La/Don Anderson will compile edits and comments of any document review
*****If required, ERO may request a change of project managers due to extraneous circumstances, with the permission of the CWCB.	

c. Keeping Project "On Target": Quality Assurance Plan

ERO's internal Quality Assurance/Quality Control Plan will be utilized. This plan will be provided for all team members and compliance will be ensured by the ERO project manager for this project. Each project's definition of "on target" is different, and during the early stages of the project, ERO will ask CWCB to define the "on target" meaning for this project to make sure everyone is on the same page. Asking the question, "What does on target mean to you?" early in the project will ensure that the project leadership is on the same page and has documented their priorities and concerns regarding deliverables and general project implementation.

d. Quality Assurance (QA)/Quality Control (Q/C) Plan

The definitions of "quality" for the QA/QC Plan are:

1. Quality assurance (QA): maintaining a desired level of quality in a service or product, especially by means of attention to every stage of the process of delivery or production.
2. Quality control (QC): a system of maintaining standards in products by testing a sample of the output against the specification.

All ERO employees and team members are responsible for the quality of all work performed on projects under this project. ERO will implement the QA/QC Plan on:

- Internal process, i.e., how the work was implemented (correct agency contacts and feedback, appropriate data sources researched, etc.);
- Internal deliverables, i.e., the completeness and quality of the work products (deliverables are appropriate, complete, readable, and understandable, etc.); and
- External process and deliverables generated by subcontractors.

High-quality deliverables will help minimize client comments and review times and facilitate the overall project schedule. Project team members review of each other's work (peer review), particularly with the structure provided by a report/process checklist, is required. Before any work product is transmitted, it will have undergone several steps of quality control and peer review. ERO will seek client feedback throughout the project on the quality of our performance, communication, schedule, cost, and products; and will be responsive by improving the quality, timing, and content of deliverables.

In summary, ERO's QA/QC Plan works at several levels:

- The program manager will ensure that components of the project, including all task orders, are undergoing a rigorous review process and that the CWCB is satisfied with the team's work products and communication under the project.
- The project manager will ensure that all components of each task are progressing as they should, and that appropriate process and document checklists are assigned and completed.
- The project manager is responsible for completing the Document Approval Checklist (available upon request) and securing commitments for adherence with the QA/QC Plan for the project, including peer review.
- A technical peer review for all deliverables including all maps, photo logs, and attachments is required. The program manager, who signs the scope/contract, is responsible for making sure the QA/QC Plan is applied to

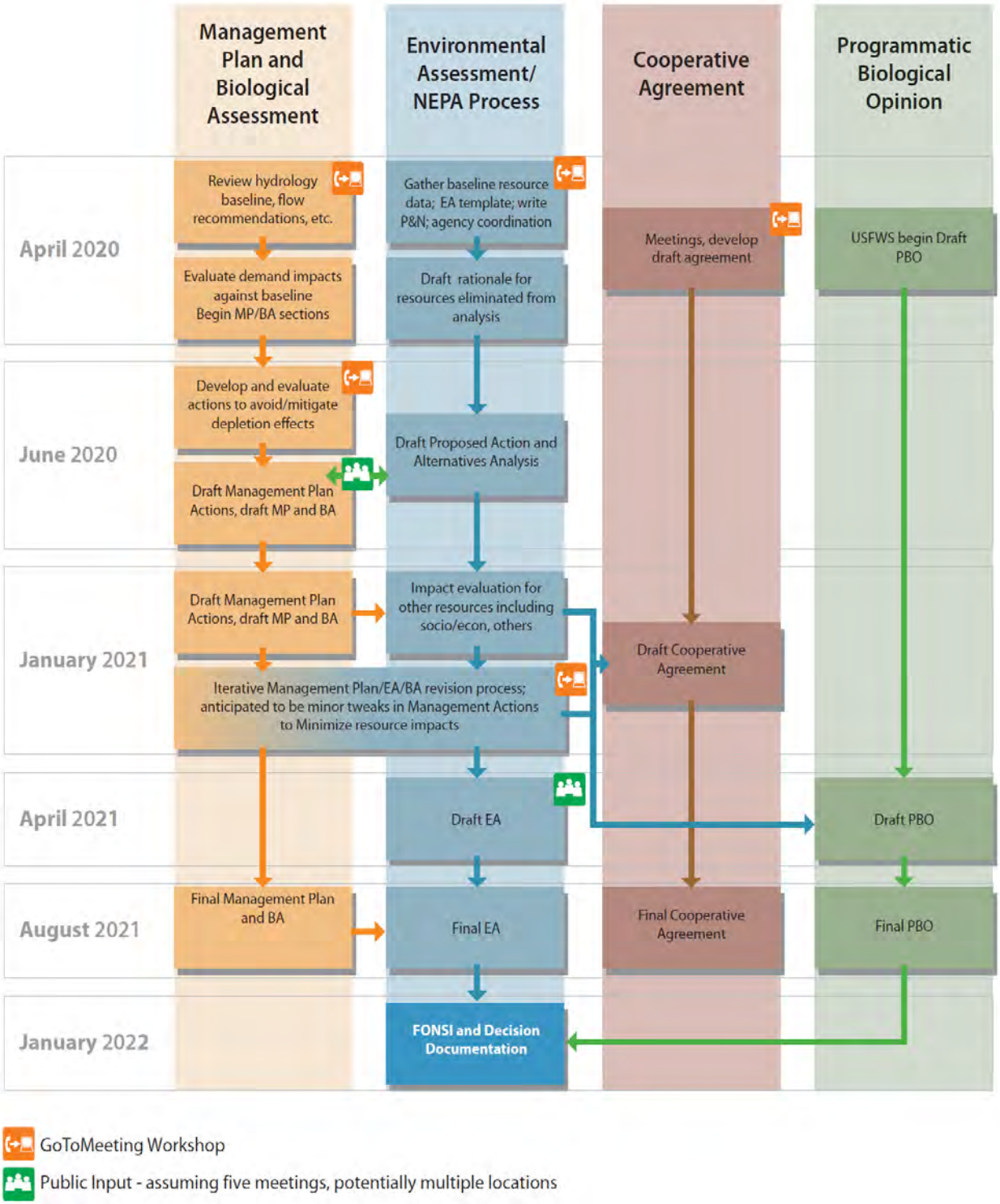
the project and can help project managers identify an appropriate peer reviewer as needed. Alternately, the program manager can delegate to another appropriate principal.

- The technical editor will review documents, including all maps, photo logs, and other relevant document attachments for quality, consistency, coherence, grammar, and comprehension.
- Resource-specific project checklists for both deliverables and process will support the quality of work performed.

This review process ensures that technical and regulatory issues are addressed and that the documents are edited for readability. Completed checklists will be retained in the project files. The intent of the QA/QC Plan is to improve not only the quality of process and deliverables, but also communication among the project team members. The nature of the work under each task order may change; and timelines, deliverables, and other expectations may change during the course of the project. This QA/QC Plan is intended to provide structure and to elevate awareness and commitment to quality and team communication.

The following flow chart identifies ERO's initial approach to scheduling. ERO will update this schedule and use it as a starting point for developing a project work plan.

White River Management Plan Project Approach



Price

The following price spreadsheets include pricing for a Categorical Exclusion and a focused Environmental Assessment. It is currently assumed that a focused Environmental Assessment will be required. The ERO Team will update the schedules in the following tables as appropriate.

Schedule

Task	Tentative Schedule	Description	Responsibility	Budget	Phase Total
1: Future Water Demand Model Results Incorporation	Spring 2020	Orientation Meeting	ERO Team and USFWS, CWCB, Planning Team	$3,500.00	$15,500.00
		Understand the current and future water demand scenarios as developed by Wilson Water Group.	ERO Team and Wilson Water Group, with oversight from the Planning Team	$3,500.00	
		Incorporate modeling results, to be provided to Consultant, into the Management Plan.	ERO Team, working with Wilson Water Group, with oversight from the Planning Team	$2,500.00	
		Conduct a literature review and evaluate the implications of the latest climate research on relevant hydrology and habitat conditions. Review the Yampa/White/Green Basin Roundtable Basin Implementation Plan Modeling Phase 3 Final Report, the Colorado Water Conservation Board's 2019 Technical Update to the Colorado Water Plan, and the Colorado River Water Availability Study to help inform an evaluation of climate change impacts.	ERO Team working with USFWS and CWCB	$2,000.00	
		Review and approve scenario analysis with future water demands and flow recommendations. Use ERO Team's literature review conclusions to evaluate a range of potential flow changes.	Planning Team, WRWG, and Wilson Water Group	$4,000.00	
2: Management Plan Development	Spring 2020/ Winter 2021	Write a draft Management Plan including a suite of recovery actions needed to offset depletion effects / Draft BA	ERO Team (Planning Team, working with USFWS, will review and comment on draft plan)	$27,500.00	$62,000.00
		Evaluate and recommend management actions for the Recovery Program, including developing a timeframe.	ERO Team (Planning Team in coordination with Recovery Program)	$14,500.00	
		Distribute draft Management Plan and conduct public meetings with public, Yampa / White / Green Basin Roundtable, Utah, and Ute Tribe, etc. to communicate content of the draft Management Plan; document results of public meetings and public input.	ERO Team working with the Recovery Program PDO	$10,500.00	
	Summer 2021	Based on public input, revise the draft plan for review by CWCB, PDO, Planning Team, and WRWG; following review, finalize Management Plan.	ERO Team	$9,500.00	
3: Environmental Compliance	Spring 2020/ Winter 2021	Develop a draft cooperative agreement framework. Initiate NEPA compliance (USFWS drafts PBO concurrently)	ERO Team	$10,000.00	$103,500.00
	Winter 2021/2022	Complete NEPA analysis	ERO Team working with USFWS Regional Office	$78,500.00	
	Summer 2022	Complete Section 7 Consultation	ERO Team working USFWS Ecological Services Field Offices	$15,000.00	
4: Project Management	2020-2022	Program Management	ERO Team coordinating with Planning Team and CWCB	$19,000.00	$19,000.00
			Total Budget:	**$200,000**	

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VI. Performance Monitoring

Performance monitoring for the contract shall include the following:

a. Performance measures and standards: The CWCB will have monthly phone meetings with ERO to make sure the project is being completed in a timely manner.

b. Accountability: Regular reporting of project status will occur monthly with the CWCB project manager and the lead project manager from ERO. ERO will submit documentation substantiating invoice amounts requested. Invoices will be submitted with brief reports of the planning, design, and management purposes served by the expenditures.

c. Monitoring Requirements: The CWCB will have access to all documents and models associated with Project and will be copied on all progress reports. Each invoice will include information regarding the portion of the task completed, the units and costs associated with each.

d. Noncompliance Resolution: In the event of a noncompliance issue the CWCB project manager will contact ERO's project manager and discuss the problem and work towards a resolution. If this does not work then the issue will escalated to the Director of the CWCB and ERO's President. The CWCB project manager will notify the DNR Purchasing Director and the Assistant Director of the Department. The DNR Assistant Director or the Deputy Director will try to resolve the issue.

VII. References

Bestgen K., Webber A., Jones T. 2012. Annual Report #22f Interagency Standardized Monitoring Program (ISMP) Assessment of Endangered Fish Reproduction in relation to Flaming Gorge Operations in the Middle Green and Lower Yampa Rivers: Assessment of Colorado Pikeminnow and Razorback Sucker Larvae

Haines, G.B., D. Irving, and T. Modde. 2004. White River Base Flow Study for Endangered Fishes, Colorado and Utah, 1995-1996. Final Report, Project 65, prepared for UCRBRIP Project No 5D.

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Roehn, G.W. 2004. Management Plan for Endangered Fishes in the Yampa River Basin and Environmental Assessment. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6). Denver.http://www.coloradoriverrecovery.org/documents-publications/technical-reports/isf/yampa/YampaPlan.pdf

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Tyus, H.M. and J.F. Saunders. 2001. An Evaluation of the Role of Tributary Streams for Recovery of Endangered Fishes in the Upper Colorado River Basin, with Recommendations for Future Recovery Actions. Final Report to Upper Colorado River Endangered Fish Recovery Program; Project No. 101. Univ. of Colorado, Boulder.

USFWS. 1999. Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River. http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/15-mr-pbo.html

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USFWS. 2009. Final Gunnison River Basin Programmatic Biological Opinion. http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/GUPBO.pdf

USFWS. 2019. Review of Fish Studies with Interim Flow Recommendations for Endangered Fishes of the White River, Colorado and Utah.

Wilson Water Group. 2018. StateMod Description and Documentation and recommended flows.

White River Management Plan Outline

Draft 02/03/2020

Annotations in red font

Executive Summary

1.0 Introduction

1.1 Purpose and Need

Description of the endangered fish, their current status, and the mandates of the Endangered Species Act. General overview of the Upper Colorado River Endangered Fish Recovery Program, its purpose, activities since its inception in 1988, outlook beyond 2023, and how this Plan fits into that larger overall effort. Define the purpose of this plan (e.g., "to promote the recovery of these species as specified quantities of new water depletions and water storage in the basin are implemented to serve projected human needs" by "defining a suite of actions to be implemented for purposes of avoiding, minimizing, or offsetting impacts to the endangered species").

Note that this document will serve as the biological assessment for a subsequent USFWS programmatic biological opinion (PBO), and will provide an initial assessment of the environmental impacts of the proposed actions. Clarify that NEPA analysis is not intended to be part of this document; however, it is anticipated that most of the necessary data and analysis for a NEPA will be provided by this document.

Describe how this Plan fits with the Colorado Water Plan and the Yampa-White-Green Basin Implementation Plan.

1.2 Setting

General description of the White River basin, the basin hydrology, current water development in the basin, potential future development scenarios, and the 'action area' to be included in the biological assessment and to be covered by the PBO.

1.3 Significance of the White River to endangered fish recovery efforts (especially pikeminnow, razorback sucker)

A lot of this detail will already be provided in the Flow Recommendations document -- so this Plan can draw liberally from that and/or reference back to that information.

1.4 Next Steps

1.4.1 Biological Opinion

Clarify that the USFWS will be preparing a biological opinion determining whether and how ESA coverage can be provided for the management actions described by this Plan (Section 5).

1.4.2 Cooperative Agreement

A Cooperative Agreement will be required between USFWS and other parties committing to implement (and with the authority to implement) the specified management actions (e.g., the State of Colorado, the Rio Blanco Water Conservancy District, the State of Utah, the Northern Ute Tribe, etc.) This is the 'federal action' that triggers the need for the biological opinion and a NEPA analysis.

2.0 Description of the Proposed Action

This information would be drawn primarily from information already compiled by Wilson Water Group and the CWCB in their development of the White River model, along with future scenarios identified by the White River Management Team.

2.1 Historic, Current, and Projected Depletions

2.2 Water Rights Administration

2.3 Depletion Accounting

2.4 Framework for Recovery Actions and Cooperative Agreement

3.0 Flow Recommendations for the White River

This section would primarily recap and reference back to the Flow Recommendations Report.

3.1 Recommended peak and shoulder peak flows

3.2 Recommended base flows

3.3 Assumptions & remaining uncertainties associated with species habitat needs and associated flow needs

3.4 Key data deficiencies meriting attention in a future study plan.

4.0 Evaluation of Basin Water Development Scenarios

4.1 Historic and current basin depletions

This information would be drawn primarily from information already compiled by Wilson Water Group and the CWCB in their development of the White River model.

4.2 Future/new depletions evaluated for this Plan

This is where the quantity of new depletions & amount of new storage to be covered by a Programmatic Biological Opinion in Colorado and in Utah would be defined. If feasible, this PBO should be framed as "tiered" coverage with an interim re-evaluation checkpoint that would be triggered by time passed (e.g., in 2040?) and/or by a specified quantity of new depletions occurring in the White River.

The likely impact of these new depletions and new storage on FWS's recommended instream flows (at both the Watson gage location and at the Green River confluence), in the absence of flow augmentation or other flow management actions to offset depletions, will be characterized and quantified in this section. The likely impacts of climate change on system hydrology will also be characterized.

(Note: the construction and installation of new points of diversion in critical habitat of the White River will not be provided ESA compliance under the PBO for impacts beyond their depletions to flow, unless those are specifically identified and described within the Plan. Instead, if there is a federal nexus, they will require a separate consultation to address at least the habitat-loss component.)

5.0 Evaluation of Possible Offsetting Actions

This is where possible actions to avoid, minimize, and/or offset impacts to the endangered species and to critical habitat from water development will be identified and evaluated for feasibility and possible cost-effectiveness. FWS Ecological Services (who will prepare the PBO) will assist in tifying possible actions. Many may not be feasible or cost-effective. Criteria to evaluate these alternatives could include:

- Economic and Social Impacts
  - Estimated cost vs. benefit provided
  - Impacts on agriculture
  - Impacts on private lands
  - Impacts on municipal and industrial interests
  - Impacts on existing conditional or future water rights development
- Hydrologic Impacts
  - Impacts on peak (and shoulder peak) flows
  - Impacts on base flows
  - Impacts on overall basin hydrology (e.g., changes in alluvial storage, return flows)
- Legal & institutional constraints

5.1 Flow Management/Protection/Augmentation Alternatives

5.1.1 Existing/future reservoir operations?

- Kenney Reservoir
- Potential new reservoir(s) (note: new or expanded reservoirs will require separate Section 7 consultation if and when they are proposed)
- Modifications to existing reservoirs (e.g., Lake Avery expansion)

5.1.2 Instream flow protections

- e.g., water delivery commitments?
- e.g., instream flow rights (existing and potential new)?
- e.g., forbearance agreements during periods of low flow?
- other?

5.1.3 Water conservation actions?

- e.g., irrigation efficiencies or voluntary agreements to reduce late summer diversions?
- e.g., water leasing to support dry-year instream flow?
- e.g., management of return flow quantities and timing?

5.2 Other Conservation Actions (Non-Flow Management)

Note: if these actions are not already in the Recovery Program's Action Plan, they should be incorporated after the Cooperative Agreement has been signed:

5.2.1 Nonnative fish (NNF) control

- Flow spikes/flushing flows to disadvantage non-native species?
- Aquatic management plan to reduce nonnative impacts (e.g., continued or expanded NNF removal activities; localized fish toxicant applications; installation of temporary weirs, barriers, or collection devices)?
- NNF management plan for existing or new reservoir(s)

5.2.2 Opening access to habitat above Kenney Reservoir?

5.2.3 Sediment management plan for Kenney Reservoir

5.2.4 Fish passage needs for current or future diversion structures

5.2.5 Monitoring activities

Monitoring will play an important role in documenting species status, documenting actual vs. anticipated effects, addressing uncertainties associated with recovery, and informing future recovery actions and priorities (i.e., adaptive management)

- Depletion accounting and reporting
  Including methodology and frequency.
- Additional stream gage installations and operation?
- Fisheries monitoring? (e.g., pikeminnow and razorback sucker adult pop estimates; early life history monitoring; possible installation of new antennae; telemetry studies of RBS captured in the White River?)
- Groundwater monitoring? (e.g., to monitor impacts on alluvial storage and return flows)
- Ditch stranding evaluations

5.2.6 Offsite conservation

- E.g., floodplain, flow, or nonnative fish-related management actions in the Green River

6.0 Proposed Management Actions

Based on the evaluation of potential offsetting actions in Section 5.0, this section will describe a suite of actions proposed for implementation. This suite of actions will be incorporated into a Cooperative Agreement which would be signed by the USFWS and other parties committing to implement (and with the authority to implement) the specified management actions (e.g., the State of Colorado, the Rio Blanco Water Conservancy District, the State of Utah, the Northern Ute Tribe, etc.). These actions would be incorporated into the Recovery Program's Action Plan.

Because this effort will include a biological assessment (BA), this section of this document (or a separate standalone document*) should include:

- A description of what the management actions will involve, where and when the actions will take place, who will implement the actions, and under what authorities;
- An "Effects of the Action" section analyzing the collective consequences of all the proposed actions on the listed fish populations and making a determination of the affect on the endangered species, with the supporting rationale for reaching that conclusion.

* USFWS Ecological Services indicates that a BA is typically (and preferably) provided as a standalone document. This is not a strict requirement; however if the BA is not packaged as a standalone document, care should be taken to clearly parse out and organize the elements that specifically address the requirements of a BA in order to streamline USFWS review.