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Department of Natural Resources

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TO: Colorado Water Conservation Board Members

FROM: Ted Kowalski, Chief, Interstate, Federal & Water Information Section
Suzanne Sellers, Interstate, Federal & Water Information Section

DATE: July 15-16, 2015 Board Meeting

AGENDA ITEM: 20. Interstate & Federal Section – Public Deliberation on the Board of Commissioners for the City of Glenwood's Recreational In-Channel Diversion (RICD) Application in Case No. 5-13CW3109

Background:

The City of Glenwood Springs is seeking three Recreational In-Channel Diversions (RICDs) on the Colorado River located in and upstream of the City of Glenwood Springs. The three RICDs that Glenwood Springs is seeking are for the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park. The reaches for each RICD are shown on the map attached. Each RICD is proposed to operate from April 1st to September 30th of each year.

Staff recommendation:

The Staff hereby submits recommendations for the subject RICD application as follows:

1. Staff recommends that the Board adopt the Staff's Recommended Comprehensive Findings of Fact as attached.
2. Staff also recommends that the Board adopt the following abbreviated Findings of Fact so long as the specific conditions of the Comprehensive Findings of Fact are incorporated in the final decree:
   - The adjudication and administration of the RICDs will materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements;
   - the proposed RICDs will not affect the natural environment that instream flow (ISF) water rights protect; and
   - the adjudication and administration of the RICDs, in the amounts claimed, will not promote maximum utilization of the waters of the State.
3. Staff recommends that the Board instruct Staff to participate in the water court case to defend the subject Findings of Fact and to assure that the final decree fully complies with relavant statutes.

Discussion:

The Staff has reviewed the Applicant's statement, rebuttal statement, drawings, engineering reports, supplemental engineering reports and proposed decrees dated May 21 and June 30, 2015 (all attached). In addition, the Staff has reviewed the submissions from the American Whitewater & Western Resource Advocates (AW&WRA), the City of Aurora, City of Colorado Springs, & Homestake Partners (Homestake et al.), Colorado Parks and Wildlife (CPW), Colorado Department of Transportation (CDOT), Colorado River Water Conservation District (CRWCD), Denver Water, and the Town of Gypsum, which are all attached to this memo.

Procedure

The statutes (attached) require that the CWCB hold a public deliberation on the RICD application, and after that public deliberation, prepare findings of fact that consider the following factors:

- whether the adjudication and administration of the RICDs would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements;
- whether the exercise of the RICDs would cause material injury to existing ISF water rights; and
- whether the adjudication and administration of the RICDs, in the amounts claimed, would promote maximum utilization of the waters of the State.

The CWCB's RICD Rules (attached) provide a more detailed list of considerations related to each of the above factors. Staff's Recommended Comprehensive Findings of Fact (attached) addresses these considerations in detail. The CWCB's Findings of Fact are currently due to the water court on August 14, 2015.

The following summarizes the Staff's analysis of the information presented and supports Staff's Recommended Comprehensive Findings of Fact with the paragraph numbers from the Findings of Fact included in parentheses.

Percent of Historical Flows (paragraph I.a.i.)

Table 1 below summarizes the proposed RICD and shows that the total volume of water requested is just below 50% of the average historical volume of water that flowed through the proposed RICD reaches, as calculated by the Applicant. However, as described below, an alternative analysis presented by Homestake et al. indicates that the volume may be higher than 50% of the average historical volume of water that flowed through the proposed RICD reaches.

Table 1. Summary of Proposed RICD Flow Rates

Period	No. of Days	Flow Rate (cfs)	Total Volume of Water Represented by RICD Flow Rates (af)*	Total Average Historical Volume (af)	Volume Claimed/ Average Hist. flow Volume
April 1 - June 7	68	1,250	168,300		
June 8 - July 23**	41 5	2,500 4,000	202,950 39,600		
July 24 - Sept 30	69	1,250	170,775		
Total in Glenwood Springs	**183**		**581,625**	**1,190,499**	**48.9%**
Total at No Name				**1,172,000**	**49.6%**

*Volume calculation is based on statutory definition and does not consider the time of day in the calculation.

** The 4,000 cfs event flow rate is further limited to no more than 5 continuous days between June 30 and July 6

The Applicant estimated the average historical volume of water in Glenwood Springs by adjusting 30 years of flows from the Dotsero gage located above Glenwood Canyon. This adjustment (roughly 7.5%) was made by comparing historic (1941-1966) RICD season Dotsero stream gage data and stream gage data from an historic gage that was previously located upstream of the Colorado River's confluence with the Roaring Fork River. In its rebuttal statement, the Applicant estimated the average historical volume of water at the No Name RICD site by subtracting the average estimated flows of No Name Creek as determined using the StreamStats tool. CWCB staff finds this an acceptable approach to calculating the stream flow for the RICD application.

Note that Homestake et al., has raised concerns about the calculation of the average historic volume. Homestake et al. estimates an average historic volume in Glenwood Springs that is roughly 4.3% lower than the amount estimated by the Applicant by using 20 years of annual gage data from an active gage on the Colorado River located below the confluence of the Roaring Fork River and subtracting the flows from a gage upstream of the confluence on the Roaring Fork River. Roughly 0.5% of the difference is based on the 10-year difference in the period of record used. Another roughly 0.4% of the difference is likely based on the fact that Homestake compared annual data rather than RICD season data. Because of this concern, Homestake et al. is recommending that the Applicant install two new gages to administer the RICDs. Using their own flow calculations, Homestake et al. asserts that the Applicant is claiming more than 50% of the historic flow, which would trigger the requirements of section 37-92-305(13)(f), C.R.S. (2013) that would limit the RICD as follows:

- a call will not be administered unless at least 85% of the decreed flow rate will result from that call;
- the RICD is limited to three time periods; and
- the RICD is limited to one flow rate per time period.

Given that the USGS classifies a "good" gage as being within 10% of the true value for 95% of daily flow values, the difference between the two calculations is well within the error of these gages.

Denver Water asserts, based on its reading of the statute, that the flows sought on any given day should not exceed 50% of the average historical volume for that day. However, the Applicant, Homestake et al., and Staff all relied on section 37-92-305(13)(e), C.R.S. (2013) which states that "total volume of water represented by the flow rates decreed for the recreational in-channel diversion means the sum of the flow rates claimed in cubic feet per second for each day on which a claim is made multiplied by 1.98."

Based on these facts, Staff determines that the Applicant is seeking less than 50% of the average historic flows and therefore is not be subject to the additional limitations described above. Further, Staff is satisfied with the Applicant's proposal to install one new gage for the purpose of administering the RICDs; however, if the Division Engineer determines that additional gages are necessary, the Division Engineer has the authority to require additional gages.

Days of Call and Volume (paragraphs I.a.iii, v, vi, viii, ix and I.c.i, ii, iv, vii, viii, xi, xii, xv, xvi, xix, xx)

Figure 1 (attached) illustrates the natural hydrograph at the proposed RICDs in Glenwood Springs using the Applicant's hydrology from 1984 to 2013. This figure illustrates the time periods in which the proposed RICDs could call given various estimated historical hydrographs. Also represented on the graph is the historical average and historical maximum flow at the proposed RICD locations during days of call by senior water rights.

The Applicant has characterized the RICDs' impact on the river as an average of only 14 or 15 days of potential call in excess of the existing Shoshone senior call with the potential maximum call on the Colorado River being limited to 46 days (June 8 - July 23). The Applicant states "outside of those 46 days, the potential for a call is unchanged from the potential for a Shoshone call."

Table 2 below summarizes the Staff's analysis of number of days of potential call on the Colorado River using the Applicant's hydrology for flows in Glenwood Springs from 1987 to 2013. These values take into account the historic call on the Colorado River as well as potential calls that could be made by the proposed RICDs. Staff estimates that the Glenwood Springs RICDs will add an average of 17 additional days of call on the Colorado River. The greatest impact will be during the month of July, when roughly half the calls will occur on average and during the months of April and June when a roughly a quarter of the calls will occur in each of those months, on average. These call estimates likely differ from the Applicant's because the Applicant's estimates do not include potential calls that may made by the RICD outside of the June 8 - July 23 period; however, there is currently no provision in the Applicant's proposed decree that limits calls to this period. Note, that the impact of the proposed Reduced Call Subordination Clause by the Applicant has not been quantified or factored in to these calculations. Additionally, Homestake et al. estimates a slightly higher number of days of call than Staff, using their own historic hydrology from 2004 to 2013. Differences are likely related to the use of 10 years of historic data and the exclusion of important drought years such as 2001 to 2003.

Table 2. Number of Potential Days of Call on Colorado River

	Historical days of Call	Additional calls by the RICDs	Future days of call	Resulting Impact (% of season called out)	Monthly Impact
Minimum	0	0	0	0%	Roughly, half the RICD calls occur in July, roughly a quarter in April and roughly a quarter in June, on average.
Average	68	17	85	46%	
Maximum	147	59	166	91%	

Table 3 provides finer detail on the potential number of days of call that may result from the proposed RICDs. The majority of days of call will occur when the 2500 cfs flow is being sought. If the Applicant were granted its RICD as requested, the annual volume of water that may be called would average 52,876 acre-feet (af) with a maximum of 158,091 af. These volume estimates likely differ from the Applicant's (average of 19,000 af per year) because the Applicant's estimates do not include potential calls that may made by the RICD outside of the June 8 - July 23 period; however, there is currently no provision in the Applicant's proposed decree that limits calls to this period.

Table 3. Detail on Potential Days of Additional Call by Proposed RICDs

	Days of Call				Annual Volume of Water* (af)
	1250 cfs**	2500 cfs	4000 cfs	Annual	
Minimum	0	0	0	0	0
Average	5	10	2	17	52,876
Maximum	29	27	5	59	158,091

* Based on a period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day.

**The potential for the Gore Canyon RICD to call for its 1500 cfs flow rate on the same days as the Applicant's RICD at the 1250 cfs flow rate is little to none based on historical hydrology and call records.

As part of its rebuttal, the Applicant has included a reduced call subordination clause in its proposed decree. The reduced call subordination would protect a certain amount of yield of future projects that provide water for west slope purposes. According to the proposed clause, a reduced call, not to exceed 1250 cfs, may potentially go into effect for the period of June 8 - July 23 if triggered by a determination by the CRWCD that the "Junior Protected Yield" of the future projects were impaired. Staff is concerned with this provision, as it does not include water rights for trans-mountain diversions. In addition, it is unclear how the CRWCD would determine whether the junior protected yield was impaired. Lastly, although the provision includes a volume of 20,000 af, given the current information provided by the Applicant, it unclear how much how much yield would actually be protected by the provision. ~~There are roughly 4,000 conditional water rights upstream of the RICDs that may potentially be considered as senior water rights in the Junior Protected Yield calculation.~~

For these reasons, Staff contends that the RICDs will exacerbate the call on the river and materially impact the ability of the state to fully use its compact entitlements because the RICDs will pull a substantial amount of water downstream of the RICDs.

Upstream and Downstream Water Demand (paragraphs I.a.ii and iv)

The Statewide Water Supply Initiative (SWSI) Basin Municipal and Industrial (M&I) Gap Analysis by CDM (June 22, 2011) indicates that the M&I Gap for upstream counties (Grand, Summit and Eagle) under the realistic (medium) scenario will be 7,500 af per year, with the M&I gap beginning in approximately 2030. There will also be a demand for future water development upstream through transmountain diversions with the M&I Gap for the front range under the realistic scenario estimated at 320,000 af per year, also beginning in approximately 2030. Currently there are several projects that have been indentified to help alleviate a portion of these gaps including the Wolcott Pumpback "Little Straw," Webster Hill Reservoir, the Eagle River Memorandum of Understanding (ERMOU) Project, the Colorado River Cooperative Agreement (CRCA) project, and the Green Mountain Pumpback. The SWSI Basin M&I Gap Analysis indicates that the M&I Gap for downstream counties (Garfield and Mesa) under the realistic scenario will be 22,000 af per year, with the M&I gap beginning in approximately 2030. Note, that the gap analysis does not include demand for future Identified Projects and Processes (IPPs).

Using the Colorado River Basin Water Supply and Demand Study (CRBWS&D Study), under the current trends scenario, Homestake et al. estimates potential new annual upstream demands of the proposed RICDs to be 551,500 af and potential new annual downstream demands to be 149,500 AF through 2060. Additionally, the CRBWS&D Study estimates that the current annual flow allocated to meet current downstream demands is 837,611 af. In addition, the Applicant has noted that the oil shale industry has numerous conditional water rights that may be developed in the basin below the RICDs, including undeveloped storage rights downstream of the RICD of over 270,000 acre-feet.

From this information, Staff concludes that water that may be pulled through the RICDS and may potentially be beneficially used before the water leaves the state.

Compact Compliance (paragraphs I.a.vii and I.c.xvii)

To address concerns about how the RICD may affect Colorado's future compact compliance, the Applicant has included a compact compliance provision in the proposed decree, which is similar to language approved by the Board in Pitkin County's RICD decree. Staff finds this provision acceptable and appropriate.

Provision for Reducing or Canceling RICD (paragraph I.a.x and I.c.xvii)

The Applicant has not included additional provisions for reducing or canceling the RICD other than the compact compliance provision and the reduced call subordination provision indicated above. Thus, the proposed RICDs will impact the ability of the State of Colorado to consumptively use its compact entitlements and would not promote maximum utilization of Colorado's water resources.

Instream Flow Water Rights (paragraph I.b)

Staff contends that the proposed RICDs will not cause material injury to existing ISF water rights because the next downstream ISF is located at the "15-mile Reach" above Grand Junction, approximately 75 miles downstream.

Federal Laws, Regulations and Policies (paragraph I.c.iii)

The Applicant has indicated that it intends to obtain all required regulatory approvals and permits upon completion of its final design.

Design Considerations (paragraphs I.c.iv, vii, xiii, xiv, xviii)

Homestake et al.'s consultant (SG1) has raised several compelling concerns about the Applicant's original design of the whitewater parks provided in its original submittal. Although the Applicant intended to design a bypass channel at each whitewater park structure, the cross sections used in the Applicant's original engineering analysis did not incorporate these bypass channels. The lack of an updated design called into question the efficiency of the current design and whether the claimed flows meet the requirement that they are the "minimum amount of stream flow for a reasonable recreational experience." Moreover, the Applicant had not demonstrated that it has used a reasonable and efficient means to use, divert, capture, and control the water for the RICD to minimize the call upon the river and avoid waste.

In its rebuttal, the Applicant modified its cross-sectional design of the whitewater parks. This information represents new information that should have been provided in the Applicant's original submittal. Staff is not inclined to change its original proposed findings associated with the design considerations until the objector's have had a chance to respond to this late information.

Demand for RICDs (paragraph I.c.v)

Homestake et al. has raised concerns about the demand for the proposed RICDs because the peak demand (based on historical commercial floatboating visitation data) commonly occurs when the stream flow in the Colorado River near Glenwood is between 1,000 and 2,000 cfs. This high amount of visitation is occurring already in a natural stream channel, without the benefit of engineered structures, to "provide" the recreational experience. Homestake et al. also note that commercial visitation is reduced during periods of higher stream flow. The Staff agrees that a demand for recreational boating exists; however, the Staff does not agree that the demand is reasonable for the flow amounts sought given that the highest visitation tends to occur at flow levels closer to the minimum flow levels sought in the applications (1250 cfs). With the benefit of engineered structures, the demand should be able to be met at these lower flow levels.

Appropriate Time Limitations (paragraph I.c.vi)

The Applicant has demonstrated a need for a period of less than 14 days for its July 4th holiday event flows and therefore has appropriate time limitations included within the application.

Economic Benefit (paragraph I.c.ix)

The Applicant and AW&WRA have provided adequate data to support a finding that there will likely be an economic benefit from the existence of the proposed RICDs.

Environment (paragraph I.c.x)

Both CPW and Homestake et al. raise environmental concerns associated with the design (i.e. scour, erosion, sediment transport and fish passage) as currently presented. Additionally, environmental concerns (fish and big horn sheep habitat) have been raised related to Horseshoe Bend and No Name sites. While, the Applicant has proposed language for the decree that may address CPW's Section 404 permitting concerns, this language does not address the other environmental concerns raised.

Other Concerns

The following concerns were also raised by Objectors; however, they are not items specifically addressed by the Board's Findings of Fact pursuant to statute. If compelled, the Board may direct staff to pursue these concerns within the context of the water court. However, the Board's direction on these matters will not be considered presumptive by the court.

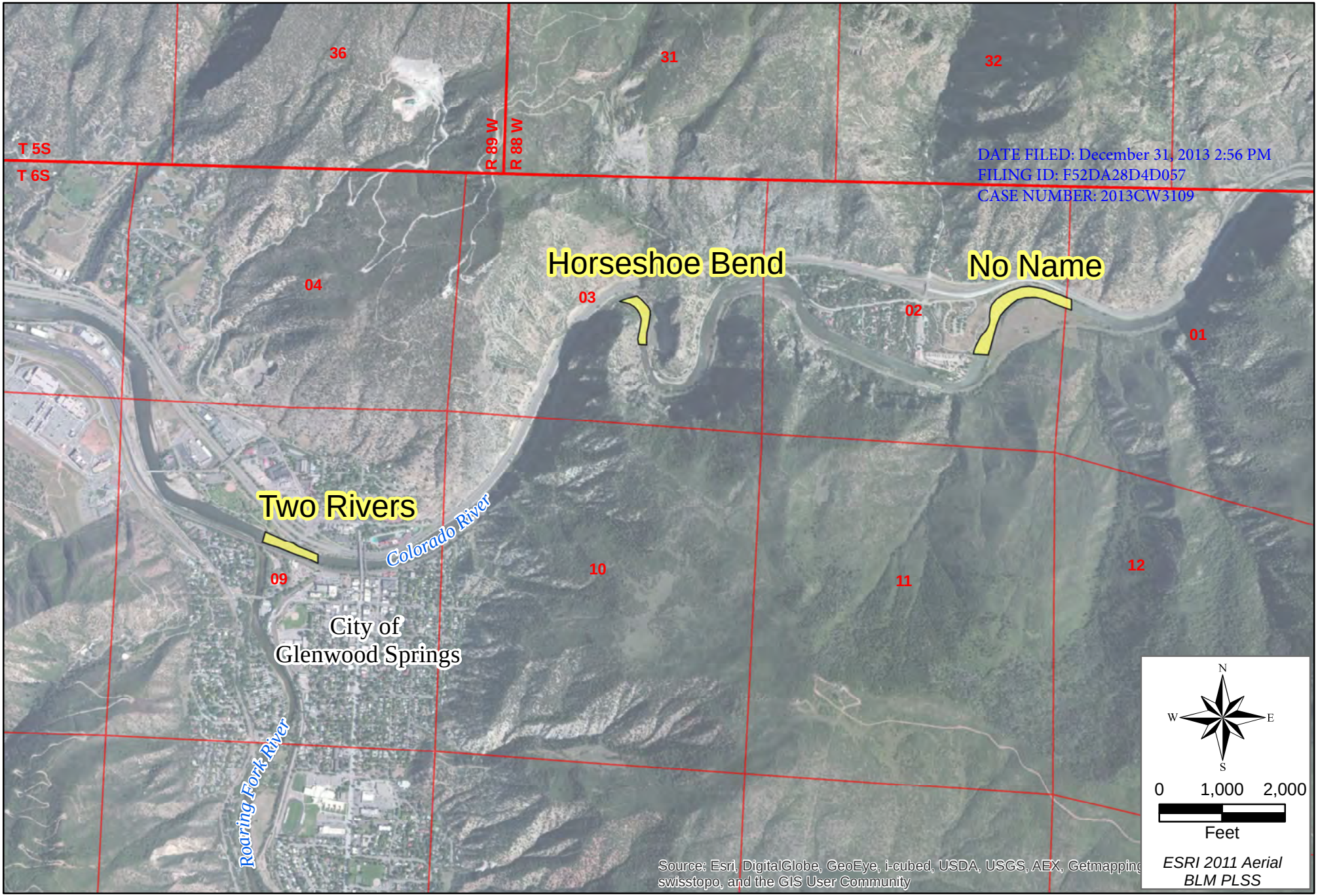
Access - The Applicant must obtain permission for access from current property owners including the CDOT, Union Pacific Railroad, and other private property owners. Homestake et al. and CPW also raise additional access concerns, with particular emphasis on the Horseshoe Bend site.

Safety – Homestake et al. and CDOT have raised several safety concerns associated with the proposed whitewater parks.

Floodplain Impacts – Homestake et al. have raised concerns about creation of a backwater effect particularly at the Two Rivers Whitewater Park site where a designated floodplain exists.

Can and Will/Speculation - Homestake et al. have raised concerns about the doctrine of can and will and the speculation doctrine. Further, CPW has indicated that the Applicant has stated several times that the Applicant plans to only build one of the three parks which calls in to question whether the Applicant can and will utilize all three water rights.

Z:\WWE\131-036\000\Engr\Exhibit A.mxd



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Date:	12-16-13
Project Number:	131-036.000

City of Glenwood Springs

Recreational In-Channel Diversion Reaches

Township: 6S Range: 89 W. of the 6th P.M.

EXHIBIT A

Staff's Recommended Comprehensive Findings of Fact
City of Glenwood Springs
Case No. 5-13CW3109
~~June 18~~July 2, 2015

I. Considering the specific amounts and activities as claimed in the application and proposed decree, and after deliberation in a public meeting held in conjunction with the regularly scheduled Board meeting held on July 15-16, 2015, in Ignacio, Colorado, the Board makes the following findings about the three proposed Recreational In-Channel Diversions (RICDs):

a. The Board must consider whether the adjudication and administration of the proposed RICDs would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. The Board makes the finding that there remains unallocated Colorado River compact apportionment available for consumptive beneficial use within Colorado. In addition, the Board finds that the adjudication and administration of the proposed RICDs, for the flow amounts and time periods specified in the proposed decree, dated ~~May 21~~June 30, 2015, will materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements and will have an impact on the manner, cost, and timing of such development. The Board makes the following specific findings about the proposed RICDs for the flow amounts and time periods claimed:

Period	Flow Rate (cfs)
April 1 - June 7	1250
June 8 - July 23	2500
June 30 - July 6 (5 days)*	4000
July 24 - Sept 30	1250

*The 4,000 cfs event flow rate is further limited to no more than 5 continuous days between June 30 and July 6

i. There remains unappropriated water that Colorado could place to consumptive beneficial use upstream of the proposed RICD reaches. The proposed RICDs will impair Colorado's ability to fully develop and place to consumptive beneficial use Colorado's compact entitlements under the Colorado River compact, the Upper Colorado River Basin compact, and the associated "Law of the River" upstream of the proposed RICDs. The Applicant is seeking less than 50% of the total average historic volume of stream flows; therefore, the requirements of section 37-92-305(13)(f) C.R.S. (2014) do not apply. The proposed decree, dated ~~May 21~~June 30, 2015, also provides that the City of Glenwood Springs cannot call for water under the RICDs water right if such call will not produce at least 500 cubic feet per second (cfs) at the control structures. Additionally, the City of Glenwood Springs has limited its claimed amounts to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. ~~The City of Glenwood Springs also contemplates the addition of a "carve-out" and/or "no-call" clause; however, the Staff has not received any proposed language for such a clause at this time.~~ Additionally, the Board finds that the following italicized conditions (including the underlined text) ~~proposed~~ agreed to by the Applicant would be acceptable provisions provided that the conditions are also included in the final decree conditions; however, even with these provisions, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements:

"11. d. Non-Opposition. Glenwood Springs shall not use the RICD Water Rights as a basis to oppose any future application in the Water Court for Water Division 5 that proposes future development of the waters of the Colorado River or its tributaries upstream of the RICD Water Rights (including applications to confirm new water rights, changes of water rights, and/or for approval of plans for augmentation) where the proposed diversion is less than 1,000 acre-feet per year. Glenwood Springs also shall not use the RICD Water Rights as a basis to oppose any water rights applications filed to implement the Colorado River Cooperative Agreement effective September 26, 2013 ("CRCA"), or the 1998 Memorandum of Understanding Between the Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium ("Eagle River MOU"), provided that the contemplated drafts and yields of such water rights filings do not exceed the contemplated drafts or yields specified in these agreements. However, unless contrary to other provisions of this decree or related stipulations or agreements, or out-of-priority diversions are replaced in time and amount through an exchange, plan for augmentation or substitute water supply plan approved in the future, all water rights junior in priority to the RICD Water Rights may be subject to curtailment by a call for water under the RICD Water Rights, and nothing herein shall prohibit Glenwood Springs from requesting water rights administration by the State or Division Engineers or from filing statements of opposition for the purpose of protecting water rights other than the RICD Water Rights.

11. e. CRCA. Glenwood Springs and the CWCB agree to cooperate and coordinate in good faith concerning the future operation of the RICD Water Rights and future water rights appropriated for the "Upper Colorado Cooperative Project", which is defined by the CRCA as "a water supply project located on the West Slope, agreed to by Denver Water and the signatories to this Agreement, and designed to produce water for use on the East and West Slopes, including at least 20,000 acre-feet of average annual diversions for use on the East Slope.

11. f. River Administration. In operating the RICD Water Rights, Glenwood Springs will regularly communicate with the Colorado River Water Conservation District (the "River District") concerning river conditions and water rights administration within Water Division No. 5, and will make reasonable efforts to operate the RICD Water Rights with due consideration of the water supply, water exchange, and augmentation needs of the River District, and its constituents, <u>including but not limited to beneficiaries of the Green Mountain Historic Users Pool</u>, in a manner consistent with the River District's statutory obligations in a manner consistent with the River District's statutory obligations regarding the development and protection of water resources for the benefit of its constituents. Glenwood Springs will at all times operate the RICD Water Rights in recognition of prior decrees and agreements."

<u>11. g. For purposes of this Section 11.g., the following determinations shall apply:</u>

i. The term "New Water Project" shall mean any single water project (which may include storage projects or storage projects with direct flow components) or combination of multiple water projects that: (a) was not constructed or otherwise in operation as of December 31, 2013; (b) diverts or stores water from points that are located upstream of the RICD Water Rights; and (c) is decreed and used for beneficial use within Water Division 5. New Water Projects may include water projects that utilize decreed water rights that are either senior or junior in administrative priority to the RICD Water Rights.

ii. The term "Firm Yield" shall mean the average annual yield of a New Water Project (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.

iii. The term "Cumulative Firm Yield" shall mean the combined average annual yield of all New Water Projects (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.

iv. The term "Junior Protected Yield" shall mean the portion of the Cumulative Firm Yield supplied by water rights junior to the RICD Water Rights, up to a maximum of 20,000 acre-feet minus the Cumulative Firm Yield of New Water Projects supplied by water rights senior to the RICD Water Rights.

Glenwood Springs shall consult with the River District on or prior to May 20th of each year regarding the implementation of this Section 11.i. If this consultation process determines that, during the period from June 8 to July 23 of that year, Glenwood Springs' placement of a call on the Colorado River for the RICD Water Rights in excess of 1,250 c.f.s. would likely impair the Junior Protected Yield, then the RICD Water Rights shall be deemed satisfied by calling, in order of priority, only those water rights necessary to produce an administrative flow rate of 1,250 c.f.s. (as measured at the single measurement point described below in Section 23) from June 8 to July 23 of that year, or such portion of that period that is determined necessary to satisfy the Junior Protected Yield. This Section is intended to alleviate potential conflicts between the future operation of the RICD Water Rights and New Water Projects, but shall not be construed to require Glenwood Springs to reduce a call in the event that the Junior Protected Yield can be achieved by: (1) diverting water outside of the June 8 to July 23 time period each year; or (2) exercising water rights that are senior to the RICD Water Rights.

ii. The Board finds that the distance of the proposed RICDs to the State line is considerable, but in light of other concerns described below, the proposed RICD application materially impairs Colorado's ability to develop its compact entitlements.

iii. The proposed RICDs are in close proximity to potentially suitable upstream points of diversion and upstream storage that could be utilized by those who would place the water to consumptive beneficial use. The Board finds that the addition of the proposed RICDs will materially impair

the ability to divert and place to consumptive beneficial use water upstream of the proposed RICDs for currently undecreed uses. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

iv. The Board finds that suitable downstream points of diversion or storage for consumptive beneficial use exist before the water leaves the State; however, in light of other concerns, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements.

v. Exchange opportunities within the State may be adversely impacted by the existence of the proposed RICDs. Therefore, the Board finds that the proposed RICDs will materially impair the ability of the State of Colorado to fully develop and place to consumptive beneficial use its compact entitlements.

vi. The Colorado River basin is over-appropriated, or "water critical," in certain locations within the basin during the RICD season and the proposed RICDs will further exacerbate these water shortages. Therefore, the Board finds that the proposed RICDs will materially impair Colorado's ability to fully develop and place to consumptive beneficial use its compact entitlements.

vii. In the case of compact curtailment under the "Law of the River," it may be necessary to exchange water through the proposed RICD reaches in order for the beneficiaries of post-compact water rights to realize necessary beneficial use of water yielded from pre-compact water rights or other water sources not affected by compact administration. Such exchanges could allow benefitted post-compact water rights to continue to divert during a compact curtailment. The Board finds that the following italicized condition would be an acceptable provision for any proposed decree to reduce the impacts of the RICDs on Colorado's ability to fully use its compact entitlements. Despite this language, in light of other concerns, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements:

> *"11.a. During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the RICD Water Rights decreed herein will be administered in accordance with the compact curtailment rules adopted by the State Engineer or such other state agency as may, in the future, be empowered to adopt rules or otherwise act to assure compliance with interstate water compacts that are then in effect, if any, including any such rules intended to avoid, delay, or limit the severity of such a compact curtailment. If no such compact curtailment rules are then in effect, Glenwood Springs shall not place a call for the RICD Water Rights decreed herein during the period that implementation of an Article VIII(d)(8) curtailment order affects water diversions in Water Division No. 5, unless the State Engineer or Division Engineer determines that exercise of all or part of the RICD Water Rights will not affect Colorado's ability to comply with the Compact. Otherwise, the RICD Water Rights decreed herein shall be administered in accordance with this Decree and Colorado law."*

viii. The RICDs will likely shield waters from consumptive uses that would otherwise be available under the Colorado River Compacts. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

ix. The Board finds that beneficial consumptive water use opportunities exist upstream of the RICDs that would be impaired by the RICDs. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

x. The Applicant has not included adequate provisions in the proposed decree for reducing or canceling the RICDs at this time. ~~, other than the provision related to the compact call situation, described above.~~ Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

~~H~~b. The Board must consider whether the exercise of the proposed RICDs will cause material injury to existing instream flow (ISF) water rights. The proposed RICD will not cause material injury to existing instream flow water rights. The Board makes the following specific findings about the proposed RICDs regarding the potential for material injury to existing ISF water rights:

i. There are currently no existing ISF water rights held by the CWCB in the Colorado River in the proposed RICD reach. However, ISF water rights exist in the 15-mile Reach above Grand Junction, significantly downstream (approximately 75 miles downstream) of the proposed RICD reach. This instream flow water right is for July 1 through September 30 of each year, for decreed rates lower than the rates sought by the RICD. As such, the proposed RICD will not cause material injury to existing ISF water rights.

ii. The Board finds that the timing and duration of the RICDs will not negatively impact the natural environment for which the 15-mile Reach ISF was decreed and thereby cause material injury to existing ISF water rights.

iii. The Board finds that the administration of the RICD would not negatively impact the natural environment for which the ISF was decreed and thereby cause material injury to existing ISF water rights.

iv. The Board finds that the construction of the RICD white water park is not likely to cause material injury to the 15-mile Reach ISF or the natural environment for which the ISF was decreed.

~~H~~c. The Board must determine whether the adjudication and administration of the proposed RICDs, in the amounts claimed, would promote maximum utilization of the waters of the State. The Board finds that the proposed RICDs, in the amounts claimed, do not promote the maximum utilization of the waters of the State. In addition, the Board makes the following specific findings about the proposed RICDs regarding maximum utilization of waters of the State:

i. The Board finds that there are probable future upstream junior appropriations for direct diversion or storage that may be adversely affected. The Board finds that the proposed RICDs will prohibit upstream junior appropriations for direct diversion and storage and, therefore, will materially impair maximum utilization of the waters of the State. Given the proximity of other water rights, the Applicant's RICDs expand the potential for calls that will curtail upstream junior appropriators. Thus, the proposed RICDs would not promote maximum utilization of the waters of the State.

ii. The Board finds that the proposed RICD appropriations, for the flow amounts sought and the time periods specified, will inhibit maximum utilization by restricting probable future changes,

transfers, or exchanges of water rights from points of diversion or storage downstream of the reach affected by the proposed RICDs to points upstream of or within the reach affected by the proposed RICDs. Therefore, the Board finds that the opportunity to allow future changes, transfers, and exchanges of water from points located downstream of the proposed RICDs to points located upstream of the proposed RICDs will be unduly impacted, thereby preventing maximum utilization of the waters of the State.

iii. The Board finds that the Applicant intends to comply with appropriate federal policies, regulations and laws. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

iv. The Board finds that the proposed RICD appropriations do not promote maximum utilization of Colorado's water resources because, by claiming flow rates that are not consistent with flow rates appropriated by nearby water rights, the Applicant has not attempted to minimize its call upon the river and avoid waste. Further, the Board finds that there is not a reasonable and efficient means proposed by the Applicant to use, divert, capture and control the water diverted through the RICDs and they will not minimize the call upon the river and avoid waste. Therefore, the RICDs will materially impair maximum utilization of the waters of the State.

v. The Board finds that there is not a reasonable demand for the recreational activities for portions of the time periods requested at the requested flow rates claimed in the proposed decree, dated ~~May 21~~June 30, 2015. Thus, the proposed RICD application will materially impair maximum utilization of the waters of the State.

vi. The Board finds that the proposed decree, dated ~~May 21~~June 30, 2015, does have appropriate limitations on the time of day, days per period, and the time of year during which the proposed RICDs would be exercised. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

vii. The Board finds that the depths and individual flow rates of the proposed RICDs do not promote maximum utilization for flow amounts sought for the individual time periods because the Applicant is seeking flow rates that would exacerbate the call on the Colorado River and pull water down through the RICD reaches.

viii. The Board finds that the frequency and duration of the requested amounts of water for the proposed RICDs for the requested periods do not promote maximum utilization of waters of the State.

ix. The Board finds that there will likely be an economic benefit from the existence of the proposed RICDs. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

x. The Board finds that the proposed RICDs, to varying degrees, may have detrimental effects on several environmental aspects ~~and therefore,~~. Additionally, the Board finds that the following italicized condition proposed by the Applicant would be an acceptable provision provided that the condition is also included in the final decree conditions; however, even with this provision, the proposed RICD application would not promote maximum utilization of Colorado's water resources ~~.~~:

> *11. h. CPW Coordination. Prior to initiation of a Section 404 permit application to the U.S. Army Corps of Engineers, Glenwood Springs shall consult with Colorado Parks & Wildlife (CPW) with regard to RICD structure siting, design and contemplated future maintenance CPW may participate in the Section 404 permitting process to*

ensure that terms are included in the Section 404 permit(s) to protect aquatic resource values. Glenwood Springs also agrees to consult with CPW as to (1) the timing of construction and (2) the timing of any future reservoir releases for the benefit of the RICD Water Rights

xi. The Board finds that the relationship of the requested individual RICD flow rates to the historic appropriated and unappropriated flow rates for each time period requested will exacerbate the call on upstream juniors, and therefore, would not promote maximum utilization of Colorado's water resources.

xii. The Board finds that the effect of the RICDs on other potential uses of water upstream of the RICDs will be detrimental, and therefore, would not promote maximum utilization of Colorado's water resources.

xiii. The Board finds that the application does not entirely meet the definition of a RICD, as defined in section 37-92-103(10.3). The Applicant has provided evidence that there is a demand for a reasonable recreational experience on additional days outside of the RICD statutory window of April 1 to Labor Day and the application has been filed by a city government. However, the Applicant has applied for an RICD outside of its city limits. The Applicant justifies this by citing the statutory language of section 31-12-105(1)(e), C.R.S. (2014), which recognizes the ability of a municipality to annex within a three-mile area of the municipality's geographical limits if the municipality has in place a plan for that area that generally describes the proposed location, character, and extent of streets, subways, bridges, waterways, waterfronts, parkways, playgrounds, squares, parks, aviation fields, other public ways, grounds, open spaces, public utilities, and terminals for water, light, sanitation, transportation, and power to be provided by the municipality and the proposed land uses for the area. Because the one RICD structure is not within the city limits but within three miles of the city limits, this reason alone should not be the basis for finding that the application would not promote maximum utilization of the waters of the state. However, the Applicant is seeking more than the "minimum amount of stream flow for a reasonable recreational experience." Therefore, the application would not promote maximum utilization of Colorado's water resources.

xiv. The Board finds that the proposed RICDs do not conserve or efficiently use the available stream flow that may be called down by other nearby water rights, and therefore negatively impacts the maximum utilization of Colorado's water.

xv. The Colorado River basin is over-appropriated, or "water critical," in certain locations within the basin during the RICD season and the proposed RICDs will further exacerbate these water shortages. Therefore, the Board finds that the proposed RICDs would not promote maximum utilization of Colorado's water resources.

xvi. The Board finds that the Applicant has failed to show how the proposed RICDs work together with existing and/or future uses within the State of Colorado in order to promote maximum utilization of waters of the State.

xvii. The Applicant has not included adequate provisions in the proposed decree for reducing or canceling the RICDs~~ other than for the compact call scenario described above~~. Therefore, the Board finds that the proposed RICDs would not promote maximum utilization of Colorado's water resources.

xviii. The Applicant has included descriptions of each recreational opportunity sought at each flow amount. However, the Board finds that the current design submitted does not demonstrate that

the flows sought are the minimum amount necessary to provide for each of the reasonable recreational experiences sought, and therefore negatively impact the maximum utilization of Colorado's water.

xix. The frequency and flow rates of historic reservoir releases through the proposed RICD reaches to meet historic upstream and downstream calls will be necessary to meet a portion of the flow rates claimed for the proposed RICDs, but not for the flow rates that exceed 1250 cfs. Maintenance of flows through the RICDs at the historic frequency and flow rates would maintain beneficial use of waters downstream of the RICDs. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

xx. The Board finds that unappropriated native flows exist in the proposed RICD stream reaches during some of the periods claimed; however, the volume of unappropriated flows claimed by the proposed RICDs is excessive and therefore the proposed RICDs would not promote maximum utilization of waters of the State.

NOTE: This bill has been prepared for the signature of the appropriate legislative officers and the Governor. To determine whether the Governor has signed the bill or taken other action on it, please consult the legislative status sheet, the legislative history, or the Session Laws.

An Act

SENATE BILL 06-037

BY SENATOR(S) Isgar, Dyer, Entz, Evans, Fitz-Gerald, Kester, Lamborn, Mitchell, Taylor, and Teck;
also REPRESENTATIVE(S) Curry, Borodkin, Buescher, Butcher, Frangas, Gallegos, Kerr A., Merrifield, Rose, and White.

CONCERNING THE ADJUDICATION OF RECREATIONAL IN-CHANNEL DIVERSIONS.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. 37-92-102 (6) (a), (6) (b), and (6) (c), Colorado Revised Statutes, are amended to read:

37-92-102. Legislative declaration - basic tenets of Colorado water law. (6) (a) ~~Following a public hearing, if requested by any party, the board shall make findings of fact and a final recommendation as to whether the application should be granted, granted with conditions, or denied.~~

(b) ~~In determining whether the board shall recommend that the water court grant, grant with conditions, or deny such application,~~ The board, AFTER DELIBERATION IN A PUBLIC MEETING, shall consider the following factors and make written findings ~~thereon~~ AS TO EACH:

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

(I) Whether the adjudication and administration of the recreational in-channel diversion would MATERIALLY impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements;

(II) ~~The appropriate reach of stream required for the intended use;~~

(III) ~~Whether there is access for recreational in-channel use;~~

(IV) Whether exercise of the recreational in-channel diversion would cause material injury to instream flow water rights appropriated pursuant to subsections (3) and (4) of this section; AND

(V) Whether adjudication and administration of the recreational in-channel diversion would promote maximum utilization of waters of the state. ~~as referenced in paragraph (a) of subsection (1) of this section; and~~

(VI) ~~Such other factors as may be determined appropriate for evaluation of recreational in-channel diversions and set forth in rules adopted by the board, after public notice and comment.~~

(c) Within ninety days after the filing of statements of opposition, the board shall report its findings to the water court for review pursuant to section 37-92-305 (13). The board may ~~defend such findings through participation~~ FULLY PARTICIPATE in the water court proceedings.

SECTION 2. 37-92-103 (7) and (10.3), Colorado Revised Statutes, are amended, and the said 37-92-103 is further amended BY THE ADDITION OF THE FOLLOWING NEW SUBSECTIONS, to read:

37-92-103. Definitions. As used in this article, unless the context otherwise requires:

(6.3) "CONTROL STRUCTURE" MEANS A STRUCTURE CONSISTING OF DURABLE MAN-MADE OR NATURAL MATERIALS THAT HAS BEEN PLACED WITH THE INTENT TO DIVERT, CAPTURE, POSSESS, AND CONTROL WATER IN ITS NATURAL COURSE FOR AN APPROPRIATOR'S INTENDED AND SPECIFIED RECREATIONAL IN-CHANNEL DIVERSION. THE CONTROL STRUCTURE AND ITS EFFICIENCY SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER, AS THAT

TERM IS DEFINED IN SECTION 12-25-102, C.R.S., OR UNDER THE DIRECT SUPERVISION OF A PROFESSIONAL ENGINEER, AND CONSTRUCTED SO THAT IT WILL OPERATE EFFICIENTLY AND WITHOUT WASTE TO PRODUCE THE INTENDED AND SPECIFIED REASONABLE RECREATION EXPERIENCE. CONCENTRATION OF RIVER FLOW BY A CONTROL STRUCTURE CONSTITUTES CONTROL OF WATER FOR A RECREATIONAL IN-CHANNEL DIVERSION.

(7) "Diversion" or "divert" means removing water from its natural course or location, or controlling water in its natural course or location, by means of a CONTROL STRUCTURE, ditch, canal, flume, reservoir, bypass, pipeline, conduit, well, pump, or other structure or device; except that, ON AND AFTER JANUARY 1, 2001, only a county, municipality, city and county, water district, water and sanitation district, water conservation district, or water conservancy district may FILE AN APPLICATION TO control water in its natural course or location BY MEANS OF A CONTROL STRUCTURE for recreational in-channel diversions. ~~This does not apply to applications filed prior to January 1, 2001.~~

(10.1) "REASONABLE RECREATION EXPERIENCE" MEANS THE USE OF A RECREATIONAL IN-CHANNEL DIVERSION FOR, AND LIMITED TO, NONMOTORIZED BOATING. OTHER RECREATIONAL ACTIVITIES MAY OCCUR BUT MAY NOT SERVE AS EVIDENCE OF A REASONABLE RECREATION EXPERIENCE.

(10.3) "Recreational in-channel diversion" means the minimum AMOUNT OF stream flow as it is diverted, captured, controlled, and placed to beneficial use between specific points defined by ~~physical~~ control structures pursuant to an application filed by a county, municipality, city and county, water district, water and sanitation district, water conservation district, or water conservancy district for a reasonable recreation experience in and on the water FROM APRIL 1 TO LABOR DAY OF EACH YEAR UNLESS THE APPLICANT CAN DEMONSTRATE THAT THERE WILL BE DEMAND FOR THE REASONABLE RECREATION EXPERIENCE ON ADDITIONAL DAYS. THE RECREATIONAL IN-CHANNEL DIVERSION SHALL BE LIMITED TO ONE SPECIFIED FLOW RATE FOR EACH TIME PERIOD CLAIMED BY THE APPLICANT. INDIVIDUAL TIME PERIODS SHALL NOT BE SHORTER THAN FOURTEEN DAYS UNLESS THE APPLICANT CAN DEMONSTRATE A NEED FOR A SHORTER TIME PERIOD. THERE SHALL BE A PRESUMPTION THAT THERE WILL NOT BE MATERIAL INJURY TO A RECREATIONAL IN-CHANNEL DIVERSION WATER RIGHT FROM SUBSEQUENT APPROPRIATIONS OR CHANGES OF WATER RIGHTS

IF THE EFFECT ON THE RECREATIONAL IN-CHANNEL DIVERSION CAUSED BY SUCH APPROPRIATIONS OR CHANGES DOES NOT EXCEED ONE-TENTH OF ONE PERCENT OF THE LOWEST DECREED RATE OF FLOW FOR THE RECREATIONAL IN-CHANNEL DIVERSION AS MEASURED AT THE RECREATIONAL IN-CHANNEL DIVERSION AND THE CUMULATIVE EFFECTS ON THE RECREATIONAL IN-CHANNEL DIVERSION CAUSED BY SUCH APPROPRIATIONS OR CHANGES DO NOT EXCEED TWO PERCENT OF THE LOWEST DECREED RATE OF FLOW FOR THE RECREATIONAL IN-CHANNEL DIVERSION MEASURED AT THE RECREATIONAL IN-CHANNEL DIVERSION. THE OWNER OF A WATER RIGHT FOR A RECREATIONAL IN-CHANNEL DIVERSION MAY NOT CALL FOR WATER THAT HAS BEEN LAWFULLY STORED BY ANOTHER APPROPRIATOR.

SECTION 3. 37-92-305 (13), Colorado Revised Statutes, is amended to read:

37-92-305. Standards with respect to rulings of the referee and decisions of the water judge. (13) (a) The water court shall ~~apply the factors set forth in section 37-92-102 (6). All~~ CONSIDER THE findings of fact ~~contained in the recommendation of~~ MADE BY the Colorado water conservation board PURSUANT TO SECTION 37-92-102 (6) (b) REGARDING A RECREATIONAL IN-CHANNEL DIVERSION, WHICH FINDINGS shall be *presumptive as to such facts, subject to rebuttal by any party.* IN ADDITION, THE WATER COURT SHALL CONSIDER EVIDENCE AND MAKE AFFIRMATIVE FINDINGS THAT THE RECREATIONAL IN-CHANNEL DIVERSION WILL:

(I) NOT MATERIALLY IMPAIR THE ABILITY OF COLORADO TO FULLY DEVELOP AND PLACE TO CONSUMPTIVE BENEFICIAL USE ITS COMPACT ENTITLEMENTS;

(II) PROMOTE MAXIMUM UTILIZATION OF WATERS OF THE STATE;

(III) INCLUDE ONLY THAT REACH OF STREAM THAT IS APPROPRIATE FOR THE INTENDED USE;

(IV) BE ACCESSIBLE TO THE PUBLIC FOR THE RECREATIONAL IN-CHANNEL USE PROPOSED; AND

(V) NOT CAUSE MATERIAL INJURY TO INSTREAM FLOW WATER RIGHTS APPROPRIATED PURSUANT TO SECTION 37-92-102 (3) AND (4).

(b) IN DETERMINING WHETHER THE INTENDED RECREATION EXPERIENCE IS REASONABLE AND THE CLAIMED AMOUNT IS THE APPROPRIATE FLOW FOR ANY PERIOD, THE WATER COURT SHALL CONSIDER ALL OF THE FACTORS THAT BEAR ON THE REASONABLENESS OF THE CLAIM, INCLUDING THE FLOW NEEDED TO ACCOMPLISH THE CLAIMED RECREATIONAL USE, BENEFITS TO THE COMMUNITY, THE INTENT OF THE APPROPRIATOR, STREAM SIZE AND CHARACTERISTICS, AND TOTAL STREAMFLOW AVAILABLE AT THE CONTROL STRUCTURES DURING THE PERIOD OR ANY SUBPERIODS FOR WHICH THE APPLICATION IS MADE.

(c) IF A WATER COURT DETERMINES THAT A PROPOSED RECREATIONAL IN-CHANNEL DIVERSION WOULD MATERIALLY IMPAIR THE ABILITY OF COLORADO TO FULLY DEVELOP AND PLACE TO CONSUMPTIVE BENEFICIAL USE ITS COMPACT ENTITLEMENTS, THE COURT SHALL DENY THE APPLICATION.

(d) IN ADDITION TO DETERMINING THE MINIMUM AMOUNT OF STREAM FLOW TO SERVE THE APPLICANT'S INTENDED AND SPECIFIED REASONABLE RECREATION EXPERIENCE, THE WATER COURT SHALL MAKE A FINDING IN THE DECREE AS TO THE FLOW RATE BELOW WHICH THERE IS NO LONGER ANY BENEFICIAL USE OF THE WATER AT THE CONTROL STRUCTURES FOR THE DECREED PURPOSES.

(e) IF THE OTHER ELEMENTS OF THE APPROPRIATION ARE SATISFIED, THE DECREE SHALL SPECIFY THE TOTAL VOLUME OF WATER REPRESENTED BY THE FLOW RATES DECREED FOR THE RECREATIONAL IN-CHANNEL DIVERSION. FOR PURPOSES OF THIS SUBSECTION (13), THE "TOTAL VOLUME OF WATER REPRESENTED BY THE FLOW RATES DECREED FOR THE RECREATIONAL IN-CHANNEL DIVERSION" MEANS THE SUM OF THE FLOW RATES CLAIMED IN CUBIC FEET PER SECOND FOR EACH DAY ON WHICH A CLAIM IS MADE MULTIPLIED BY 1.98.

(f) IF THE COURT DETERMINES THAT THE TOTAL VOLUME OF WATER REPRESENTED BY THE FLOW RATES DECREED FOR THE RECREATIONAL IN-CHANNEL DIVERSION EXCEEDS FIFTY PERCENT OF THE SUM OF THE TOTAL AVERAGE HISTORICAL VOLUME OF WATER FOR THE STREAM SEGMENT WHERE THE RECREATIONAL IN-CHANNEL DIVERSION IS LOCATED FOR EACH DAY ON WHICH A CLAIM IS MADE, THE DECREE SHALL:

(I) SPECIFY THAT THE STATE ENGINEER SHALL NOT ADMINISTER A

CALL FOR THE RECREATIONAL IN-CHANNEL DIVERSION UNLESS THE CALL WOULD RESULT IN AT LEAST EIGHTY-FIVE PERCENT OF THE DECREED FLOW RATE FOR THE APPLICABLE TIME PERIOD;

(II) LIMIT THE RECREATIONAL IN-CHANNEL DIVERSION TO NO MORE THAN THREE TIME PERIODS; AND

(III) SPECIFY THAT EACH TIME PERIOD IS LIMITED TO ONE FLOW RATE.

SECTION 4. Applicability. This act shall apply only to applications for and the administration of new recreational in-channel diversions filed on or after the effective date of this act and shall not apply to applications for reasonable diligence or to make absolute recreational in-channel diversions that were decreed or applied for prior to the effective date of this act.

SECTION 5. Safety clause. The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Joan Fitz-Gerald
PRESIDENT OF
THE SENATE

Andrew Romanoff
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

Karen Goldman
SECRETARY OF
THE SENATE

Marilyn Eddins
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

APPROVED_____

Bill Owens
GOVERNOR OF THE STATE OF COLORADO

DEPARTMENT OF NATURAL RESOURCES

Colorado Water Conservation Board

2 CCR 408-3

RECREATIONAL IN-CHANNEL DIVERSION RULES

1. Title

Rules Concerning Recreational In-Channel Diversions, adopted pursuant to section 37-92-102, C.R.S., and hereinafter referred to as the "RICD Rules" or "Rules".

2. Purpose of Rules

The purpose of these Rules is to set forth the procedures to be followed by: 1) applicants for Recreational In-Channel Diversions (hereinafter referred to as "RICDs"); and 2) the Colorado Water Conservation Board (hereinafter referred to as "CWCB" or "Board") when making Findings of Fact to a water court regarding RICDs. In addition, the purpose of these Rules is to provide guidance about the type of information that will assist the Board in making its findings to the water court. The Board has incorporated into these Rules, the Statement of Basis and Purpose prepared and adopted at the time of the rulemaking. These Rules will supersede the RICD Rules adopted on November 15, 2005, codified at 2 CCR 408-3, and they are intended to apply to applications that will be reviewed by the Board after the effective date of these Rules. However, they will not apply to applications that were already filed prior to July 1, 2006.

3. Statutory Authority

The General Assembly specifically recognized the appropriation and adjudication of RICDs by local governmental entities, pursuant to sections 37-92-102, 37-92-103, & 37-92-305, C.R.S. The statutory authority for these Rules is found at section 37-60-106(k) and 37-60-108, C.R.S. By promulgating these Rules, the Board assumes no liability related to RICDs and expressly does not waive its sovereign immunity under Article 10, Title 24, C.R.S.

4. Definitions

a. Applicant. Means a local governmental entity that has filed a water court application for a RICD on or after July 1, 2006.
b. Application Receipt Date. Means the date that the Board receives a copy of the RICD application.
c. Application. A water court application filed with the CWCB for consideration under these Rules.
d. Beneficial Use. Is defined as stated in section 37-92-103(4), C.R.S., which is incorporated herein by reference.
e. Board. Means the Colorado Water Conservation Board as defined in sections 37-60-101, 103 and 104, C.R.S., which is incorporated herein by reference.
f. Board's Office. Means the Colorado Water Conservation Board's office, located at 1313 Sherman Street, 7th Floor, Denver, CO 80203. The phone number is (303) 866-3441. The facsimile number is (303) 866-4474. The Board's website is http://www.cwcb.state.co.us.

g. Compact Entitlements. Means all of Colorado's water entitlements pursuant to interstate compacts, equitable apportionments, supreme court rulings designating water apportionments, or any other legally recognized designation of apportionment of interstate waters.
h. Control Structure. Is defined as stated in section 37-92-103(6.3), C.R.S., which is incorporated herein by reference.
i. Director. Means the director of the Colorado Water Conservation Board, who is the chief administrative head of the Board, under the direction and supervision of the Board, and who has general supervision and control of all its activities, functions, and employees.
j. Diversion or Divert. Is defined as stated in section 37-92-103(7), C.R.S., which is incorporated herein by reference.
k. Findings of Fact. Means the written factual findings of the Board regarding the factors set out in section 37-92-102(6), C.R.S. and filed with the water court.
l. Instream Flow (hereinafter referred to as "ISF"). Means any water, water rights or interests in water appropriated or acquired by the Board, pursuant to section 37-92-102(3), C.R.S., for the preservation of the natural environment to a reasonable degree. Pursuant to section 37-92-102(3), C.R.S., no other person or entity may appropriate such rights, for any purpose whatsoever.
m. Local Governmental Entity. Means a Colorado entity authorized to appropriate a RICD and includes a county, municipality, city and county, water district, water and sanitation district, water conservation district, or water conservancy district.
n. Person. Means an individual, a partnership, a corporation, a municipality, the state of Colorado, the United States, or any other legal entity, public or private.
o. Reasonable Recreation Experience. Is defined as stated in section 37-92-103(10.1), C.R.S., which is incorporated herein by reference.
p. Recreational In-Channel Diversion. Is defined as stated in section 37-92-103(10.3), C.R.S., which is incorporated herein by reference.
q. Staff. Means the Director and other personnel employed by the Board.

5. Optional Pre-Application Process

Prior to submitting an application to the water court or to the Board, the Board encourages the applicant to meet with staff to discuss the proposed RICD application and the procedures to be followed by the Board to review the application. Staff will provide input regarding how the proposed application can meet the intent of the RICD Rules.

6. Submissions Required from an Applicant

Within 30 days after filing an application for a RICD with any water court, an applicant shall submit a copy of the application to the Board office, pursuant to section 37-92-102(5), C.R.S.

7. Required Findings

The Board, after deliberation in a public meeting, is required to make certain written findings relative to each RICD application. § 37-92-102(6), C.R.S. The statutory definition of RICD requires that the applicant claim only the minimum stream flow, that the flow be used for a reasonable recreation experience in and on the water, and that the flow be diverted, captured, controlled, and placed to beneficial use. The required findings on factors are:

a. Whether the adjudication and administration of the RICD would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. The Board, in making this finding, may consider, but is not limited to, the following:
   i. The amount and location of remaining unappropriated compact entitlement waters in the basin in question and at the RICD point of diversion;
   ii. The proximity of the RICD to the state line;
   iii. The proximity of the RICD to suitable upstream points of diversion or storage which may be utilized by those who would place the water to consumptive beneficial use;
   iv. The existence of suitable downstream points of diversion or storage for consumptive beneficial uses before the water leaves the state;
   v. Exchange opportunities within the state that may be adversely impacted by the existence of the RICD;
   vi. Whether the basin is over-appropriated;
   vii. The effect on other decreed, existing undecreed, or reasonably foreseeable uses of the amount of water claimed;
   viii. Whether a RICD shields waters from a consumptive use that would otherwise be available under a particular compact;
   ix. Whether beneficial consumptive water use opportunities upstream from the claimed RICD would further develop Colorado's compact entitlements and would be impaired by applicant's sought for stream flow amounts; and,
   x. What provisions in the application are proposed for reducing or canceling the RICD.

b. Whether the exercise of the RICD would cause material injury to existing ISF water rights. The Board, in making this finding, may consider, but is not limited to, the following:
   i. The nature and extent of the ISF in the proposed reach or any affected downstream reach;
   ii. The timing and duration of the RICD as such may relate to the specific natural environment for which the ISF was decreed;
   iii. Whether the RICD, or administration of the RICD, would negatively impact the natural environment for which the ISF was decreed; and,
   iv. Whether during the construction of the RICD structures, the construction may cause material injury to the ISF or the natural environment for which the ISF was decreed.

c. Whether the adjudication and administration of the RICD, in the amounts claimed, would promote maximum utilization of the waters of the State. The Board, in making this finding, may consider, but is not limited to, the following:
   i. Whether there are any probable future upstream junior appropriations for direct diversion or storage;
   ii. Whether there are any probable future changes, transfers, or exchanges of water rights from points of diversion downstream of the reach affected by the RICD to points upstream of or in the reach affected by the RICD;

iii. Whether Applicant has demonstrated that it has complied with appropriate federal policies, regulations and laws, or has indicated that it will comply with all appropriate federal policies, regulations and laws;
iv. Whether a reasonable and efficient means is to be utilized to use, divert, capture and control the water for a RICD so as to minimize its call upon the river and avoid waste;
v. Whether a reasonable demand exists for the recreational activity in question as determined by levels of current use and/or estimates of future use;
vi. Whether the application has appropriate limitations upon the time of day, days per month, or seasons during which the RICD would be exercised;
vii. The depth and flow rate of the proposed RICD;
viii. With what frequency and duration, and from what sources, the requested amounts of water for the RICD occur;
ix. The economic effects of the proposed RICD;
x. The environmental effects of the proposed RICD;
xi. The relationship of the requested RICD flow rates to the historic appropriated and unappropriated flow rates for each time period requested;
xii. The effect of the RICD on other potential uses of water;
xiii. Whether the application as a whole meets the elements of the definition of a RICD, as found in section 37-92-103(10.3);
xiv. Whether the RICD would conserve and efficiently use the available stream flow, thereby promoting maximum utilization of Colorado's water resources;
xv. Whether the RICD will make the river basin water critical and the resulting impact on existing water rights and users;
xvi. Whether the RICD may work together with existing and/or future uses within the State of Colorado to promote maximum utilization;
xvii. Any provision in the application for reducing or canceling the RICD;
xviii. A description of each recreational opportunity sought by the applicant at each flow amount sought, and why the flow amount is the minimum amount for each reasonable recreation experience sought;
xix. The historic frequency and flow rates of imported water and reservoir releases through the proposed RICD reach, and whether such flows will be necessary to meet the flow rates claimed for the proposed RICD; and,
xx. Whether, and to what extent, unappropriated native flows exist in the proposed RICD stream reach during the periods claimed, and the percentage of unappropriated flows claimed by the RICD.

8. Additional Information

Because section 37-92-102(6)(b), C.R.S. requires the Board to report its findings within 90 days after the closing date for the filing of statements of opposition, an applicant may elect to provide additional information at the time it submits its application to the Board. The following types of information would assist the Board in making its findings:

a. A description of structures, including design plans for the physical control structures, engineering data and calculations used to design the facilities associated with the application;
b. Maps showing the location of all physical control structures and access points;

c. Evidence, including hydraulic and hydrologic calculations, that the physical control structures are capable of diverting, capturing, and controlling water within the stream channel;
d. Documentation describing and justifying the nature of the recreational experience sought;
e. Documentation identifying and/or justifying the time of day and season of use sought;
f. Evidence that the amounts requested in the RICD application are available for appropriation;
g. Information about the frequency of occurrence of the requested stream flows, including exceedance calculations and duration curves for the claimed stream flows;
h. Information demonstrating that the amount of water claimed is the minimum amount necessary to achieve the reasonable recreation experience sought;
i. Information about all necessary permits and the status thereof, including existing or proposed permit terms and conditions;
j. List of persons notified by the applicant about the RICD; and,
k. Information about existing or proposed gages on the affected stream that may be utilized to administer the water right being sought.

9. Notice

Within fifteen days of the application receipt date, the staff shall post notice of receipt of the application on the CWCB website. The notice shall include the name of the applicant, the flow amounts claimed, the water division, the name of the stream, the proposed reach of the stream, the location of the structures including the county, and information about how to obtain party status. In addition, the staff shall notify the county commissioners of the county in which the RICD is (or will be) located, and any upstream counties. The Board shall include notice of public deliberations on an RICD on its agenda for a regularly scheduled or specially scheduled Board meeting that is also posted on the CWCB website. At that time or at a subsequently noticed Board meeting the Board will: 1) ratify the Statement of Opposition filed by the Staff; 2) direct the Staff to issue appropriate written findings.

10. Statements of Opposition and Staff Report

The staff intends to file a statement of opposition in every RICD case to assure that the Board has the ability to properly weigh in on the requisite factors to the water court. Circumstances may occur where the Staff would propose not filing a statement of opposition to an RICD case, but the Staff would inform the Board of such a case and obtain Board concurrence or comment in these types of situations. The Staff shall provide a written report and recommendation to the Board based on the information provided by the applicant and any other applicable information. At a Board meeting following the Staff's filing of a statement of opposition, the Board will: 1) ratify the statement of opposition, inform the Staff about the appropriate findings to file with the water court, and direct the Staff to fully participate in the water court proceedings; 2) inform the Staff about the appropriate findings to file with the water court and choose to withdraw the statement of opposition; or 3) ratify the statement of opposition and table the discussion regarding the appropriate findings to file with the water court and whether to participate fully in water court.

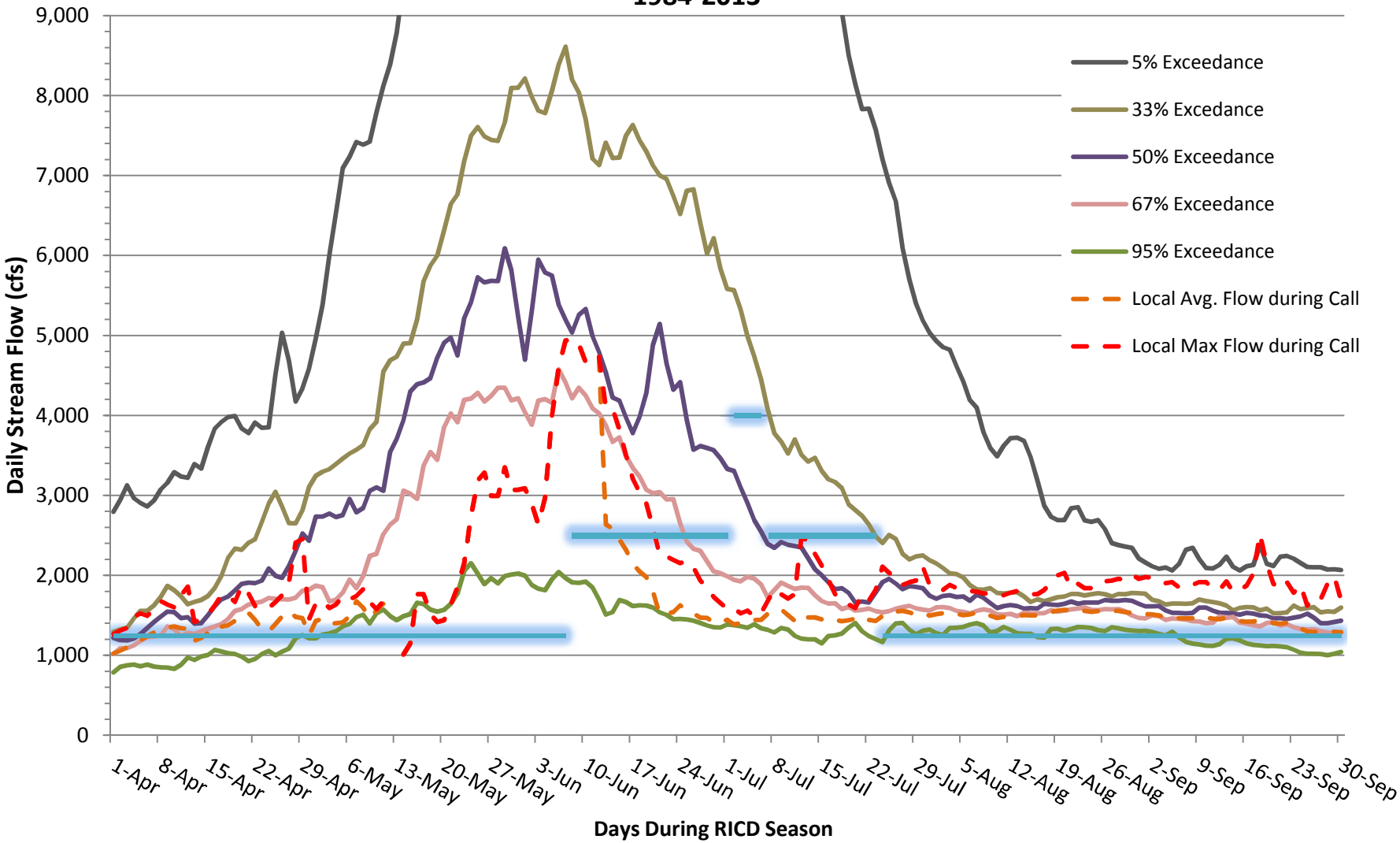
11. Public Deliberations

The Board will publicly deliberate about the findings that it will make for each RICD.

12. Submission of Findings to the water court

Pursuant to section 37-92-102(6)(c), C.R.S., the Board shall submit its findings of fact to the water court within 90 days after the final closing date for filing statements of opposition. However, the Board, for good cause shown on the record, may request that the water court grant additional time to the Board for making and reporting its findings of fact.

Figure 1.
Adjusted Colorado River Stream Flow
for Proposed Glenwood Springs River Parks
1984-2013



COLORADO
Colorado Water Conservation Board
Department of Natural Resources

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John Hickenlooper, Governor

Mike King, DNR Executive Director

James Eklund, CWCB Director

TO: Colorado Water Conservation Board Members

FROM: Ted Kowalski, Chief, Interstate, Federal & Water Information Section
Suzanne Sellers, Interstate, Federal & Water Information Section

DATE: July 15-16, 2015 Board Meeting

AGENDA ITEM: 20. Interstate & Federal Section – Public Deliberation on the Board of Commissioners for the City of Glenwood's Recreational In-Channel Diversion (RICD) Application in Case No. 5-13CW3109

Background:

The City of Glenwood Springs is seeking three Recreational In-Channel Diversions (RICDs) on the Colorado River located in and upstream of the City of Glenwood Springs. The three RICDs that Glenwood Springs is seeking are for the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park.

Because of the volume of materials anticipated to be submitted for this public deliberation, Staff is providing the Board with the following materials at this time:

Applicant's submittals to date
American Whitewater & Western Resource Advocates' (AWWRA) submittals to date
City of Aurora, City of Colorado Springs, & Homestake Partners' (Homestake et al.) submittals to date
Colorado Parks and Wildlife's (CPW) submittals to date
Colorado Department of Transportation's (CDOT) submittals to date
Colorado River Water Conservation District's (CRWCD) submittals to date
Denver Water's submittals to date
Town of Gypsum's submittals to date
Staff's Preliminary Recommended Comprehensive Findings of Fact

Additional materials will be included with the board packet, including, but not limited to:
Applicant's Rebuttal Statement
Staff's Board Memo

Staff's Recommended Comprehensive Findings of Fact
City of Glenwood Springs
Case No. 5-13CW3109
June 18, 2015

SERVED ONLY: June 18, 2015 4:42 PM
FILING ID: EB40C35E75A91
CASE NUMBER: 2013CW3109

I. Considering the specific amounts and activities as claimed in the application and proposed decree, and after deliberation in a public meeting held in conjunction with the regularly scheduled Board meeting held on July 15-16, 2015, in Ignacio, Colorado, the Board makes the following findings about the three proposed Recreational In-Channel Diversions (RICDs):

a. The Board must consider whether the adjudication and administration of the proposed RICDs would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. The Board makes the finding that there remains unallocated Colorado River compact apportionment available for consumptive beneficial use within Colorado. In addition, the Board finds that the adjudication and administration of the proposed RICDs, for the flow amounts and time periods specified in the proposed decree, dated May 21, 2015, will materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements and will have an impact on the manner, cost, and timing of such development. The Board makes the following specific findings about the proposed RICDs for the flow amounts and time periods claimed:

Period	Flow Rate (cfs)
April 1 - June 7	1250
June 8 - July 23	2500
June 30 - July 6 (5 days)*	4000
July 24 - Sept 30	1250

*The 4,000 cfs event flow rate is further limited to no more than 5 continuous days between June 30 and July 6

i. There remains unappropriated water that Colorado could place to consumptive beneficial use upstream of the proposed RICD reaches. The proposed RICDs will impair Colorado's ability to fully develop and place to consumptive beneficial use Colorado's compact entitlements under the Colorado River compact, the Upper Colorado River Basin compact, and the associated "Law of the River" upstream of the proposed RICDs. The Applicant is seeking less than 50% of the total average historic volume of stream flows; therefore, the requirements of section 37-92-305(13)(f) C.R.S. (2014) do not apply. The proposed decree, dated May 21, 2015, also provides that the City of Glenwood Springs cannot call for water under the RICDs water right if such call will not produce at least 500 cubic feet per second (cfs) at the control structures. Additionally, the City of Glenwood Springs has limited its claimed amounts to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The City of Glenwood Springs also contemplates the addition of a "carve-out" and/or "no-call" clause; however, the Staff has not received any proposed language for such a clause at this time. Additionally, the Board finds that the following italicized conditions proposed by the Applicant would be acceptable provisions provided that the conditions are also included in the final decree conditions; however, even with these provisions, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements:

"11. d. Non-Opposition. Glenwood Springs shall not use the RICD Water Rights as a basis to oppose any future application in the Water Court for Water Division 5 that proposes future development of the waters of the Colorado River or its tributaries upstream of the RICD Water Rights (including applications to confirm new water rights, changes of water rights, and/or for approval of plans for augmentation) where the proposed diversion is less than 1,000 acre-feet per year. Glenwood Springs also shall not use the RICD Water Rights as a basis to oppose any water rights applications filed to implement the Colorado River Cooperative Agreement effective September 26, 2013 ("CRCA"), or the 1998 Memorandum of Understanding Between the Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium ("Eagle River MOU"), provided that the contemplated drafts and yields of such water rights filings do not exceed the contemplated drafts or yields specified in these agreements. However, unless contrary to other provisions of this decree or related stipulations or agreements, or out-of-priority diversions are replaced in time and amount through an exchange, plan for augmentation or substitute water supply plan approved in the future, all water rights junior in priority to the RICD Water Rights may be subject to curtailment by a call for water under the RICD Water Rights, and nothing herein shall prohibit Glenwood Springs from requesting water rights administration by the State or Division Engineers or from filing statements of opposition for the purpose of protecting water rights other than the RICD Water Rights.

11. e. CRCA. Glenwood Springs and the CWCB agree to cooperate and coordinate in good faith concerning the future operation of the RICD Water Rights and future water rights appropriated for the "Upper Colorado Cooperative Project", which is defined by the CRCA as "a water supply project located on the West Slope, agreed to by Denver Water and the signatories to this Agreement, and designed to produce water for use on the East and West Slopes, including at least 20,000 acre-feet of average annual diversions for use on the East Slope.

11. f. River Administration. In operating the RICD Water Rights, Glenwood Springs will regularly communicate with the Colorado River Water Conservation District (the "River District") concerning river conditions and water rights administration within Water Division No. 5, and will make reasonable efforts to operate the RICD Water Rights with due consideration of the water supply, water exchange, and augmentation needs of the River District, and its constituents, <u>including but not limited to beneficiaries of the Green Mountain Historic Users Pool</u>, in a manner consistent with the River District's statutory obligations in a manner consistent with the River District's statutory obligations regarding the development and protection of water resources for the benefit of its constituents. Glenwood Springs will at all times operate the RICD Water Rights in recognition of prior decrees and agreements."

ii. The Board finds that the distance of the proposed RICDs to the State line is considerable, but in light of other concerns described below, the proposed RICD application materially impairs Colorado's ability to develop its compact entitlements.

iii. The proposed RICDs are in close proximity to potentially suitable upstream points of diversion and upstream storage that could be utilized by those who would place the water to consumptive beneficial use. The Board finds that the addition of the proposed RICDs will materially impair the ability to divert and place to consumptive beneficial use water upstream of the proposed RICDs for currently undecreed uses. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

iv. The Board finds that suitable downstream points of diversion or storage for consumptive beneficial use exist before the water leaves the State; however, in light of other concerns, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements.

v. Exchange opportunities within the State may be adversely impacted by the existence of the proposed RICDs. Therefore, the Board finds that the proposed RICDs will materially impair the ability of the State of Colorado to fully develop and place to consumptive beneficial use its compact entitlements.

vi. The Colorado River basin is over-appropriated, or "water critical," in certain locations within the basin during the RICD season and the proposed RICDs will further exacerbate these water shortages. Therefore, the Board finds that the proposed RICDs will materially impair Colorado's ability to fully develop and place to consumptive beneficial use its compact entitlements.

vii. In the case of compact curtailment under the "Law of the River," it may be necessary to exchange water through the proposed RICD reaches in order for the beneficiaries of post-compact water rights to realize necessary beneficial use of water yielded from pre-compact water rights or other water sources not affected by compact administration. Such exchanges could allow benefitted post-compact water rights to continue to divert during a compact curtailment. The Board finds that the following italicized condition would be an acceptable provision for any proposed decree to reduce the impacts of the RICDs on Colorado's ability to fully use its compact entitlements. Despite this language, in light of other concerns, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements:

> *"11.a. During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the RICD Water Rights decreed herein will be administered in accordance with the compact curtailment rules adopted by the State Engineer or such other state agency as may, in the future, be empowered to adopt rules or otherwise act to assure compliance with interstate water compacts that are then in effect, if any, including any such rules intended to avoid, delay, or limit the severity of such a compact curtailment. If no such compact curtailment rules are then in effect, Glenwood Springs shall not place a call for the RICD Water Rights decreed herein during the period that implementation of an Article VIII(d)(8) curtailment order affects water diversions in Water Division No. 5, unless the State Engineer or Division Engineer determines that exercise of all or part of the RICD Water Rights will not affect Colorado's ability to*

comply with the Compact. Otherwise, the RICD Water Rights decreed herein shall be administered in accordance with this Decree and Colorado law."

viii. The RICDs will likely shield waters from consumptive uses that would otherwise be available under the Colorado River Compacts. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

ix. The Board finds that beneficial consumptive water use opportunities exist upstream of the RICDs that would be impaired by the RICDs. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

x. The Applicant has not included provisions in the proposed decree for reducing or canceling the RICDs at this time, other than the provision related to the compact call situation, described above. Thus, the proposed RICDs will materially impair the ability of the State of Colorado to consumptively use its compact entitlements.

II. The Board must consider whether the exercise of the proposed RICDs will cause material injury to existing instream flow (ISF) water rights. The proposed RICD will not cause material injury to existing instream flow water rights. The Board makes the following specific findings about the proposed RICDs regarding the potential for material injury to existing ISF water rights:

i. There are currently no existing ISF water rights held by the CWCB in the Colorado River in the proposed RICD reach. However, ISF water rights exist in the 15-mile Reach above Grand Junction, significantly downstream (approximately 75 miles downstream) of the proposed RICD reach. This instream flow water right is for July 1 through September 30 of each year, for decreed rates lower than the rates sought by the RICD. As such, the proposed RICD will not cause material injury to existing ISF water rights.

ii. The Board finds that the timing and duration of the RICDs will not negatively impact the natural environment for which the 15-mile Reach ISF was decreed and thereby cause material injury to existing ISF water rights.

iii. The Board finds that the administration of the RICD would not negatively impact the natural environment for which the ISF was decreed and thereby cause material injury to existing ISF water rights.

iv. The Board finds that the construction of the RICD white water park is not likely to cause material injury to the 15-mile Reach ISF or the natural environment for which the ISF was decreed.

III. The Board must determine whether the adjudication and administration of the proposed RICDs, in the amounts claimed, would promote maximum utilization of the waters of the State. The Board finds that the proposed RICDs, in the amounts claimed, do not promote the maximum utilization of the waters of the State. In addition, the Board makes the following specific findings about the proposed RICDs regarding maximum utilization of waters of the State:

i. The Board finds that there are probable future upstream junior appropriations for direct diversion or storage that may be adversely affected. The Board finds that the proposed RICDs will prohibit upstream junior appropriations for direct diversion and storage and, therefore, will materially impair maximum utilization of the waters of the State. Given the proximity of other water rights,

the Applicant's RICDs expand the potential for calls that will curtail upstream junior appropriators. Thus, the proposed RICDs would not promote maximum utilization of the waters of the State.

ii. The Board finds that the proposed RICD appropriations, for the flow amounts sought and the time periods specified, will inhibit maximum utilization by restricting probable future changes, transfers, or exchanges of water rights from points of diversion or storage downstream of the reach affected by the proposed RICDs to points upstream of or within the reach affected by the proposed RICDs. Therefore, the Board finds that the opportunity to allow future changes, transfers, and exchanges of water from points located downstream of the proposed RICDs to points located upstream of the proposed RICDs will be unduly impacted, thereby preventing maximum utilization of the waters of the State.

iii. The Board finds that the Applicant intends to comply with appropriate federal policies, regulations and laws. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

iv. The Board finds that the proposed RICD appropriations do not promote maximum utilization of Colorado's water resources because, by claiming flow rates that are not consistent with flow rates appropriated by nearby water rights, the Applicant has not attempted to minimize its call upon the river and avoid waste. Further, the Board finds that there is not a reasonable and efficient means proposed by the Applicant to use, divert, capture and control the water diverted through the RICDs and they will not minimize the call upon the river and avoid waste. Therefore, the RICDs will materially impair maximum utilization of the waters of the State.

v. The Board finds that there is not a reasonable demand for the recreational activities for portions of the time periods requested at the requested flow rates claimed in the proposed decree, dated May 21, 2015. Thus, the proposed RICD application will materially impair maximum utilization of the waters of the State.

vi. The Board finds that the proposed decree, dated May 21, 2015, does have appropriate limitations on the time of day, days per period, and the time of year during which the proposed RICDs would be exercised. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

vii. The Board finds that the depths and individual flow rates of the proposed RICDs do not promote maximum utilization for flow amounts sought for the individual time periods because the Applicant is seeking flow rates that would exacerbate the call on the Colorado River and pull water down through the RICD reaches.

viii. The Board finds that the frequency and duration of the requested amounts of water for the proposed RICDs for the requested periods do not promote maximum utilization of waters of the State.

ix. The Board finds that there will likely be an economic benefit from the existence of the proposed RICDs. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

x. The Board finds that the proposed RICDs, to varying degrees, may have detrimental effects on several environmental aspects and therefore, would not promote maximum utilization of Colorado's water resources.

xi. The Board finds that the relationship of the requested individual RICD flow rates to the historic appropriated and unappropriated flow rates for each time period requested will exacerbate the

call on upstream juniors, and therefore, would not promote maximum utilization of Colorado's water resources.

xii. The Board finds that the effect of the RICDs on other potential uses of water upstream of the RICDs will be detrimental, and therefore, would not promote maximum utilization of Colorado's water resources.

xiii. The Board finds that the application does not entirely meet the definition of a RICD, as defined in section 37-92-103(10.3). The Applicant has provided evidence that there is a demand for a reasonable recreational experience on additional days outside of the RICD statutory window of April 1 to Labor Day and the application has been filed by a city government. However, the Applicant has applied for an RICD outside of its city limits. The Applicant justifies this by citing the statutory language of section 31-12-105(1)(e), C.R.S. (2014), which recognizes the ability of a municipality to annex within a three-mile area of the municipality's geographical limits if the municipality has in place a plan for that area that generally describes the proposed location, character, and extent of streets, subways, bridges, waterways, waterfronts, parkways, playgrounds, squares, parks, aviation fields, other public ways, grounds, open spaces, public utilities, and terminals for water, light, sanitation, transportation, and power to be provided by the municipality and the proposed land uses for the area. Because the one RICD structure is not within the city limits but within three miles of the city limits, this reason alone should not be the basis for finding that the application would not promote maximum utilization of the waters of the state. However, the Applicant is seeking more than the "minimum amount of stream flow for a reasonable recreational experience." Therefore, the application would not promote maximum utilization of Colorado's water resources.

xiv. The Board finds that the proposed RICDs do not conserve or efficiently use the available stream flow that may be called down by other nearby water rights, and therefore negatively impacts the maximum utilization of Colorado's water.

xv. The Colorado River basin is over-appropriated, or "water critical," in certain locations within the basin during the RICD season and the proposed RICDs will further exacerbate these water shortages. Therefore, the Board finds that the proposed RICDs would not promote maximum utilization of Colorado's water resources.

xvi. The Board finds that the Applicant has failed to show how the proposed RICDs work together with existing and/or future uses within the State of Colorado in order to promote maximum utilization of waters of the State.

xvii. The Applicant has not included provisions in the proposed decree for reducing or canceling the RICDs other than for the compact call scenario described above. Therefore, the Board finds that the proposed RICDs would not promote maximum utilization of Colorado's water resources.

xviii. The Applicant has included descriptions of each recreational opportunity sought at each flow amount. However, the Board finds that the current design submitted does not demonstrate that the flows sought are the minimum amount necessary to provide for each of the reasonable recreational experiences sought, and therefore negatively impact the maximum utilization of Colorado's water.

xix. The frequency and flow rates of historic reservoir releases through the proposed RICD reaches to meet historic upstream and downstream calls will be necessary to meet a portion of the flow rates claimed for the proposed RICDs, but not for the flow rates that exceed 1250 cfs. Maintenance of flows through the RICDs at the historic frequency and flow rates would maintain beneficial use

of waters downstream of the RICDs. However, in light of other concerns, the proposed RICDs will materially impair maximum utilization of the waters of the State.

xx. The Board finds that unappropriated native flows exist in the proposed RICD stream reaches during some of the periods claimed; however, the volume of unappropriated flows claimed by the proposed RICDs is excessive and therefore the proposed RICDs would not promote maximum utilization of waters of the State.

DISTRICT COURT, WATER DIVISION NO. 5 **STATE OF COLORADO** Court Address: 109 Eighth Street, Suite 104 Glenwood Springs, CO 81601 (970) 928-3062 *telephone*	
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: **THE CITY OF GLENWOOD SPRINGS, COLORADO** **in Garfield County, Colorado.**	**▲ COURT USE ONLY ▲**
Attorneys for Applicant, City of Glenwood Springs: Name: Mark E. Hamilton, #24585 Address: HOLLAND & HART LLP 600 East Main Street, Suite 104 Aspen, CO 81611-1991 Telephone: (970) 925-3476 Facsimile: (866) 784-7682 E-Mail: MEHamilton@hollandhart.com Name: Christopher L. Thorne, #20003 Kylie J. Crandall, #41159 Address: HOLLAND & HART LLP 555 17th Street, Suite 3200 Denver, CO 80202-3979 Telephone: (303) 295-8488 Facsimile: (303) 713-6310 E-Mail: CThorne@hollandhart.com KJCrandall@hollandhart.com	**Case Number:** **13 CW 3109**

APPLICANT, THE CITY OF GLENWOOD SPRINGS' PRE-MEETING STATEMENT BEFORE THE COLORADO WATER CONSERVATION BOARD ON JULY 15-16, 2015

Applicant, the City of Glenwood Springs, Colorado ("Glenwood Springs" or the "City"), through its undersigned counsel Holland & Hart LLP, submits this Pre-Meeting Statement (the "Statement") pursuant to the Notice of Pre-Meeting Conference and Deadlines for Submissions circulated by the Hearing Coordinator for the Colorado Water Conservation Board (the "CWCB") on May 6, 2015.

This Statement includes the following information: (1) an introduction and general overview of the Recreational In-channel Diversion ("RICD") Water Rights claimed by Glenwood Springs in this case; (2) a discussion of how Glenwood's claims satisfy the CWCB's

review criteria pursuant to Colorado statutes; (3) Glenwood Springs' proposed CWCB findings for this case; and (4) lists of the speakers and exhibits supporting the claims and application that Glenwood Springs anticipates presenting to the CWCB during its July 2015 meeting.

1. Introduction and General Overview of Glenwood Springs' RICD Water Rights.

Glenwood Springs, Colorado is a small city of approximately 10,000 people, situated at the confluence of the Colorado and Roaring Fork Rivers just west of Glenwood Canyon. It is an historic Colorado town with long and deep-rooted history in recreation and resort businesses. Each year over one million people visit Glenwood Springs to raft, kayak, hike, bike, ski and swim. Glenwood Springs is home to many attractions, including Sunlight Mountain Resort, Glenwood Hot Springs Lodge and Pool, the Hotel Colorado, and the Glenwood Caverns Adventure Park. Much tourism activity is focused around activities that involve the Colorado River, including the existing Glenwood Springs Whitewater Activity Area, located in West Glenwood Springs below the confluence of the Colorado and Roaring Fork Rivers, which features a renowned high water wave that attracts freestyle whitewater enthusiasts from around the world during high stream flows each year.

Glenwood Springs filed an application in Case No. 13CW3109, Water Division 5, to confirm conditional water rights for RICD Water Rights in the Colorado River at three proposed whitewater park locations above the confluence of the Colorado and Roaring Fork Rivers. As part of this project, Glenwood Springs desires to improve Glenwood Springs' reputation as a travel destination and to enhance local recreational amenities, while continuing to maintain and improve aquatic and riparian habitats. Glenwood Springs' primary purposes in seeking to confirm RICD Water Rights is to protect and enhance recreational boating activities on the Colorado River. The 2013 Colorado River Cooperative Agreement ("CRCA") executed by and between Glenwood Springs, the Colorado River Water Conservation District ("River District"), Denver Water, and numerous other entities, contemplates that Glenwood Springs would confirm RICD Water Rights.

a. Colorado River Hydrology

The Colorado River drainage basin above the confluence with the Roaring Fork River has an area of 4,560 square miles. The annual volume of Colorado River flows through Glenwood Springs exceeds 1,500,000 acre feet, and the total physical supply of water leaving Colorado in the Colorado River and its tributaries is more than 4,400,000 acre feet on average.

The flow regime on the Colorado River upstream of the City of Grand Junction is controlled by two sets of decreed water rights. The first are the water rights associated with the Shoshone Hydroelectric Power Plant in Glenwood Canyon (approximately six miles upstream of Glenwood Springs, and only a few miles above the claimed RICD Water Rights). The second are a number of irrigation water rights in the Grand Valley collectively referred to as the "Cameo Call." The Shoshone water rights consist of a 1907 senior right for 1,250 c.f.s. and a 1956 junior water right for 158 c.f.s. for year round non-consumptive, hydroelectric uses. The Cameo Call consists mainly of irrigation water rights owned by major irrigation entities located in the Grand Valley, totaling approximately 2,260 c.f.s. In combination, the Shoshone water rights and the Cameo Call have the potential to place a call on the Colorado River during most times of the

year except during spring run-off. Because the decreed points of diversion for these water rights are located in and downstream of Glenwood Canyon, these existing calls serve to pull water down to and through the reaches of the Colorado River in which Glenwood Springs' claimed RICD water rights are located. The administration and call regime associated with these existing water rights contribute to an existing high quality recreational boating experience that Glenwood Springs is seeking to protect and enhance through its pending application.

b. Three Whitewater Parks

The proposed RICD Water Rights are associated with three whitewater parks on the reach of the Colorado River in Glenwood Canyon and through the City above the Roaring Fork River confluence, as shown on the Concept Drawings attached as Exhibit 6. Glenwood Springs hosted a site visit and tour for CWCB staff of all three locations on October 30, 2014. The locations of the three whitewater parks span approximately 3.5 miles, from a point about one-half mile east of the City at the No Name Rest Area off of Interstate 70 to a location in downtown Glenwood Springs immediately upstream of the Roaring Fork River confluence. These three park locations are referred to as the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park. (*see* Exhibit A to the City's Proposed Decree, dated May 21, 2014 (the "Proposed Decree")).

The No Name Whitewater Park is the furthest upstream of the three proposed whitewater parks. It is located approximately one-half mile east of the present Glenwood Springs municipal boundary at the existing Colorado Department of Transportation ("CDOT") rest area off of I-70. This rest area is well known to river users, bicyclists and tourists, and already has a heavily used bicycle and pedestrian trail along the northwest river bank. A private river camping resort is immediately downstream. The City is currently is working with CDOT to plan and develop whitewater park facilities at this location in a manner that would complement and add to existing rest area facilities.

The Horseshoe Bend Whitewater Park is proposed to be located near the No Name Tunnel on I-70. This site is physically accessed from the No Name exit off of I-70 along the former route of Highway 6. This route was recently repaved by CDOT all the way to the Horseshoe Bend site, which is entirely owned by the City. The Horseshoe Bend Whitewater Park is surrounded by breathtaking steep canyon walls, yet has ample flat space to provide for development of sufficient auxiliary facilities, parking areas, and a vehicular turn-around. It is already a popular destination for biker, boaters, and tourists.

The Two Rivers Whitewater Park is the furthest downstream of the City's three proposed whitewater parks. This site, which is surrounded by existing bicycle and pedestrian trails, including an existing pedestrian bridge over the Colorado River from which boating can be viewed, includes part of the existing Two Rivers Park proximate to downtown Glenwood Springs. The proposed RICD structures at this site will be entirely upstream of the confluence of the Colorado and Roaring Fork Rivers. Access would be through the existing Two Rivers Park, where parking, bathrooms, and trails already exist. Access can also be obtained from the other side of the river in central Glenwood Springs, via pedestrian and bike trails through Confluence Park to the pedestrian bridge.

c. Times and Amounts of RICD Water Rights Claims

The proposed season of use for the RICD Water Rights extends from April 1 to September 30. This season was determined primarily through an evaluation of current boating use. Because of the moderate temperatures that continue well into the autumn in Glenwood Springs, boating uses on the Colorado River continue through September and well into October. Numerous e-mails and letters from the boating community supporting the claim for the RICD Water Rights, documenting use of this reach of the Colorado River, and establishing a continued need for flows in this reach through the end of September are attached at as Appendix A to Exhibit 5.

To simplify water rights administration, the City is claiming one set of flow rates for all three whitewater parks. The claimed RICD Water Rights are less than 50% of the historic flows of the Colorado River at each location (the historic volume of average daily flow in these reaches is approximately 1,190,499 acre-feet during the RICD season, and the City's aggregate claims comprise only 581,625 acre-feet of this amount).

The base flow claimed for the RICD Water Rights is 1,250 c.f.s., and is equivalent to the existing senior call by the Shoshone Power Plant. However, based in part upon interviews conducted by the City's consultants, the boating and business community in and around Glenwood Springs desire to maintain an intermediate level flow of 2,500 c.f.s. for as long as possible, and to develop and host a late season, elite whitewater event or competition around the July 4th holiday, at a time when other, smaller rivers throughout the region are not flowing at a rate sufficient to support such an event. As a result, a 4,000 c.f.s. event flow is claimed by Glenwood Springs for a limited period of up to five days each year. This amount of time is shorter than the 14 days prescribed by statute. The City intends to appropriate a water right for these flows for only five days in order to have a flow sufficient to support competitive events, but not to command more flow than necessary, to the detriment of other competing water demands. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if the Fourth of July falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if the Fourth of July falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if the Fourth of July falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

Additionally, the City's RICD Water Rights will be limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when the hours may be extended to 12:00 a.m.

The chart below summarizes the City's RICD Water Rights claims:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

d. Water Availability

As further discussed below, the historic flows in the Colorado River in the vicinity of Glenwood Springs are substantial due to the large tributary area above the subject reaches and the typical call regime driven by the existing Shoshone and Cameo water rights. The frequency that the flow claims would have been satisfied during the 30-year period of record as a measure of the water availability is shown on Exhibit 7 (Figures B, C and D). As shown, through the claimed flow periods, the 1,250 c.f.s. base flow available approximately 92% of the time, the 2,500 c.f.s. intermediate flow claimed is available approximately 60% of the time, and the 4,000 c.f.s. event flow is available approximately 39% of the time**.**

e. Discussions with Other Parties to the Pending Water Court Case.

Through its consultants and counsel, Glenwood Springs, has been actively engaged in settlement discussions with most opposers in the pending water court case. In particular, the City has already reached a stipulation and agreement with the U.S. Bureau of Land Management ("B.L.M."), which includes a revised legal description for the upstream extent of the Horseshoe Bend Whitewater Park. The City is continuing active discussions with the Glenwood Hot Springs Lodge and Pool concerning additional potential terms and conditions relating to construction of RICD structures at Two Rivers Whitewater Park. Additionally, prior to and since filing the application, Glenwood Springs has been in discussions with Denver Water concerning matters relating to the CRCA. The City is also currently working with the Colorado River Water Conservation District ("River District") and other objectors to address concerns regarding future river administration, including the preservation of some opportunity for further development of junior water rights in the upper Colorado River Basin upstream of the RICD Water Rights, without increased impact from calls in excess of the existing senior call for the Shoshone power plant. Below is a brief overview of some of the revisions reflected in the Proposed Decree that have resulted from these settlement discussions:

i. *Compact Administration Language*. To address concerns about administration of the RICD Water Rights during any period the Colorado River is subject to compliance with any applicable compact, Glenwood Springs is proposing compact administration language in paragraph 11.a of the Proposed Decree. Pursuant to this new paragraph, Glenwood Springs has agrees not to place a call under its RICD Water Rights if a compact curtailment occurs prior to such time that compact administration rules are implemented by the State Engineer.

ii. *Non-Opposition Provision*. Glenwood Springs is also proposing that its RICD Water Rights would not be used as the basis for opposition to upstream water rights filings involving less than 1000 acre-feet of annual water diversions.

iii. *Revised Period of Record*. To address concerns about whether the study period initially used by Glenwood Springs adequately accounted for trans-mountain diversion projects, Glenwood Springs revised its study period to incorporate the most recent 30 year period of record, which post-dates most major trans-mountain diversion projects.

iv. *Measurement of River Flows and the RICD Water Rights.* To address concerns regarding measurement of the RICD Water Rights at the existing Dotsero Gage, Glenwood Springs is proposing to install, operate and maintain a single measurement gauge and compliance point for administration for the RICD Water Rights.

v. *Confluence of Roaring Fork and Colorado Rivers.* As set forth above in the description of the Two Rivers Whitewater Park location, Glenwood Springs is not appropriating water from the Roaring Fork River in this case. Glenwood Springs confirms that RICD structures at the Two Rivers Whitewater Park will be located upstream of the Roaring Fork confluence in paragraph 8.a of the Proposed Decree.

2. Discussion of statutory factors to be considered by the CWCB.

The CWCB is required to make written findings on specific factors, relating to all applications for RICD water rights. Pursuant to C.R.S. §37-92-102(5), the CWCB, "after deliberation in a public meeting, shall consider the following [three] factors and make written findings as to each:

(I) Whether the adjudication and administration of the recreational in-channel diversion would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements;

(IV) Whether exercise of the recreational in-channel diversion would cause material injury to instream flow water rights . . .; and

(V) Whether adjudication and administration of the recreational in-channel diversion would promote maximum utilization of waters of the state."

As described below, Glenwood Springs' claims for RICD Water Rights in this case favorably satisfy each the three statutory factors.

a. Glenwood Springs' RICD Water Rights will not materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements.

The RICD Water Rights claimed by Glenwood Springs will not impair the ability of Colorado to develop its compact entitlements. The location, amount, and non-consumptive nature of Glenwood Springs' RICD Water Rights, together with the terms and conditions in the Proposed Decree, ensure that the RICD water rights will not impair Colorado's development of its compact entitlements. The interstate compacts relevant to the RICD Water Rights are the Colorado River Compact of 1922 and the Upper Colorado River Compact of 1948.

Pursuant to Glenwood Springs' Proposed Decree, the volume of water claimed (sum of average daily flow) at the three whitewater parks is 581,625 acre feet. By comparison, the total average historical volume of water for the stream segments where the diversion structures will be located is 1,190,499 acre feet. Glenwood Springs' proposed appropriation is less than 50% of this total. Additionally, because the RICD Water Rights will only be in place for approximately six months each year, Glenwood Springs' claims constitute only 38% of average annual flow.

Therefore, substantial ample unappropriated flows will remain in the Colorado River system upstream of the RICD Water Rights.

Additionally, Glenwood Springs is located roughly halfway between the headwaters of the Colorado River and the Utah border. The proposed RICD Water Rights are non-consumptive; so, to the extent that Glenwood Springs is claiming RICD Water Rights for flows above flow levels historically called down to the senior water right for the Shoshone power plant, these additional volumes will be available to downstream water users for consumptive beneficial use along the more than 130 river miles between the location of the whitewater whitewater parks and the Utah border. In addition, Colorado's entitlement under the Colorado River compacts can be developed in other basins in Colorado, including the Yampa, White, Green, Little Snake, Dolores, and San Juan River sub-basins.

As described above, Glenwood Springs has included a provision in its Proposed Decree regarding compliance with any compact curtailment rules adopted by the State or the State Engineer pursuant to C.R.S. §§ 37-80-104 and 37-92-501. Glenwood Springs is thereby proposing that it will not call for water for its RICD Water Rights if a compact curtailment occurs and no compact curtailment rules are in effect. Glenwood Springs is also in discussions with various opposers regarding inclusion of additional provisions whereby Glenwood Springs would further agree not to call for more water than the senior Shoshone water right has demanded under certain scenarios. The City is also proposing not to oppose certain water rights applications on the basis of claimed injury to the RICD Water Rights, including applications to implement the CRCA and the Eagle River Memorandum of Understanding up to the contemplated drafts and yields described in these agreements.

b. The exercise of Glenwood Springs' RICD Water Rights will not cause material injury to instream flow water rights.

No existing instream flow water rights exist within these reaches of the Colorado River. As a result, the RICD Water Rights will not cause material injury to instream flow water rights. C.R.S. §§37-92-301(2) and 303(1).

c. Glenwood Springs' RICD Water Rights promote maximum utilization of the waters of the state.

The non-consumptive RICD Water Rights claimed by Glenwood Springs promote maximum utilization of the waters of the state of Colorado. The claimed RICD Water Rights will preserve and enhance a valuable, beneficial use of water for recreation on a seasonally over-appropriated stream, while allowing for continuing utilization and development of the waters of the state of Colorado for both consumptive and non-consumptive uses, without causing any reduction in flow, injury to downstream water rights, or injury to upstream senior water rights. Non-motorized boating on the Colorado River provides substantial economic benefits to Glenwood Springs and to the State in general. As set forth in S2o Design's attached reports, the Glenwood Springs' proposed RICD structures have been preliminarily designed to generate a range of freestyle whitewater experiences for beginner, intermediate and advanced boaters, while also providing safe bypass for other water users and fish passage channels at each structure. The proposed RICD structures will therefore efficiently divert and control water in its natural course,

without waste, and produce targeted recreational experiences at varying river flows. Glenwood Springs has claimed the minimum amounts of water necessary for these targeted reasonable recreational experiences.

Glenwood Springs has developed its flow claims for the RICD Water Rights in a manner that would result in only 46 days each year having adjudicated in excess of the senior Shoshone water right in the amount of 1,250 c.f.s. The proposed incremental increases in volume associated with the RICD Water Rights above the existing senior Shoshone water right amount to only 114,000 acre feet (without the event flow) and 129,000 acre feet (with the event flow), as compared with the historical average stream flow of 1,190,499 acre feet. If the junior Shoshone water right and the portion of the Cameo Call that is satisfied with Colorado River flows were added to this calculation, this incremental increase would be significantly less.

Allowing Glenwood Springs to appropriate non-consumptive water rights for new white-water recreation in and around the City is a prime example of utilizing Colorado's water resources in an efficient, beneficial manner. Again, almost all of the flow claimed by the RICD Water Rights is part of the historical Cameo and Shoshone Calls.. In addition, there are more than 130 river miles remaining in Colorado downstream of the RICD Water Rights where the same water can be put to additional beneficial uses.

Glenwood Springs' claimed RICD Water Rights will not impair maximum utilization of water for other uses upstream in the Colorado River basin. Ample unappropriated flow remains in the Colorado River even after accounting for the RICD Water Rights. Numerous, trans-mountain diversion projects upstream of the RICD Water Rights exist that will be senior to the 2013, and Glenwood Springs is working with various parties to limit operational conflict between its claimed RICD Water Rights and the additional trans-mountain diversions contemplated by existing agreements.

3. List of Speakers and Exhibits

At the public meeting regarding Glenwood Springs' RICD Water Rights, Glenwood Springs may present its information through the following speakers, using the following exhibits:

a. Speakers

Mark Hamilton, Chris Thorne, and/or Kylie Crandall
Holland & Hart LLP
Attorneys for Glenwood Springs

> Messrs. Hamilton and Thorne and/or Ms. Crandall will discuss the application, on-going negotiations with parties including CWCB staff, Proposed Decree, and engineering reports.

City Mayor, City Manager and/or a Council Member
City of Glenwood Springs

One or more of these representatives may discuss Glenwood Spring's intent in filing the application, and the economic and other benefits to Glenwood Springs from whitewater recreation.

Jonathan Kelly, P.E.
Wright Water Engineers, Inc.

Mr. Kelly may discuss matters from his Preliminary and Supplemental Engineering Reports, including the historical flow regime at the location of the proposed RICD Water Rights, Compact entitlement and administration issues, and maximum utilization.

Scott Shipley, P.E. or Dan Woolley, MSCE
S2o Design & Engineering, Inc.

Messrs. Shipley and Woolley may discuss the design of the structures for the RICD Water Rights, including stream reach appropriateness, the recreational experiences sought at each claimed flow rate, and park design/access issues.

b. **Exhibits** (copies of each are submitted with this statement).

1. Proposed Decree in Case No. 13CW3109 (Water Division No. 5), May 21, 2015 (the "Proposed Decree").

2. Preliminary Engineering Report Wright Water Engineers, Inc., dated May 30, 2014 (the "WWE Report").

3. Supplemental Engineering Report Wright Water Engineers, Inc., dated December 5, 2014 (with amended page 20) (the "WWE Supplemental Report, and with the WWE Report, the "WWE Reports").

4. Preliminary Engineering Design Report by S20 Design & Engineering, dated May 30, 2014, and Appendix A and B to the same (the "S2o Report").

5. Supplement to Preliminary Engineering Design Report by S20 Design & Engineering, dated December 5, 2014, and Appendix A to the same (the "S2o Supplemental Report", and with the S2o Report, the "S2o Reports").

6. The Land Studios, Inc. and S2o Design and Engineering Conceptual Drawings, as revised May 12, 2105 (the "Concept Drawings").

7. Wright Water Engineers, Inc. Figures A, B, C and D (the "WWE Figures").

The City reserves the right to present additional evidence, exhibits or testimony to rebut the information presented by any other party.

4. Conclusion.

At the July 15-16, 2015 CWCB meeting in Southwestern Colorado, Glenwood Springs intends to present information, as outlined in this pre-meeting statement, that will demonstrate that the CWCB should make favorable findings pursuant to C.R.S. § 37-92-102(5), regarding Glenwood Spring's application for the RICD Water Rights in Case No. 13CW3109.

Dated: May 21, 2015

Christopher L. Thorne
Mark E. Hamilton
Kylie J. Crandall
HOLLAND & HART LLP
ATTORNEYS FOR THE CITY OF GLENWOOD SPRINGS, COLORADO

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CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of May, 2015, a true and correct copy of the foregoing document was served upon the following by via courier and/or e-mail:

Party	Type	Attorney
American Whitewater	Opposer	Bartlett Phillip Miller (Western Resource Advocates) Robert Kortum Harris (Western Resource Advocates)
Aurora, City of	Opposer	John Marshall Dingess (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC) Ryan P. McLane (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC) Teri L Petitt (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC)
City And County of Denver Acting By And	Opposer	Casey S Funk (Denver Water)
Colorado Department of Transportation	Opposer	Jennifer Lyn Mele (CO Attorney General
Colorado River Water Conservation Dist	Opposer	Jason Victor Turner (Colorado River Water Conservation District) Peter Cheney Fleming (Colorado River Water Conservation District)
Colorado Springs, City of	Opposer	Michael John Gustafson (Colorado Springs Office of the City Attorney)
Colorado Water Conservation Board	Opposer	Susan J Schneider (CO Attorney General)
Division 5 Engineer	Division Engineer	Division 5 Water Engineer (State of Colorado DWR Division 5)
Glenwood Hot Springs Lodge And Pool Inc	Opposer	David Carl Hallford (Balcomb and Green PC) Scott M Balcomb (Balcomb and Green PC)
Glenwood Springs, City of	Applicant	Christopher Langhorne Thorne (Holland & Hart LLP) Kylie Jo Crandall (Holland & Hart LLP) Mark Edward Hamilton (Holland & Hart LLP)
Grand County Board of Commissioners	Opposer	David C Taussig (White & Jankowski, LLP) Mitra Marie Pemberton (White & Jankowski, LLP)
Grand Valley Water Users Association	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC) Mark Allen Hermundstad (Williams Turner and Holmes PC)

Party	Type	Attorney
Gypsum, Town of	Opposer	Jason M. Groves (Patrick, Miller & Kropf, P.C.) Kevin Land Patrick (Patrick, Miller & Kropf, P.C.)
Homestake Steering Committee	Opposer	Mary Mead Hammond (Carlson, Hammond & Paddock, L.L.C.) Mason Hamill Brown (Carlson, Hammond & Paddock, L.L.C.) William Arthur Paddock (Carlson, Hammond & Paddock, L.L.C.)
Orchard Mesa Irrigation District	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC) Mark Allen Hermundstad (Williams Turner and Holmes PC)
State Engineer	State Engineer	Colorado Division Of Water Resources (State of Colorado - Division of Water Resources)
United States of America	Opposer	Kristen C Guerriero (US Attorneys Office)
Ute Water Conservancy District	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC) Mark Allen Hermundstad (Williams Turner and Holmes PC)
West Divide Water Conservancy District	Opposer	Edward Bryan Olszewski (Olszewski, Massih & Maurer, P.C.)
Western Resource Advocates	Opposer	Bartlett Phillip Miller (Western Resource Advocates) Robert Kortum Harris (Western Resource Advocates)
Natural Resources & Environment Section, Office of the Colorado Attorney General	Coordinator and Assistant Attorney General	Casey Shpall Susan Schneider

/s/ Kylie J. Crandall

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MAY 21, 2015 - PROPOSED RULING
SETTLEMENT DOCUMENT PURSUANT TO CRE 408

DISTRICT COURT, WATER DIVISION NO. 5, COLORADO Court Address: 109 Eighth Street, Suite 104 Glenwood Springs, CO 81601 (970) 928-3062 *telephone*	
CONCERNING THE APPLICATION OF: **The CITY OF GLENWOOD SPRINGS, a Colorado home rule city,** **in Garfield County, Colorado**	**▲ COURT USE ONLY ▲** **Case Number:** **13CW3109** **Water Division: 5**

FINDINGS OF FACT, CONCLUSIONS OF LAW, RULING OF THE REFEREE, JUDGMENT AND DECREE

This matter comes before the Court on the Application for Surface Water rights for Recreational In-Channel Uses of the City of Glenwood Springs, Colorado ("Glenwood Springs" or "Applicant") filed on December 31, 2013. The Water Judge referred the Application to the Water Referee for Water Division 5, in accordance with C.R.S. § 37-92-101, *et seq.*, known as the Water Right Determination and Administration Act of 1969.

The Court, having considered the matters raised by the Application, including the findings and recommendations of the Colorado Water Conservation Board ("CWCB"), and having made such investigations as are necessary to become fully advised with respect to the subject matter of the Application, hereby makes the following Findings of Fact, Conclusions of Law, and Ruling and Decree in this matter.

FINDINGS OF FACT

1. The name and address of the Applicant are:

City of Glenwood Springs
101 West 8th Street
Glenwood Springs, CO 81601

With copy to:

Mark E. Hamilton, Esq.
Christopher L. Thorne, Esq.
Holland & Hart LLP
600 E. Main St., Suite 104
Aspen, CO 81611

2. Timely and adequate notice of the Application were given as required by statute, and the Court has jurisdiction over the subject matter of this proceeding and over all parties affected hereby, whether they have appeared or not. None of the land or water involved in the Application are within the boundaries of a designated groundwater basin.

3. Timely statements of opposition were filed by: the City and County of Denver by and through its Board of Water Commissioners, the Town of Gypsum, the U.S. Bureau of Land Management, the Glenwood Hot Springs Lodge & Pool, Inc., the Ute Water Conservancy District, Grand Valley Water Users Association, Orchard Mesa Irrigation District, the Colorado River Water Conservation District, the Colorado Department of Transportation, the Homestake Steering Committee, the Grand County Board of County Commissioners, the City of Aurora, the Colorado Water Conservation Board, the City of Colorado Springs, and the West Divide Water Conservancy District. Additionally, two other Objectors, American Whitewater and Western Resource Advocates, were permitted to intervene in this matter by order of the court dated _____. No other statements of opposition were received. The time for filing statements of opposition has expired.

4. Glenwood Springs has entered into stipulations with the U.S. Bureau of Land Management; and _____. The Court has reviewed these stipulations and entered orders approving them. The Court finds that this Judgment and Decree is consistent with the terms of the stipulations.

5. Glenwood Springs seeks confirmation of conditional surface water rights for recreational in-channel diversions (each a "RICD Water Right") located in the Colorado River, for three proposed boating parks to be known as the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park, all as more fully described below.

6. *RICD Water Right:* No Name Whitewater Park.

a. Location:

The diversion structures comprising the No Name Whitewater Park will be located in the channel of the Colorado River between the following two points on the centerline of the river:

i. No Name Whitewater Park Upstream Extent:

PLSS: NW¼ of the SW¼ of Section 1, Township 6 South, Range 89 West of the 6th P.M., at a point 1880 feet from the north section line and 85 feet from the west section line of said Section 1, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,478 m, easting 303,685 m

ii. No Name Whitewater Park Downstream Extent:

PLSS: NW¼ of the SE¼ of Section 2, Township 6 South, Range 89 West of the 6th P.M., at a point 1475 feet from the south section line and 1290 feet from the east section line of said Section 1, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,237 m, easting 303,246 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute. Although the location for the No Name Park Whitewater Park location is not presently within the city limits of Glenwood Springs, it is only approximately one-half mile east of the present city limits of Glenwood Springs. Colorado law empowers municipalities to plan for access, utilities, waterways, waterfronts and parks within three miles of municipal boundaries. *See* C.R.S. 31-12-105(1)(e) (2015).

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

7. *RICD Water Right:* Horseshoe Bend Whitewater Park.

a. Location:

The diversion structures comprising the Horseshoe Bend Whitewater Park will be located within the channel of the Colorado River between the following two points on the centerline of the river:

i. Horseshoe Bend Whitewater Park Upstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1,386 feet from the south section line and 1916 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,318.52 m, easting 301,605.95 m

ii. Horseshoe Bend Whitewater Park Downstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1920 feet from the north section line and 2250 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,513 m, easting 301,551 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: by formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

8. *RICD Water Right:* Two Rivers Whitewater Park.

a. Location:

The diversion structures comprising the Two Rivers Whitewater Park will be located within the channel of the Colorado River, above its confluence with the Roaring Fork River, between the following two points on the centerline of the river:

i. Two Rivers Whitewater Park Upstream Extent:

PLSS: SW¼ of the NE¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2394 feet from the north section line and 1975 feet from the east section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,248m, easting 300,033 m

ii. Two Rivers Whitewater Park Downstream Extent:

PLSS: SE¼ of the NW¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2075 feet from the north section line and 2330 feet from the west section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,353 m, easting 299,772 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in

effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

9. Findings to Support the RICD Water Rights:

a. Appropriate Entity. Glenwood Springs is a municipality incorporated within the State of Colorado and is entitled to appropriate surface water rights for recreational in-channel diversion water rights as defined in C.R.S. § 37-92-103(10.3) (2013).

b. Specific Plan and Intent. Glenwood Springs has a specific plan and intent to divert or otherwise capture, possess and control a specific quantity of water for specific beneficial uses authorized by statute.

c. Available Water. Glenwood Springs has demonstrated that unappropriated water is available in the amounts set forth in this Decree from the source claimed.

d. Can and Will. Glenwood Springs has sufficiently demonstrated that the water can and will be diverted and beneficially used, and that the project can and will be completed with diligence and within a reasonable time.

e. Appropriate Stream Reaches. The reaches of the Colorado River in which the Glenwood Springs recreational in-channel diversions will be located are appropriate reaches of the stream for the intended RICD Water Rights.

f. Control Structures. The amounts of water claimed and decreed herein will be controlled in the water's natural course in the Colorado River during the claimed time periods by means of the RICD structures identified above. The design capacities of these structures will capture, control, and divert the flows of the Colorado River up to 4000 c.f.s., which allow flows of that amount to be fully captured by the high flow channel constructed into each structure. The structures will be designed such that the Colorado River is usable at a variety of water levels. The low flow channel constructed into each structure will provide passage for boats and a usable hydraulic feature for inner tubes and other recreational water craft or include safety bypass channels for downstream users. During run-off, the high flow channel constructed into each structure will provide a larger, more usable hydraulic feature in the form of a hydraulic jump or wave train that kayakers and other boaters may use for the intended recreational purposes. In

view of the foregoing, the structures are capable of efficiently diverting and controlling the water flows without waste for the claimed conditional amounts as identified above and in a manner that constitutes a diversion under C.R.S. § 37-92-103(7) (2013), at all flow rates up to the maximum claimed above.

g. Reasonable Recreational Experience. The claimed uses (all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses) are reasonable and the proposed amounts of water that the Applicant desires to appropriate are reasonable and appropriate, under reasonably efficient practices, to accomplish without waste the purpose for which the appropriations are lawfully made. Likewise, Applicant has demonstrated that there is reasonable demand for these recreational experiences throughout the season claimed. *See generally* C.R.S. § 37-92-103(10.3) (2013).

h. Minimum Stream Flow. The claimed flow amounts represent the minimum amount of stream flow to serve Applicant's intended and specified reasonable recreation experiences. C.R.S. § 37-92-305(13)(d) (2013).

i. Amount Below Which There Is No Beneficial Use. The flow rate below which there is no longer any beneficial use of water at the control structures for the decreed purposes is 500 c.f.s. C.R.S. § 37-92-305(13)(d) (2013).

j. Stream Flow Volume. During the RICD season claimed, the total average historical volume of water for the stream segments where the diversion structures will be located has been calculated to be 1,190,499 acre-feet. Fifty percent of this total average historical volume is 595,250 acre-feet. The total volume of water represented by the flow rates decreed for the claimed recreational in-channel diversions of 581,625 acre-feet is no greater than 50% of the sum of the total average historical volume of water for the stream segments where the diversion structures will be located. Therefore, this Decree and the RICD Water Rights granted herein are not limited by sub-sections I, II or III of C.R.S. § 37-92-305(13)(f) (2013). Except as otherwise limited by this decree or in stipulations or agreements related thereto, Glenwood Springs may initiate a call for any amount of water between 500 c.f.s. and the maximum decreed rate within each applicable time period specified in Sections 6.f, 7.f and 8.f, above.

k. Extended RICD Season. The Applicant has demonstrated a need for the reasonable recreational experience from Labor Day to September 30 each year, as required by C.R.S. § 37-92-103 (10.3). The Court finds that there is demand for a reasonable recreation experience at the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park between Labor Day and September 30 each year. Without limiting the foregoing, the Court finds that

non-motorized boating already occurs in these areas between Labor Day and September 30 each year, and that there is present and future demand for a reasonable recreation experience on the Colorado at these locations during the period from Labor Day to September 30 each year.

l. Event Flows. The Applicant has demonstrated a need for an event-flow period that shall be shorter than fourteen days, as required by C.R.S. § 37-92-103 (10.3). The Court finds that there is a need for event flows at 4000 c.f.s. for a total of five continuous days from June 30 to July 6 each year, as more specifically set forth in Sections 6.f, 7.f and 8.f, above.

10. Findings Regarding Compliance with the CWCB Review Process Pursuant to C.R.S. § 37-92-102(6) (2013) and Additional Statutory Factors Pursuant to C.R.S. § 37-92-113 (2013):

a. CWCB Review Process. Pursuant to C.R.S. § 37-92-102(6) (2013), after deliberation at a public meeting on July 16, 2015, CWCB made written findings as to: (1) whether the adjudication and administration of the claimed recreational in-channel diversions would materially impair the ability of Colorado to fully develop and place to beneficial use its compact entitlements; (2) whether the adjudication and administration of the claimed recreational in-channel diversions would cause material injury to an instream flow; and (3) whether adjudication and administration of the claimed recreational in channel diversions would promote maximum utilization of the waters of the state. In making the following additional determinations, the Court has considered the CWCB's findings as required by C.R.S. § 35-92-305(13)(a) (2013).

b. Compact Entitlements. The Court finds that the adjudication and administration of the RICD Water Rights, under the conditions contained in this Decree, will not impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. C.R.S. § 37-92-305(13)(a)(I) (2013).

c. Maximum Utilization. The RICD Water Rights will support a new, valuable, beneficial use on the water of a seasonally over-appropriated stream, while allowing for continued utilization and development of the waters of the State for both consumptive and non-consumptive uses, without causing any reduction in flow, injury to downstream water rights, or injury to upstream senior water rights. The RICD Water Rights promote maximum utilization of Colorado's water resources because Glenwood Springs has used a reasonable means to use, divert, capture, and control the water for RICD purposes so as to minimize its call upon the river and avoid waste. Based upon the evidence, the Court finds that the adjudication and administration of the RICD Water Rights, subject to the terms of this Decree, will promote maximum utilization of the waters of the State.

d. Stream Reach Appropriateness. The Court finds that the proposed whitewater parks are located in appropriate reaches of the stream required for the intended uses. C.R.S. § 37-92-305(13)(a)(III) (2013). The locations of the whitewater parks are appropriate for many reasons. These parks are all located in an already popular and active recreational use corridor accessible from I-70 and near downtown Glenwood Springs. In addition, the physical locations of the parks are appropriate due to favorable stream gradients and the adequacy of the existing river flows.

e. Access for Recreational Use. The nature and extent of the access required for the activities sought is proper. The City of Glenwood Springs and/or other public agencies own and/or control access to the recreational in-channel use, and there are no irresolvable impediments preventing the City of Glenwood Springs obtaining adequate access. In particular, there is existing public access to the river above and below these parks, and additional site-specific public access can be developed at each park location. The Court therefore finds, for the reasons stated above, that there is sufficient access for the contemplated recreational uses. C.R.S. § 37-92-305(13)(a)(IV)(2013).

f. Instream Flow Rights Injury. There are no instream flow water rights within these reaches of the Colorado River. As a result, the Court finds that the RICD Water Rights will not cause material injury to instream flow water rights. C.R.S. § 37-92-305(13)(a)(V) (2013).

11. Additional Terms and Conditions.

a. Compact Administration. During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the RICD Water Rights decreed herein will be administered in accordance with the compact curtailment rules adopted by the State Engineer or such other state agency as may, in the future, be empowered to adopt rules or otherwise act to assure compliance with interstate water compacts that are then in effect, if any, including any such rules intended to avoid, delay, or limit the severity of such a compact curtailment. If no such compact curtailment rules are then in effect, Glenwood Springs shall not place a call for the RICD Water Rights decreed herein during the period that implementation of an Article VIII(d)(8) curtailment order affects water diversions in Water Division No. 5, unless the State Engineer or Division Engineer determines that exercise of all or part of the RICD Water Rights will not affect Colorado's ability to comply with the Compact. Otherwise, the RICD Water

Rights decreed herein shall be administered in accordance with this Decree and Colorado law.

b. Floodplain Regulations. Glenwood Springs will ensure that the design of the control structures complies with applicable floodplain management requirements.

c. Direct Flow Water Rights—No Claim to Stored Water. The RICD Water Rights provide appropriative rights only to direct flows of the Colorado River at the boating parks specified herein. Although storage releases may flow through and be put to use in the boating parks to help satisfy the RICD Water Rights, this decree shall not give Glenwood Springs any rights to stored water, limit in any way either the amount or timing of releases of stored water, or provide any basis for Glenwood Springs to request or demand releases of such water; provided, that stored water may be delivered for beneficial use by the RICD structures described herein consistent with the terms of water court decrees or other authorizations for upstream storage rights and the consent of the owner(s) of said water rights.

d. Non-Opposition. Glenwood Springs shall not use the RICD Water Rights as a basis to oppose any future application in the Water Court for Water Division 5 that proposes future development of the waters of the Colorado River or its tributaries upstream of the RICD Water Rights (including applications to confirm new water rights, changes of water rights, and/or for approval of plans for augmentation) where the proposed diversion is less than 1,000 acre-feet per year. Glenwood Springs also shall not use the RICD Water Rights as a basis to oppose any water rights applications filed to implement the Colorado River Cooperative Agreement effective September 26, 2013 ("CRCA"), or the 1998 Memorandum of Understanding Between the Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium ("Eagle River MOU"), provided that the contemplated drafts and yields of such water rights filings do not exceed the contemplated drafts or yields specified in these agreements. However, unless contrary to other provisions of this decree or related stipulations or agreements, or out-of-priority diversions are replaced in time and amount through an exchange, plan for augmentation or substitute water supply plan approved in the future, all water rights junior in priority to the RICD Water Rights may be subject to curtailment by a call for water under the RICD Water Rights, and nothing herein shall prohibit Glenwood Springs from requesting water rights administration by the State or Division Engineers or from filing statements of opposition for the purpose of protecting water rights other than the RICD Water Rights.

e. CRCA. Glenwood Springs and the CWCB agree to cooperate and coordinate in good faith concerning the future operation of the RICD Water Rights and future water rights appropriated for the "Upper Colorado Cooperative Project", which is

defined by the CRCA as "a water supply project located on the West Slope, agreed to by Denver Water and the signatories to this Agreement, and designed to produce water for use on the East and West Slopes, including at least 20,000 acre-feet of average annual diversions for use on the East Slope."

f. River Administration. In operating the RICD Water Rights, Glenwood Springs will regularly communicate with the Colorado River Water Conservation District (the "River District") concerning river conditions and water rights administration within Water Division No. 5, and will make reasonable efforts to operate the RICD Water Rights with due consideration of the water supply, water exchange, and augmentation needs of the River District, and its constituents, in a manner consistent with the River District's statutory obligations regarding the development and protection of water resources for the benefit of its constituents. Glenwood Springs will at all times operate the RICD Water Rights in recognition of prior decrees and agreements.

g. *Additional Upstream Water Rights Development. [TBD—As of the date of submittal of this revised proposed decree, Glenwood Springs is in active discussions with the Colorado River Water Conservation District and other parties concerning possible additional carve-outs and/or no-call agreements for the purpose of allowing continued development of an additional amount of junior water rights free from any call from the RICD Water Rights in excess of 1,250 c.f.s. (the amount of the senior historical call from the Shoshone power plant). Glenwood Springs intends to supplement this proposed decree with additional proposed language when available].*

CONCLUSIONS OF LAW

12. The Application filed herein was complete, covering all applicable matters required under C.R.S. § 37-92-302 (2013).

13. All notices required by law have been given, and no further notice need be given.

14. The Court has jurisdiction of this matter and of all persons, whether they have appeared or not. C.R.S. §§ 37-92-301(2) and -303(1) (2013).

15. The Court has authority to confirm the conditional surface water rights for recreational in-channel diversion as requested by the Applicant. C.R.S. §§ 37-92-103(4) and (10.3) (2013).

16. The Court concludes that the Applicant is an entity entitled to obtain a water right for a recreational in-channel diversion pursuant to C.R.S. §§ 37-92-103(4) and (10.3) (2013).

17. The Applicant has complied with all requirements and met all standards and burdens of proof; therefore it is entitled to a decree confirming and approving the conditional RICD Water Rights described herein.

RULING OF THE REFEREE

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

19. The Court GRANTS the Application and hereby confirms conditional RICD Water Rights for the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park. The RICD Water Rights are decreed for the amounts as set forth above for the above-described recreational in-channel uses, subject to the terms and conditions set forth herein.

20. The City Council of Glenwood Springs shall determine, by resolution, up to three employees or agents of the Glenwood Springs who shall be authorized to place a call for the RICD Water Rights approved herein. Glenwood Springs shall provide the Division Engineer with a copy of the initial resolution designated the authorized individuals and each subsequent resolution changing the authorized individuals. This resolution shall be passed prior to use of the RICD Water Rights decreed herein.

21. The Application herein was filed in 2013 and the water rights herein confirmed shall be administered as filed in 2013, and shall be junior to all water rights for which applications were filed in prior years. As between water rights filed in 2013, priorities shall be determined by historical dates of appropriation and shall not be affected by the date of entry of this Decree.

22. The Applicant may seek curtailment of water rights junior to the RICD Water Rights, diverting upstream of the RICD structures, only at times when beneficial use of the RICD Water Rights for non-motorized boating is occurring.

23. As part of compromise negotiations, Glenwood Springs has agreed to install, operate and maintain a single point gage for measurement and recording of administration for the RICD Water Rights granted in this Decree. This device will be acceptable to the Division engineer for water rights administration purposes. The gage shall be installed at the location of the first RICD structure to be constructed and shall be used for measurement at all of the RICD structures granted in this Decree. Only this device will be used for administrative purposes. Applicant shall provide accounting relating to the RICD Water Rights, as required by the Division Engineer.

It is ORDERED that a copy of this Decree shall be filed with the Division Engineer for Water Division No. 5 and with the State Engineer.

It is further ORDERED that this Ruling shall be filed with the Water Clerk, subject to judicial review.

DATED this ____ day of _____, 20___.

BY THE REFEREE:

_____
Holly Strablizky, Water Referee
Water Division No. 5, State of Colorado

JUDGMENT AND DECREE

No protest having been filed to the foregoing Ruling of the Referee and the time for filing such protest having now expired, the foregoing Ruling of the Referee is confirmed and approved and is hereby made the judgment and decree of this Court. An Application for Finding of Reasonable Diligence shall be filed on or before the end of the month, six years from the date of the Water Judge's Order, and thereafter in accordance with the provisions of Article 92 of Chapter 37, Colorado Revised Statutes, so long as Glenwood Springs desires to maintain the conditional surface water rights decreed herein, or until such rights are made absolute.

DATED this ____ day of _____, 20____.

BY THE COURT:

_____
Hon. James Boyd, Water Judge
Water Division No. 5, State of Colorado

Preliminary Engineering Report City of Glenwood Springs Recreational In-Channel Diversion Water Rights (Case No. 13CW3109)

DATE FILED: May 30, 2014 3:29 PM
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CASE NUMBER: 2013CW3109

Prepared for:

City of Glenwood Springs
101 West 8th Street
Glenwood Springs, CO 81601

Wright Water Engineers, Inc.

May 30, 2014
131-036.000

Preliminary Engineering Report
City of Glenwood Springs
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101 West 8th Street
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Prepared by:

WRIGHT WATER ENGINEERS, INC.
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1.0 INTRODUCTION

The City of Glenwood Springs (City) is located at the confluence of the Colorado River and the Roaring Fork River at the western end of the Glenwood Canyon. The City has a well-deserved reputation as a vacation hub for outdoor activities relating to the river and the mountains and was recently named Most Fun Town in America by Rand McNally (Bly, 2011).

The City has been contemplating protecting and enhancing the recreational whitewater activities on the Colorado River for several years. In 2013, the City selected the team of Holland & Hart LLP, Wright Water Engineers, Inc., S_2O Design and Engineering, The Land Studio, Inc., and Healthy Mountain Communities to file for recreational in-channel diversion (RICD) water rights and develop preliminary designs for whitewater parks on the Colorado River upstream of the confluence with the Roaring Fork River. The study reach on the Colorado River runs from the community of No Name, downstream to the confluence with the Roaring Fork River. The study reach already supports a thriving recreational boating industry, with both kayakers and rafting companies active. Primary access to the study reach for recreational boating is currently via the Grizzly Creek boat ramp, with some additional, more limited access at other locations, including No Name.

Wright Water Engineers, Inc. (WWE) has prepared this engineering report in support of a water court application by the City for RICD water rights on the Colorado River. On December 19, 2013, City Council passed Resolution 2013-38 authorizing the filing of an application. The filing occurred on December 31, 2013 (Case No. 13CW3109) and in accordance with Colorado Revised Statutes 37-92-102, 37-92-103 and 37-92-305.

2.0 CWCB RICD RULES

The Colorado Water Conservation Board (CWCB) has a statutory requirement to make written findings for all RICD applications and promulgated RICD Rules to outline the factors it will use in reviewing proposed RICDs (RICD Rules 2 CCR 408-3). Specifically, the required findings on factors are:

- Whether the adjudication and administration of the RICD would materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements.

- Whether the exercise of the RICD would cause material injury to existing ISF water rights.

- Whether the adjudication and administration of the RICD, in the amounts claimed, would promote maximum utilization of the waters of the State.

WWE addresses these factors below.

In addition, the Division Engineer issued a Summary of Consultation dated March 7, 2014 (Appendix B; Martellaro, 2014). The Division Engineer's comments are addressed below and in the May 30, 2014 S_2O Report entitled "Preliminary Design Engineering Report Supporting the City of Glenwood Springs' Recreational In-Channel Diversion Water Rights Application." (S_2O Report).

3.0 COLORADO RIVER HYDROLOGY

The Colorado River drainage basin above the confluence with the Roaring Fork River has an area of 4,560 square miles (mi^2), providing the largest available flows of any existing or proposed RICD in the state. The annual flow volume exceeds 1,500,000 acre-feet (AF).

The U.S. Geological Survey (USGS) operates a streamflow gage on the Colorado River near Dotsero (ID 09070500) with a period of record of December 1, 1940 through the present. The gage is located upstream of the eastern end of Glenwood Canyon approximately 1.5 miles downstream from the confluence with the Eagle River and has a drainage basin of 4,394 mi^2.

The flows in the study reach are heavily influenced by two sets of water rights that largely control the administration of the Colorado River basin above Grand Junction. The first are the rights associated with the Shoshone Power Plant in Glenwood Canyon. The second are the irrigation water rights in the Grand Valley often referred to as the Cameo Call. Figure 1 is a vicinity map showing the locations of these calling rights relative to the study reach and the Dotsero gage.

The Shoshone water rights consist of a senior right for 1,250 cubic feet per second (cfs) adjudicated in 1907 and a junior right for 158 cfs decreed in 1956 (CDSS, 2014). Since the water rights are used for hydropower generation, they are not limited to the irrigation season and they are non-consumptive. As a result, the Shoshone Call is a controlling factor for many operations in the upper Colorado River, including transmountain diversions. The study reach is located just 6 miles downstream of the return flows from the power plant, thereby benefitting the reach both historically and in the future. The Division of Water Resources uses the Dotsero gage to administer the Shoshone Call.

The Cameo Call consists of mostly irrigation rights owned by several entities collectively referred to as the Grand Valley irrigators. As shown in Table 1, the water rights comprising the Cameo Call total approximately 2,260 cfs (CDSS, 2007). However, the Division Engineer currently administers the call to provide a flow of 1,950 cfs at the Grand Valley Project diversion dam. Since these rights are located downstream of the City, they serve to pull water down through the study reach.

TABLE 1
Controlling Water Rights on the Colorado River

Water Right	Admin. Number	Appropriation Date	Amount (cfs)	Use
Shoshone Power Plant	20427.18999	01-07-1902	1,250	power
	33023.28989	01-07-1902	158	power
Cameo				
Grand Valley Canal	22729.11922	8-22-1882	520.81	irrigation
Palisade Irrigation District	22729.14519	10-01-1889	80	irrigation
E. Palisade Irrigation District	22729.18536	10-01-1990	10.2	irrigation
Mesa Co. Irrigation District	22729.19544	07-01-1903	40	irrigation
Orchard Mesa Irrigation District	22729.21116	10-25-1907	450	irrigation/power
Grand Valley Project	22729.21241	02-27-1908	730	irrigation
Grand Valley Project	30895.21241	02-27-1908	400	power/commercial
Grand Valley Canal	30895.23491	04-26-1914	119.47	irrigation

These two sets of water rights have the potential to place the river on call beginning in July and carrying through to the start of spring runoff in April. Both of these controlling sets of water

rights benefit the study reach by calling water down to and through Glenwood Canyon. These factors have contributed to creating a high quality recreational boating experience, and one that the City would like to enhance and protect.

4.0 RICD WHITEWATER PARK LOCATIONS

Alternative locations for whitewater parks within the study reach were evaluated, as described in more details in the S_2O Report. City staff and council ultimately selected three sites to include in the water court application: No Name Whitewater Park, Horseshoe Bend Whitewater Park, and Two Rivers Whitewater Park. These locations are shown on Figure 2 and are identified by upstream and downstream extents of the river centerline as follows:

No Name Whitewater Park

The upstream extent of the No Name Whitewater Park is located in the NW¼ of the SW¼ of Section 1, Township 6 South, Range 89 West of the 6th P.M., at a point 1880 feet from the north section line and 85 feet from the west section line of said Section 1 based on BLM PLSS. UTM coordinates are northing 4,381,478 m, easting 303,685 m (NAD 83 Zone 13S).

The downstream extent of the No Name Whitewater Park is located in the NW¼ of the SE¼ of Section 2, Township 6 South, Range 89 West of the 6th P.M., at a point 1475 feet from the south section line and 1290 feet from the east section line of said Section 1 based on BLM PLSS. UTM coordinates are northing 4,381,237 m, easting 303,246 m (NAD 83 Zone 13S).

Horseshoe Bend Whitewater Park

The upstream extent of the Horseshoe Bend Whitewater Park is located in the NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1285 feet from the south section line and 1910 feet from the east section line of said Section 3 based on BLM PLSS. UTM coordinates are northing 4,381,288 m, easting 301,608 m (NAD 83 Zone 13S).

The downstream extent of the Horseshoe Bend Whitewater Park is located in the NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1920 feet from

the north section line and 2250 feet from the east section line of said Section 3 based on BLM PLSS. UTM coordinates are northing 4,381,513 m, easting 301,551 m (NAD 83 Zone 13S).

Two Rivers Whitewater Park

The upstream extent of the Two Rivers Whitewater Park is located in the SW¼ of the NE¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2394 feet from the north section line and 1975 feet from the east section line of said Section 9 based on BLM PLSS. UTM coordinates are northing 4,380,248m, easting 300,033 m (NAD 83 Zone 13S).

The downstream extent of the Two Rivers Whitewater Park is located in the SE¼ of the NW¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2075 feet from the north section line and 2330 feet from the west section line of said Section 9 based on BLM PLSS. UTM coordinates are northing 4,380,353 m, easting 299,772 m (NAD 83 Zone 13S).

5.0 RICD FLOW CLAIMS

While the locations of the three whitewater parks span a channel length of about 3.5 miles, there are no major tributaries that enter the Colorado River within this reach. The largest tributary is No Name Creek with a tributary area of roughly 20 mi^2, whose flows would not significantly affect the hydrologic analysis. By claiming one set of flow rates at all three locations, the City is seeking to simplify administration.

As discussed above, the most representative USGS streamflow gage for the study reach is the Dotsero gage. The drainage area at the gage of 4,394 mi^2 represents over 96 percent of the drainage area contributing to the study reach, which ranges from 4,530 mi^2 at No Name to 4,560 mi^2. By using the Dotsero gage, the calculated flows in the study reach will be slightly conservative since the gage does not account for tributaries entering the Colorado River within Glenwood Canyon. These tributaries, including Grizzly, Cottonwood and No Name Creeks, contribute only a small fraction of the flow in the Colorado River through the study reach.

The Dotsero gage has over 70 years of record, beginning in 1940 and operating today. WWE determined that using the full period of record for statistical analyses would best represent

historical conditions. WWE consulted with the Division 5 Engineer's Office, who concurred that the full record would be appropriate. In response to comments from Denver Water, WWE evaluated the effect of using a later starting date for our analyses. Shortening the period of record had less than a 5 percent effect on the average historical volume; therefore, WWE continues to rely upon the full period of record.

The methodology that the statutes specify for evaluating the volume of appropriation is based on taking the average historical volume of water during the period of the RICD flow claims as specified in CRS 37-92-305(13)(e):

> If the other elements of the appropriation are satisfied, the decree shall specify the total volume of water represented by the flow rates decreed for the recreational in-channel diversion. For purposes of this subsection (13), the "total volume of water represented by the flow rates decreed for the recreational in-channel diversion" means the sum of the flow rates claimed in cubic feet per second for each day on which a claim is made multiplied by 1.98.

In addition, CRS 37-92-305(13)(f) requires that:

> If the court determines that the total volume of water represented by the flow rates decreed for the recreational in-channel diversion exceeds fifty percent of the sum of the total average historical volume of water for the stream segment where the recreational in-channel diversion is located for each day on which a claim is made, the decree shall:
>
> (I) Specify that the state engineer shall not administer a call for the recreational in-channel diversion unless the call would result in at least eighty-five percent of the decreed flow rate for the applicable time period;
>
> (II) Limit the recreational in-channel diversion to no more than three time periods; and
>
> (III) Specify that each time period is limited to one flow rate.

Consequently, WWE began our analysis by constructing a hydrograph of the daily volumes (in AF) for the period of record at the Dotsero gage (the red line in Figure 3). The timing of the RICD flow claims was determined based primarily on an evaluation of the season of use by the recreational and commercial boaters. Even though boating regularly continues well into autumn, April 1 through September 30 was determined to be the appropriate season. Please refer to the S_2O Report for additional information on the season of use and justification for extending beyond Labor Day.

Once the beginning and end dates were established, it was possible to calculate the historical volume of 1,136,191 AF during the RICD period (the light blue shading in Figure 3). Based on the City's desire to stay below the fifty percent threshold, WWE was then able to calculate the maximum volume of 568,095 AF for the combined RICD flow claims.

Although the Colorado RICD statutes do not require applicants to restrict claims to levels under the historical hydrograph, the flow claims by the City are all beneath or approximately equal to the historical average flows. This guideline helped establish the base flow of 1,250 cfs for the RICD claim as historically this was approximately the average flow on April 1 and September 30 (the lower dark blue area in Figure 3). The flow of 1,250 cfs is not coincidentally the same as the senior Shoshone Call since that right historically controlled the base flows in the study reach.

Based upon interviews with the boating community, the response was a desire to maintain a flow of 2,500 cfs as long as possible and to have a late season event around the Fourth of July when other whitewater parks do not have reliable flows. With these guidelines, the date which the historical hydrograph dropped below 2,500 cfs was July 23 and the maximum duration of the flow claim based on the volumetric limitation would be 46 days. Therefore, the maximum period of the RICD 2,500 cfs would be from April 30 through July 23 (Figure 3).

The event flow around the Fourth of July weekend was determined based on the average historical flow of 4,000 cfs and confirmation from S_2O of the appropriateness of that flow from a design and kayaking perspective. The duration of the event flow would be up to 5 days, from July 1 through July 5. When accounting for the event flows of 4,000 cfs for 5 days, the duration of the 2,500 cfs flow would be reduced to 35 days remain under the fifty percent criterion.

The following table summarizes the RICD flow claims:

TABLE 2
RICD Flow Claims

Time Period	Flow Rate (cfs)
Apr. 1 through Apr. 29	1,250
Apr. 30 through May 10	Not to exceed 2,500*
May 11 through July 6	Not to exceed 4,000*
July 7 through July 23	Not to exceed 2,500*
July 24 through Sept 30	1,250

*Up to 5 continuous days of event flows at a rate of 4,000 cfs between May 11 and July 6, with the remainder of days between April 30 and July 23 not to exceed 2,500 cfs.

The above flow claims are limited to the period between 6:00 am and 9:00 pm each day, except during competitive events when these hours may be extended to between 6:00 am and 12:00 midnight each day.

Since the City's flow claims are under fifty percent of the historical volume, there is no requirement for the number of flow claims to be limited per the statutes. However, the City has decided to simplify stream administration and limit its flow claims to three tiers.

6.0 COMPACT ENTITLEMENTS

The CWCB must consider whether the RICD would materially impair the ability of Colorado to fully develop its compact entitlements. WWE finds that the City's RICD claims will not impair the ability of Colorado to develop its compact entitlements due to its location on the Colorado River and due to the claims being less than fifty percent of the available flows.

The locations of RICD water rights are upstream of the confluence with the Roaring Fork River and over 130 stream miles from the state line. The RICD has no effect on the ability to develop additional water supplies in the lower Colorado River, including the Roaring Fork River, the White River, the Yampa River, or the Gunnison River.

There are numerous existing transmountain diversion projects upstream of the City's RICD that are senior to 2013. Ongoing efforts to firm up the yield of these projects would not be adversely affected by the City's RICD claims. In addition, the City has determined to limit its appropriated flow volumes to less than fifty percent of the available flow. Since the City's RICD will only be in place for six months a year, the percentage drops to less than 38 percent of the annual flow volume. Therefore, there is ample unappropriated flow remaining in the Colorado River even after accounting for the proposed RICD flow amounts.

The City's RICD flow claims do not exceed the existing Shoshone senior water right except for a 46 day period. The City does not claim RICD water rights for 182 days a year (October through March); and, for 137 days a year, the RICD claims do not exceed the Shoshone call.

7.0 INSTREAM FLOW RIGHTS

As the RICD water rights are non-consumptive, they will not materially injure instream flow rights held by the CWCB. The study reach does not have an instream flow right, although there are upstream and downstream CWCB instream flows. Even though there is not an instream flow in the study reach, the design and construction of the RICD control structures will make considerations for aquatic habitat and fish passage (S_2O Report).

8.0 MAXIMUM UTILIZATION

The RICD claims above 1,250 cfs are located on the receding limb of the hydrograph, thereby enabling existing and future appropriations to divert and/or store additional supplies during the rising limb and peak of the hydrograph.

As mentioned above, the City has developed its flow claims in a manner which results in only 46 days a year having values in excess of the senior Shoshone water right of 1,250 cfs. The incremental increase in volume associated with the City's claims above the existing Shoshone right of 1,250 cfs is only 114,000 AF as compared to the historical average of 683,000 AF. This volume would be even less if the junior Shoshone right were included.

The City's RICD claims are appropriate given their location on the main stem of the Colorado River. The S_2O Report documents how the proposed whitewater parks will efficiently use the available flow in the river.

9.0 CONCLUSION

The City has elected to protect and enhance the recreational whitewater activities present on the Colorado River above the confluence with the Roaring Fork River. The RICD flow claims are appropriate based upon the historically available flow and the stream channel characteristics.

The City's flow claims extend from April 1 through September 30 and have three tiers at 1,250 cfs, 2,500 cfs, and short duration event flows of 4,000 cfs. The flow values and timing have been determined based upon recreational boating and whitewater event opportunities. Of the 183 days claimed under the RICD application, only 46 days exceed the existing Shoshone water right of 1,250 cfs.

The City will limit the cumulative flow volume of its claims to less than fifty percent of the available flow, thereby preserving additional flows for maximum utilization of the river and not impairing the state's ability to develop its compact entitlements.

10.0 REFERENCES

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S_2O Design and Engineering (2014, May 30). "Preliminary Design Engineering Report Supporting the City of Glenwood Springs' Recreational In-Channel Diversion Water Rights Application."

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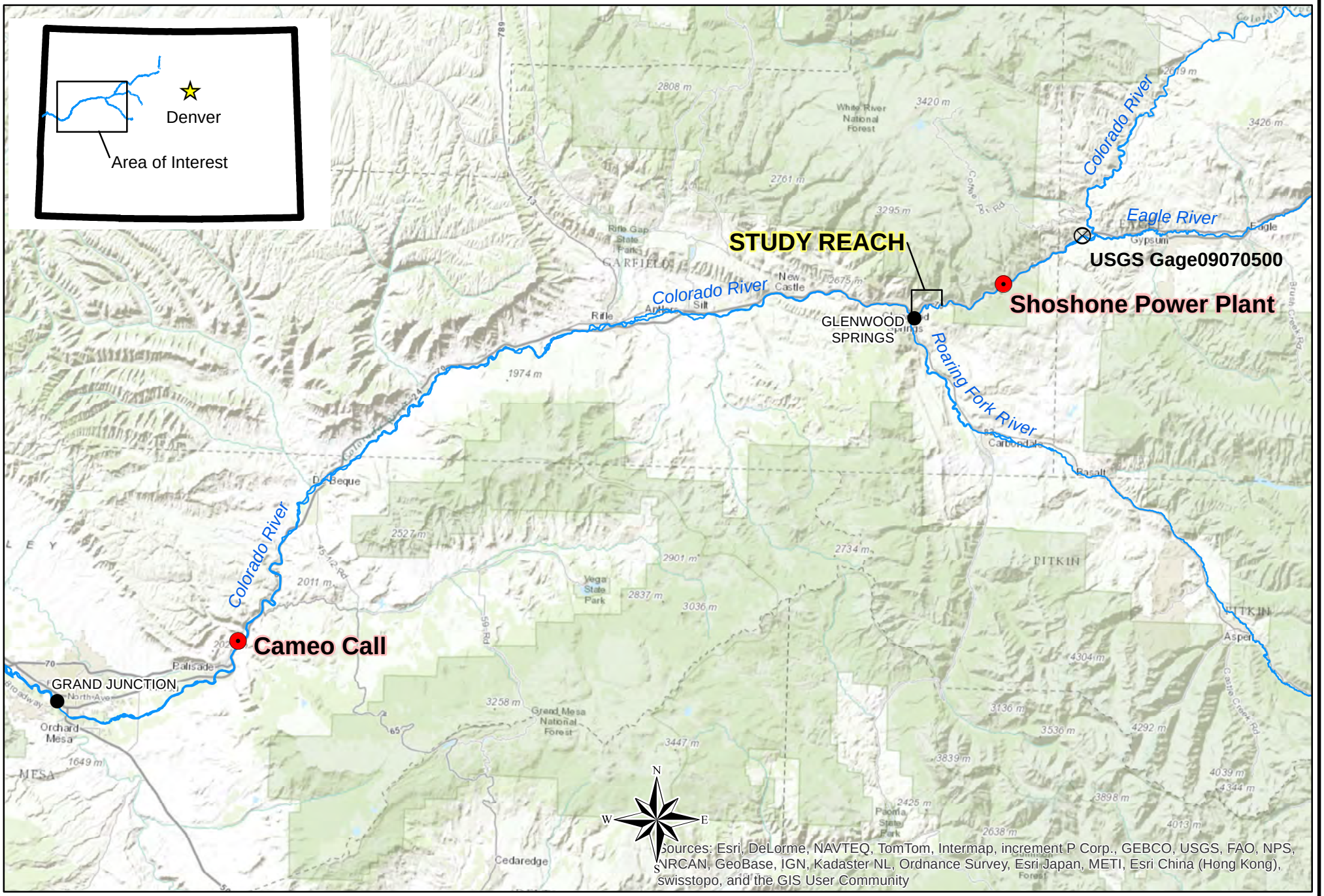

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Glenwood Springs, CO 81601
P:(970) 945-7755 F:(970) 945-9210

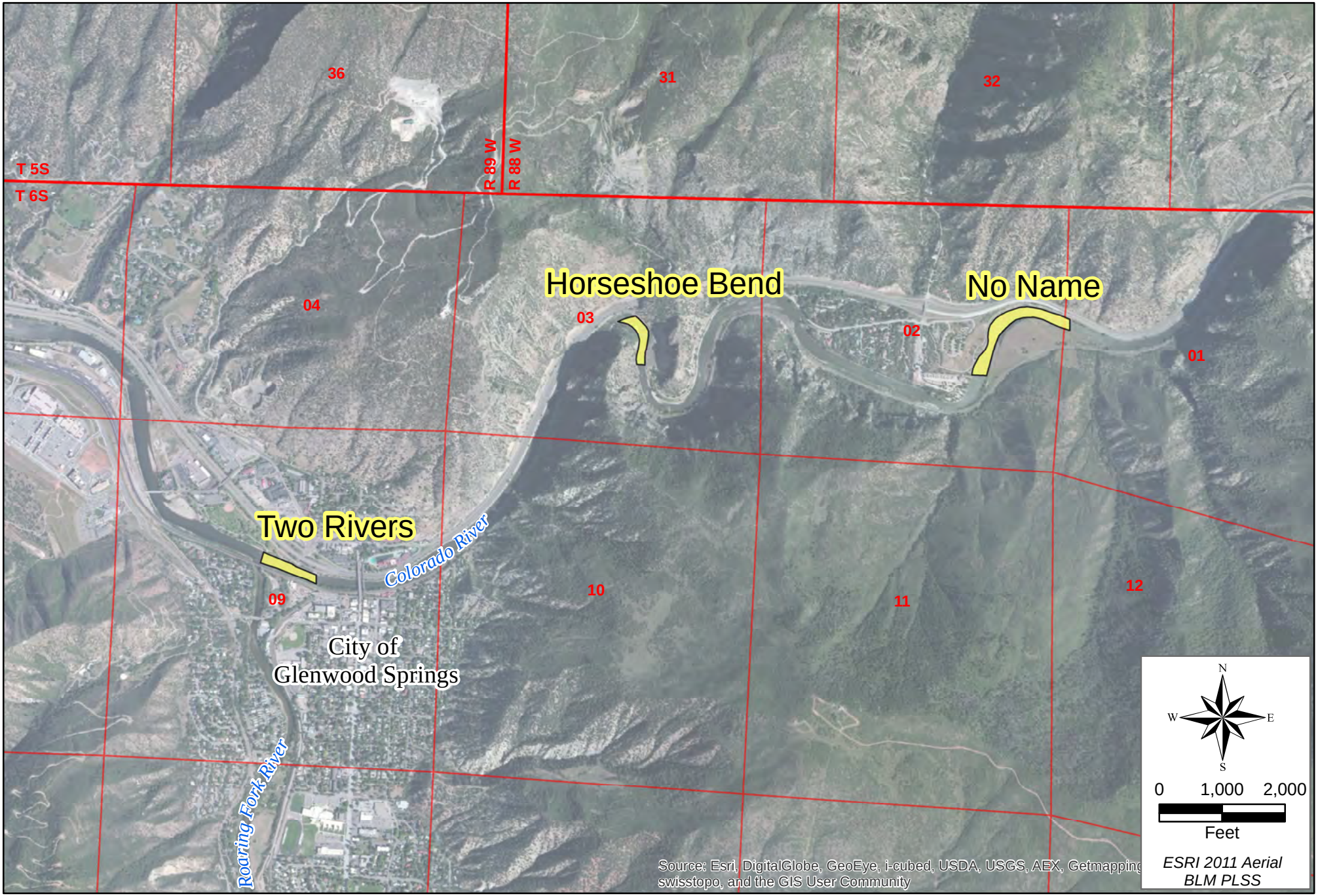
Designed by: HJC
Checked by: JMK
Date: 05/29/2014
Project Number: 131-036.000

City of Glenwood Springs RICD

Vicinity Map

FIGURE 1

Z:\WWE\131-036\000\Engr\Figure 2.mxd



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Designed by:	HJC
Checked by:	JMK
Date:	12-16-13
Project Number:	131-036.000

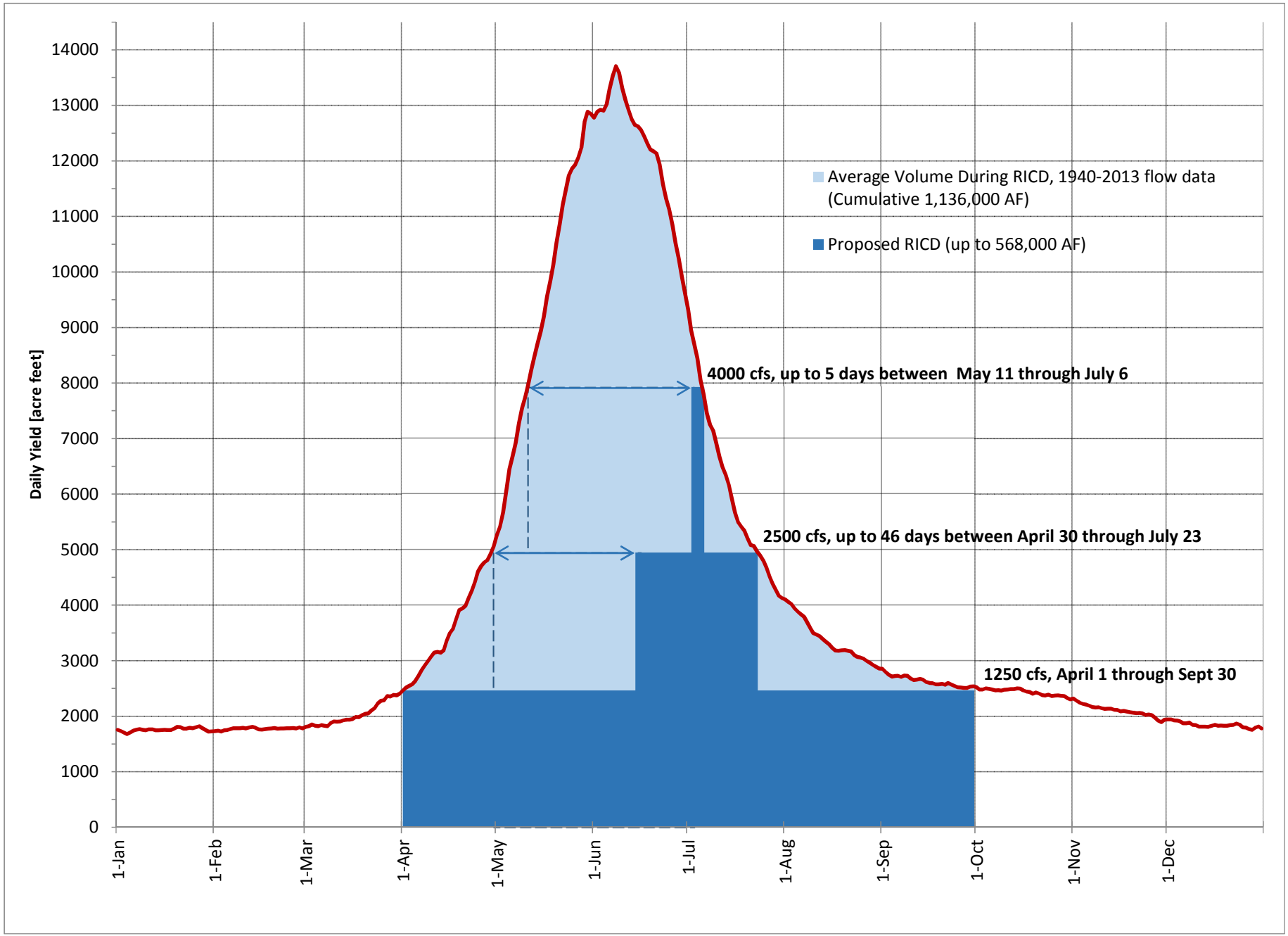
City of Glenwood Springs

Recreational In-Channel Diversion Reaches

Township: 6S Range: 89 W. of the 6th P.M.

FIGURE 2

Figure 3
City of Glenwood Springs RICD Flow Claims



APPENDIX A

Water Court Application

Case No. 13CW3109

DISTRICT COURT, WATER DIVISION NO. 5 **STATE OF COLORADO** Court Address: 109 Eighth Street, Suite 104 Glenwood Springs, CO 81601 (970) 945-5075 *telephone*	DATE FILED: December 31, 2013 2:56 PM FILING ID: F52DA28D4D057 CASE NUMBER: 2013CW3109
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: **THE CITY OF GLENWOOD SPRINGS, COLORADO** **in Garfield County, Colorado.**	▲ **COURT USE ONLY** ▲
Attorneys for Applicant: Name: Mark E. Hamilton, #24585 Address: HOLLAND & HART LLP 600 East Main Street, Suite 104 Aspen, CO 81611-1991 Telephone: (970) 925-3476 Facsimile: (866) 784-7682 E-Mail: MEHamilton@hollandhart.com Name: Christopher L. Thorne, #20003 Address: HOLLAND & HART LLP 555 17th Street, Suite 3200 Denver, CO 80202-3979 Telephone: (303) 295-8488 Facsimile: (303) 713-6310 E-Mail: CThorne@hollandhart.com	**Case Number:** **13 CW _____** **Div.:** **Ctrm.:**
APPLICATION FOR SURFACE WATER RIGHTS FOR RECREATIONAL IN-CHANNEL USES	

1. *Name and address of Applicant*:

City of Glenwood Springs
c/o Jan Shute, City Attorney
101 West 8th Street
Glenwood Springs, CO 81601

Please direct all pleadings to:
Mark E. Hamilton, Esq.
Christopher L. Thorne, Esq.
Holland & Hart LLP
600 E. Main St., Suite 104
Aspen, CO 81611
mehamilton@hollandhart.com
cthorne@hollandhart.com

2. *Introduction*: The City of Glenwood Springs ("City" or "Applicant") seeks to confirm three conditional water rights associated with three whitewater parks in and on the Colorado River: the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park. Each location will have control structures designed to control the entire flow within the river channel and to perform at various rates of flow for the beneficial uses described below. The locations of these three parks are depicted on the attached map (Exhibit A).

3. *Names of structures*: No Name Whitewater Park, Horseshoe Bend Whitewater Park, and Two Rivers Whitewater Park.

4. *Conditional surface water right for recreational in-channel diversion:* No Name Whitewater Park

   a. Location:

   The diversion structures comprising the No Name Whitewater Park will be located in the channel of the Colorado River between the following two points on the centerline of the river:

      i. No Name Whitewater Park Upstream Extent:

      PLSS: NW¼ of the SW¼ of Section 1, Township 6 South, Range 89 West of the 6th P.M., at a point 1880 feet from the north section line and 85 feet from the west section line of said Section 1, Garfield County, CO.

      UTM: NAD 83 Zone 13S: northing 4,381,478 m, easting 303,685 m

      ii. No Name Whitewater Park Downstream Extent:

      PLSS: NW¼ of the SE¼ of Section 2, Township 6 South, Range 89 West of the 6th P.M., at a point 1475 feet from the south section line and 1290 feet from the east section line of said Section 1, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,237 m, easting 303,246 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of this Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts claimed:

Time Period	**Flow Rate (c.f.s.)**
Apr. 1 through Apr. 29	1250
Apr. 30 through May 10	Not to exceed 2500*
May 11 through July 6	Not to exceed 4000*
July 7 through July 23	Not to exceed 2500*
July 24 through Sept 30	1250

The above amounts claimed are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day.

*Applicant seeks to confirm a conditional water right for up to five days of event flows at a rate of 4000 c.f.s. between May 11 and July 6, with the remainder of days between April 30 and July 23 not to exceed the claimed 2500 c.f.s. flow rate. *See* below remarks in Section 8.a concerning additional limitations.

g. Use: All recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

5. *Conditional surface water right for recreational in-channel diversion:* Horseshoe Bend Whitewater Park

a. Location:

The diversion structures comprising the Horseshoe Bend Whitewater Park will be located within the channel of the Colorado River between the following two points on the centerline of the river:

i. Horseshoe Bend Whitewater Park Upstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1285 feet from the south section line and 1910 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,288 m, easting 301,608 m

ii. Horseshoe Bend Whitewater Park Downstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1920 feet from the north section line and 2250 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,513 m, easting 301,551 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of this Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts claimed:

Time Period	**Flow Rate (c.f.s.)**
Apr. 1 through Apr. 29	1250
Apr. 30 through May 10	Not to exceed 2500*
May 11 through July 6	Not to exceed 4000*
July 7 through July 23	Not to exceed 2500*

July 24 through Sept 30	1250

The above amounts claimed are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day.

* Applicant seeks to confirm a conditional water right for up to five (5) days of event flows at a rate of 4000 c.f.s. between May 11 and July 6, with the remainder of days between April 30 and July 23 not to exceed the claimed 2500 c.f.s. flow rate. *See* below remarks in Section 8.a concerning additional limitations.

g. Use: All recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

6. *Conditional surface water right for recreational in-channel diversion:* Two Rivers Whitewater Park

a. Location:

The diversion structures comprising the Two Rivers Whitewater Park will be located within the channel of the Colorado River between the following two points on the centerline of the river:

i. Two Rivers Whitewater Park Upstream Extent:

PLSS: SW¼ of the NE¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2394 feet from the north section line and 1975 feet from the east section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,248m, easting 300,033 m

ii. Two Rivers Whitewater Park Downstream Extent:

PLSS: SE¼ of the NW¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2075 feet from the north section line and 2330 feet from the west section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,353 m, easting 299,772 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of this Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts claimed:

Time Period	**Flow Rate (c.f.s.)**
Apr. 1 through Apr. 29	1250
Apr. 30 through May 10	Not to exceed 2500*
May 11 through July 6	Not to exceed 4000*
July 7 through July 23	Not to exceed 2500*
July 24 through Sept 30	1250

The above amounts claimed are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day.

*Applicant seeks to confirm a conditional water right for up to five (5) days of event flows at a rate of 4000 c.f.s. between May 11 and July 6, with the remainder of days between April 30 and July 23 not to exceed the claimed 2500 c.f.s. flow rate. *See* below remarks in Section 8.a concerning additional limitations.

g. Use: All recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

7. *Names and addresses of owners of lands upon which structures will be located (based upon information obtained from the Garfield County Assessor)*:

a. No Name Whitewater Park:

Colorado Department of Transportation
222 S. 6th St.
Grand Junction, CO 81501

Joseph Wayne McKeel
6544 Harlow Drive
Bremerton, WA 98312

b. Horseshoe Bend Whitewater Park:

City of Glenwood Springs (Applicant)

c. Two Rivers Whitewater Park:

City of Glenwood Springs (Applicant)

Colorado Department of Transportation
(*see above* Section 7.a)

Union Pacific Corporation
c/o Bob Brenner (property tax department)
1400 Douglas St., Stop 1640
Omaha, NE 68179-1640

Pursuant to Colo. Rev. Stat. § 37-92-302(2)(b), within ten (10) days of filing this application, Applicant shall give notice by registered or certified mail, return receipt requested, to each of the foregoing landowners (other than Applicant).

8. *Remarks*:

a. The City hereby reserves the right, and gives notice to all interested parties, that it will further refine the time periods and flow rates claimed herein and provide such information to the Colorado Water Conservation Board ("CWCB") and objectors in this proceeding. While flow rates will not exceed the above-listed claims, nor extend beyond the time periods listed, it is the City's intent that any final decree in this matter will limit the total volume of water represented by the flow rates decreed for the claimed recreational in-channel diversions to no greater than 50% of the sum of the total average historical volume of water for the stream segments where the diversion structures will be located, pursuant to C.R.S. § 37-92-305(13)(f). Based upon preliminary engineering, this is expected to result in no more than 46 days each year with flow rates in excess of 1250 c.f.s. With regard to the 4000 c.f.s. claimed flow rate, it is the City's intent to confirm an event flow right at this rate for no more than five days each year to coincide with a holiday weekend or other planned special events.

b. This Application is made pursuant to Colo. Const. Art XVI, § 5, Art XVI, § 6, and C.R.S. §§ 37-92-101, *et seq*. Pursuant to C.R.S. § 37-92-102(5), within 30 days of filing the Applicant will submit a copy of this Application to the CWCB for review.

RESPECTFULLY SUBMITTED this 31st day of December 2013.

Respectfully submitted,

Mark E. Hamilton, #24585
Christopher L. Thorne, #20003
HOLLAND & HART LLP
ATTORNEYS FOR APPLICANT

6558667_3

VERIFICATION

I, Leo McKinney, Mayor of the City of Glenwood Springs, Colorado, state under oath that I have read this application and verify its content.

Leo McKinney

STATE OF COLORADO)
) ss.
COUNTY OF GARFIELD)

Subscribed and sworn to before me this 31st day of December 2013, by Leo McKinney, as Mayor of the City of Glenwood Springs, Colorado.

WITNESS my hand and official seal.
My commission expires: 3/27/16

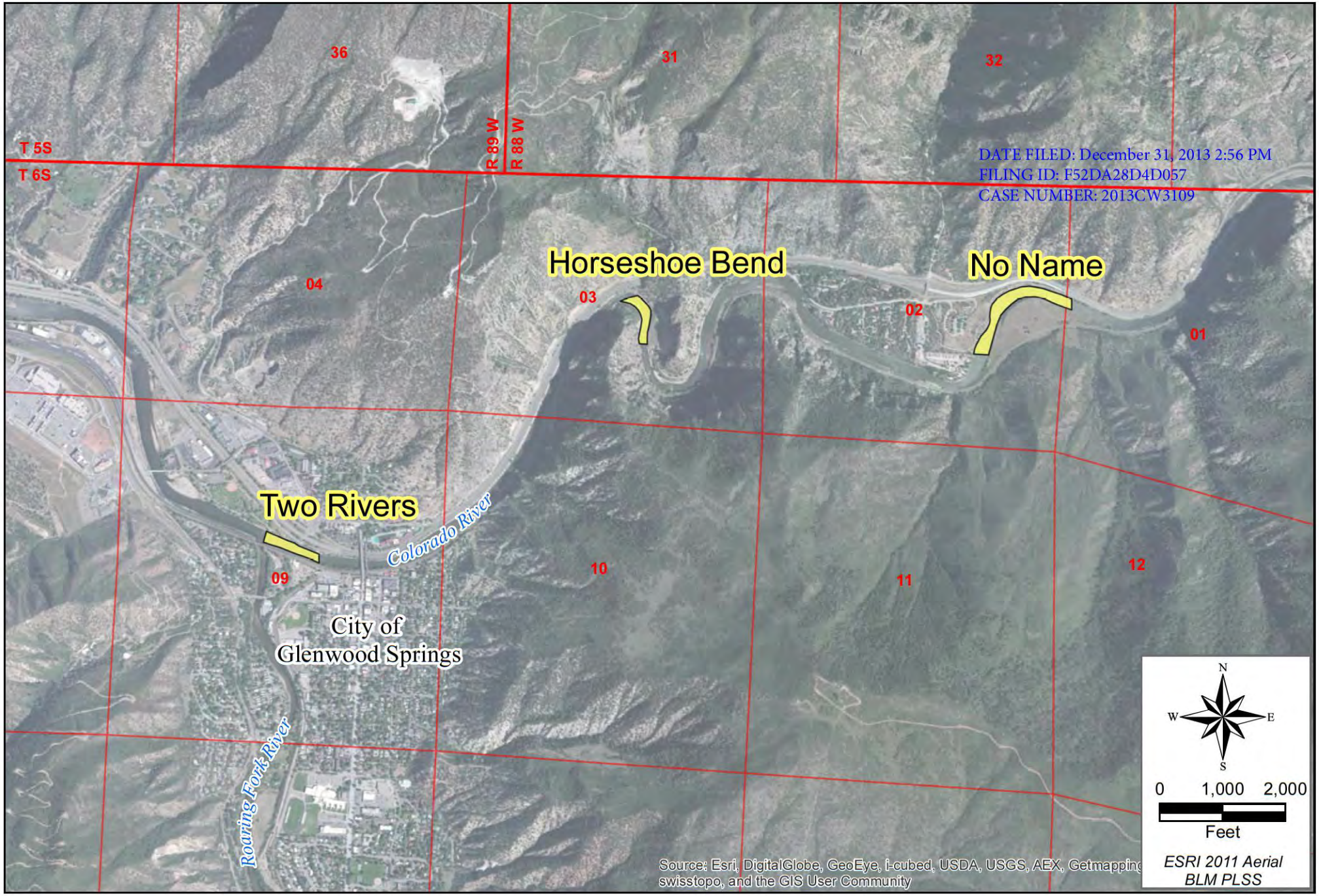
MARY LOU HAFLINGER NOTARY PUBLIC STATE OF COLORADO

Notary Public

In accordance with C.R.C.P. 121 § 1-26, this document has been electronically filed via ICCES. A printed copy of this document with original signatures is maintained by the filing party and will be made available for inspection by other parties or by the Court upon request.

6558667_1

Z:\WWE\131-036\000\Engr\Exhibit A.mxd



Wright Water Engineers, Inc.
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Glenwood Springs, CO 81601
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Designed by:	HJC
Checked by:	JMK
Date:	12-16-13
Project Number:	131-036.000

City of Glenwood Springs

Recreational In-Channel Diversion Reaches

Township: 6S Range: 89 W. of the 6th P.M.

EXHIBIT A

13CW___, COLORADO RIVER, GARFIELD COUNTY. Application for Surface Water Rights for Recreational In-Channel Uses. The City of Glenwood Springs, Colorado, c/o Mark E. Hamilton, Esq. and Christopher L. Thorne, Esq., HOLLAND & HART LLP, 600 E. Main St., Suite 104, Aspen, CO 81611-1991, (970) 925-3476, mehamilton@hollandhart.com, cthorne@hollandhart.com. *Names of Structures*: No Name Whitewater Park, Horseshoe Bend Whitewater Park, Two Rivers Whitewater Park. *Locations*: (1) the diversion structures comprising the No Name Whitewater Park will be located in the channel of the Colorado River between the following two points on the centerline of the river: (a) No Name Whitewater Park Upstream Extent: PLSS: NW¼ SW¼ Sec. 1, T. 6 S., R. 89 W., 6th P.M., at a point 1880 ft from the N. section line and 85 ft from the W. section line of said Sec. 1, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,381,478 m, easting 303,685 m; and (b) No Name Whitewater Park Downstream Extent: PLSS: NW¼ SE¼ Sec. 2, T. 6 S., R. 89 W., 6th P.M., at a point 1475 ft from the S. section line and 1290 ft from the E. section line of said Sec. 1, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,381,237 m, easting 303,246 m; (2) the diversion structures comprising the Horseshoe Bend Whitewater Park will be located in the channel of the Colorado River between the following two points on the centerline of the river: (a) Horseshoe Bend Whitewater Park Upstream Extent: PLSS: NW¼ SE¼ of Sec. 3, T. 6 S., R. 89 W. of the 6th P.M., at a point 1285 ft from the S. section line and 1910 ft from the E. section line of said Sec. 3, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,381,288 m, easting 301,608 m; and (b) Horseshoe Bend Whitewater Park Downstream Extent: PLSS: NW¼ SE¼ of Sec. 3, T. 6 S., R. 89 W. of the 6th P.M., at a point 1920 ft from the N. section line and 2250 ft from the E. section line of said Sec. 3, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,381,513 m, easting 301,551 m; and (3) the diversion structures comprising the Two Rivers Whitewater Park will be located within the channel of the Colorado River between the following two points on the centerline of the river: (a) Two Rivers Whitewater Park Upstream Extent: PLSS: SW¼ NE¼ of Sec. 9, T. 6 S., R. 89 W. of the 6th P.M., at a point 2394 ft from the N. section line and 1975 ft from the E. section line of said Sec. 9, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,380,248m, easting 300,033 m; and (b) Two Rivers Whitewater Park Downstream Extent: PLSS: SE¼ NW¼ of Sec. 9, T. 6 S., R. 89 W. of the 6th P.M., at a point 2075 ft from the N. section line and 2330 ft from the W. section line of said Sec. 9, Garfield County, CO; UTM: NAD 83 Zone 13S: northing 4,380,353 m, easting 299,772 m. The precise locations of all structures will be confirmed upon making these conditional water rights absolute. *Source (all structures)*: Colorado River (all structures). *Approp. Date (all structures)*: 12/19/2013. *How appropriations were initiated (all structures)*: by formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution No. 2013-38 by the City of Glenwood Springs authorizing the filing of this Application. *Amounts (all structures)*:

DATE FILED: December 31, 2013 2:56 PM
FILING ID: F52DA28D4D057
CASE NUMBER: 2013CW3109

Time Period	Flow Rate (c.f.s.)
Apr. 1 through Apr. 29	1250*
Apr. 30 through May 10	Not to exceed 2500*
May 11 through July 6	Not to exceed 4000*
July 7 through July 23	Not to exceed 2500*
July 24 through Sept 30	1250*

*Applicant seeks to confirm conditional water rights for up to five days of event flows at a rate of 4000 c.f.s. between May 11 and July 6 to coincide with a holiday weekend or other planned special events, with the remainder of days between April 30 and July 23 not to exceed the claimed 2500 c.f.s. flow rate. All of the above amounts claimed are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The Applicant hereby reserves the right, and gives notice to all interested parties, that it will further refine the time periods and flow rates claimed herein and provide such information to the Colorado River Water Conservation Board (CWCB) and objectors in this proceeding. While flow rates will not exceed the above-listed claims, nor extend beyond the time periods listed, the Applicant intends that any final decree in this matter will limit the total volume of water represented by the flow rates decreed for the claimed recreational in-channel diversions to no greater than 50% of the sum of the total average historical volume of water for the stream segments where the diversion structures will be located, pursuant to C.R.S. § 37-92-305(13)(f). *Uses (all structures)*: All recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses. *Names and addresses of owners of lands upon which structures will be located (based upon information obtained from the Garfield County Assessor)*: City of Glenwood Springs (Applicant); Colorado Department of Transportation, 222 S. 6th St., Grand Junction, CO 81501; Joseph Wayne McKeel, 6544 Harlow Drive, Bremerton, WA 98312; Union Pacific Corporation, c/o Bob Brenner, 1400 Douglas St., Stop 1640, Omaha, NE 68179-1640. *Remarks*: This Application is made pursuant to Colo. Const. Art XVI, § 5, Art XVI, § 6, and C.R.S. §§ 37-92-101, *et seq.* (9 pages)

APPENDIX B

Summary of Consultation

Case No. 13CW3109

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WATER RESOURCES

DATE FILED: March 12, 2014 11:18 AM

John W. Hickenlooper
Governor

Mike King
Executive Director

Dick Wolfe, P.E.
Director/State Engineer

Alan C. Martellaro, P.E.
Division Engineer

REPORT OF THE DIVISION ENGINEER

SUMMARY OF CONSULTATION

CASE NO.: 13CW3109
APPLICANT: The City of Glenwood Springs

STRUCTURE	APPL. CLAIM
No Name Whitewater Park	Surface Water Right
Horseshoe Bend Whitewater Park	Surface Water Right
Two Rivers Whitewater Park	Surface Water Right

The application was filed with the court on December 31, 2013.

CONCERNS

I cannot recommend approval of this application until the following concerns are addressed:

1. The application does not contain sufficient information to allow the Division of Water Resources or the Water Court to state more specific areas of concern. The Division Engineer and the Water Court Referee reserve the right to state additional, more specific concerns as more information becomes available.
2. Applicant must provide the information required by CRS§37-92-305(13) for the Water Court to make findings and consider the findings of fact to be made by the Colorado Water Conservation Board. The applicant should also provide to the Court any studies, engineering, and reports that allow the Colorado Water Conservation Board to make their findings of fact.
3. The evidence must demonstrate that the claims are less than 50% of the historic average to support the claims for more than 3 time periods of a single flow for each whitewater park.
4. The ruling must include a finding of the amount below which there is no beneficial use. Therefore, the applicants' engineering must provide the minimum design flow that creates a recreational experience.
5. The applicant is not the sole owner of the properties where the structures are located. Applicant must demonstrate that public access to the recreational in-channel diversions will not be prevented by other ownership.
6. The applicant must demonstrate they can and will put the claims to beneficial use within a reasonable amount of time and that applicant is not speculating with the claims.

RECOMMENDATIONS

Based on the above concerns, the State and Division Engineers ask that the issues discussed in this consultation be addressed prior to granting any water rights, and any ruling should include the following terms and conditions:

1. Beneficial use by non-motorized boating must occur at the time any upstream junior rights are curtailed.

Information requested in this consultation should be submitted to the Division 5 Water Court.

Date: March 7, 2014 SIGNED: Alan C. Martellaro, P.E., Division Engineer

Staff Assigned: Alan Martellaro

CRS 1973, 37-92-302(4),signed into law May 17, 1998, provide that the applicant or the applicant's attorney shall mail or deliver a copy of this consultation to all parties of record who filed a statement of opposition to this application. The statute also requires that the applicant or his/her attorney shall file a certificate of mailing with the water clerk for Water Division 5, confirming that this consultation (and attachment) is mailed to any and all opposing parties.

CERTIFICATE OF MAILING

I hereby certify that on this 12th day of March 2014, a true and correct copy of the foregoing Summary of Consultation of the Division Engineer was served to the individuals listed below, either electronically through Integrated Colorado Courts E-Filing System or by first-class U.S. mail, as indicated:

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Supplemental Engineering Report City of Glenwood Springs Recreational In-Channel Diversion Water Rights (Case No. 13CW3109)

Submitted under CRE 408

Prepared for:

City of Glenwood Springs
101 West 8th Street
Glenwood Springs, CO 81601

Wright Water Engineers, Inc.

December 5, 2014
131-036.000

Supplemental Engineering Report
City of Glenwood Springs
Recreational In-Channel Diversion Water Rights (Case No. 13CW3109)

Submitted Under CRE 408

Prepared for:

City of Glenwood Springs
101 West 8th Street
Glenwood Springs, Colorado 81601

Prepared by:

WRIGHT WATER ENGINEERS, INC.
Glenwood Springs, Colorado

December 5, 2014
131-036.000

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1.0 INTRODUCTION

Wright Water Engineers, Inc. (WWE) prepared this supplemental engineering report to address certain issues and questions raised by objectors in the City of Glenwood Springs Recreational In-Channel Diversion (RICD) application and the preliminary engineering reports in Case No. 13CW3109. This report is intended to supplement the information in WWE's Preliminary Engineering Report: City of Glenwood Springs Recreational In-Channel Diversion Water Rights (Case No. 13CW3109) (May 2014); only where specifically noted in this Supplemental Report will the data supersede that contained in the Preliminary Report.

2.0 WHITEWATER PARK EXTENTS

WWE provided legal descriptions for the upstream and downstream extents of the whitewater parks in the original application. In order to respond to several comments received regarding the river reaches at the Horseshoe Bend and Two Rivers sites, we felt it was worth clarifying both the intent and the basis for the extents. There were no issues identified with the reach claimed at the No Name Whitewater Park, so only the other two sites are discussed in this section.

The Horseshoe Bend Whitewater Park is intended to be wholly located on property presently owned by the City of Glenwood Springs. WWE used parcel data obtained from Garfield County to derive the upstream and downstream extents of the RICD reach. Upon reviewing the water court application, the BLM informed us that upstream extent of the reach appeared to be on BLM property based on their database. In response, WWE created **Figure 1**, which shows the Garfield County Assessor's parcel data boundary compared to the BLM boundary data. Based on this analysis, it does appear that the upstream extent of the reach is located on BLM property. We have discussed this issue with BLM personnel and agreed that, consistent with our intent, the reach will be defined by the City's property boundary.

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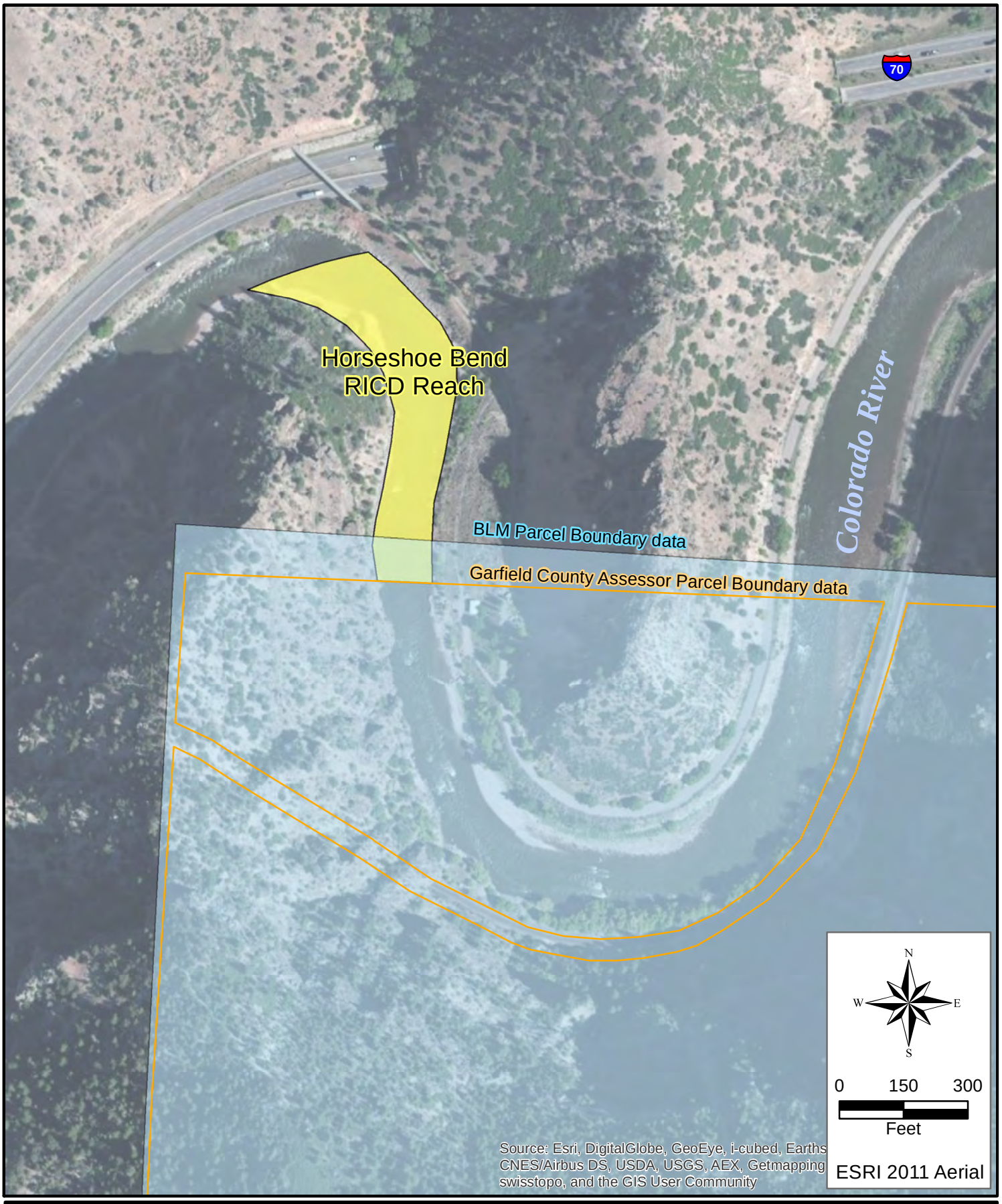

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Project	131-036.000

City of Glenwood Springs

BLM Parcel Comparison for Horseshoe Bend Location

FIGURE 1

The Two Rivers Whitewater Park is intended to be located on the Colorado River upstream of the confluence with the Roaring Fork River. We received a comment questioning the downstream extent of the RICD reach relative to the confluence of the two rivers. When preparing the application, WWE found that the exact location of the confluence was somewhat variable depending on whether the USGS topographic quadrangle (**Figure 2a**) or more recent aerial photographs (**Figure 2b**) was used. In summary, there is no intent to appropriate water from the Roaring Fork River, and Figure 2b shows the downstream extent of the Two Rivers Whitewater Park is upstream of the confluence.

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Wright Water Engineers, Inc. 818 Colorado Avenue, Suite 307 P.O. Box 219 Glenwood Springs, CO 81602 (970) 945-7755 TEL	Design CBB Check JMK Date 12-5-14 Project 131-036.000	*City of Glenwood Springs* **Two Rivers RICD Reach (USGS Topo)**	**FIGURE 2a**

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Two Rivers RICD Reach (Aerial Photo)

FIGURE 2b

3.0 PERIOD OF RECORD

The flow claims for the proposed whitewater parks are based on streamflow data from the U.S. Geological Survey gage Colorado River near Dotsero (ID 09070500). The gage has been operational continuously since 1940 and includes hydrologic conditions from extreme dry years to extreme wet years. It was on this basis that WWE used the full period of record for the flow claims as discussed in our preliminary report.

Following comments from parties in the water court case, WWE conducted additional analyses to assess whether a subset of the full period of record would be more representative. A specific issue raised was the timing of the development of transmountain diversion projects and their associated large reservoirs. **Table 1** lists the significant transmountain diversions that occur above the proposed RICD reach. **Table 2** lists the large reservoirs above the RICD reach, some of which are tied to the transmountain diversions or provide compensation for the diversions.

TABLE 1
Transmountain Diversions Located Above Proposed RICD

Name	Diversion (AF/year)*	First Appropriation*
Adams Tunnel	216,570	1935
Harold D. Roberts Tunnel	58,426	1946
Moffat Tunnel	52,390	1921
Homestake Tunnel	25,286	1952
Grand River Ditch	17,462	1890
Hoosier Pass Tunnel	8,375	1930
Wurtz Ditch	2,508	1906
Columbine Ditch	1,431	1930
Ewing Ditch	1,027	1880
Berthoud Pass Ditch	664	1902
Vidler Tunnel	518	1893
Straight Creek Tunnel	311	1957
Boreas Pass Ditch	117	1937

*Based upon CFWE's Citizen's Guide to Colorado's Transbasin Diversions published in 2014. http://issuu.com/cfwe/docs/cfwe_cgtb_web

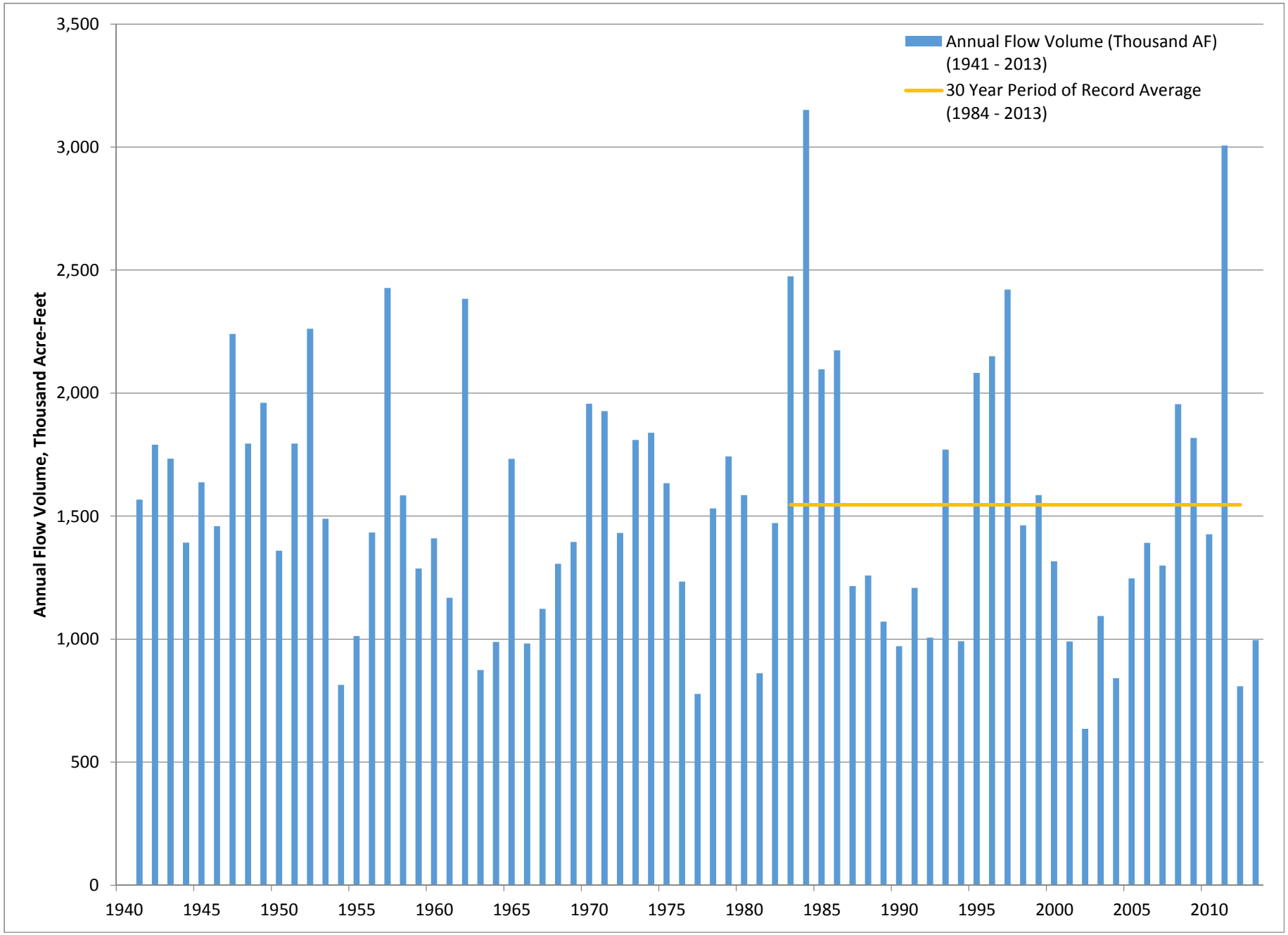
TABLE 2
Reservoirs Located Above Proposed RICD

Name	Decreed Volume Absolute (AF)	First Appropriation
Lake Granby	543,758	1952
Dillon Reservoir	266,202	1955
Green Mountain Reservoir	164,817	1955
Williams Fork Reservoir	187,274	1937
Wolford Mountain Reservoir	65,993	1987
Homestake Reservoir	43,989	1958
Eagle Park Reservoir[1]	3,301	1992
Shadow Mountain Lake	19,669	1955
Willow Creek Reservoir	10,553	1955
Clinton Reservoir[2]	0	1936

1. Eagle Park Reservoir includes 24,299 AF conditional which has been built.
2. Clinton Reservoir includes 1,100 AF conditional and 4,443 AF for an alternate point/exchange.

While some of these projects initiated operations prior to 1940, when the Dotsero gage began recording streamflow data, overall transmountain diversions continued to increase in subsequent years. As a result, the most recent 30 years of record appears to best represent current streamflow conditions in the Colorado River at the proposed whitewater parks. **Figure 3** shows the annual flows for the full period of record (1940 through 2013) and the last 30 years of record (1984 through 2013). **Figure 4** shows a comparison between the average hydrographs using the full period of record and the last 30 years of record. Although the hydrographs reflect, in part, the storage of water during the spring runoff and the release of water during the late irrigation season.

Figure 3
Colorado River at Dotsero Annual Flows



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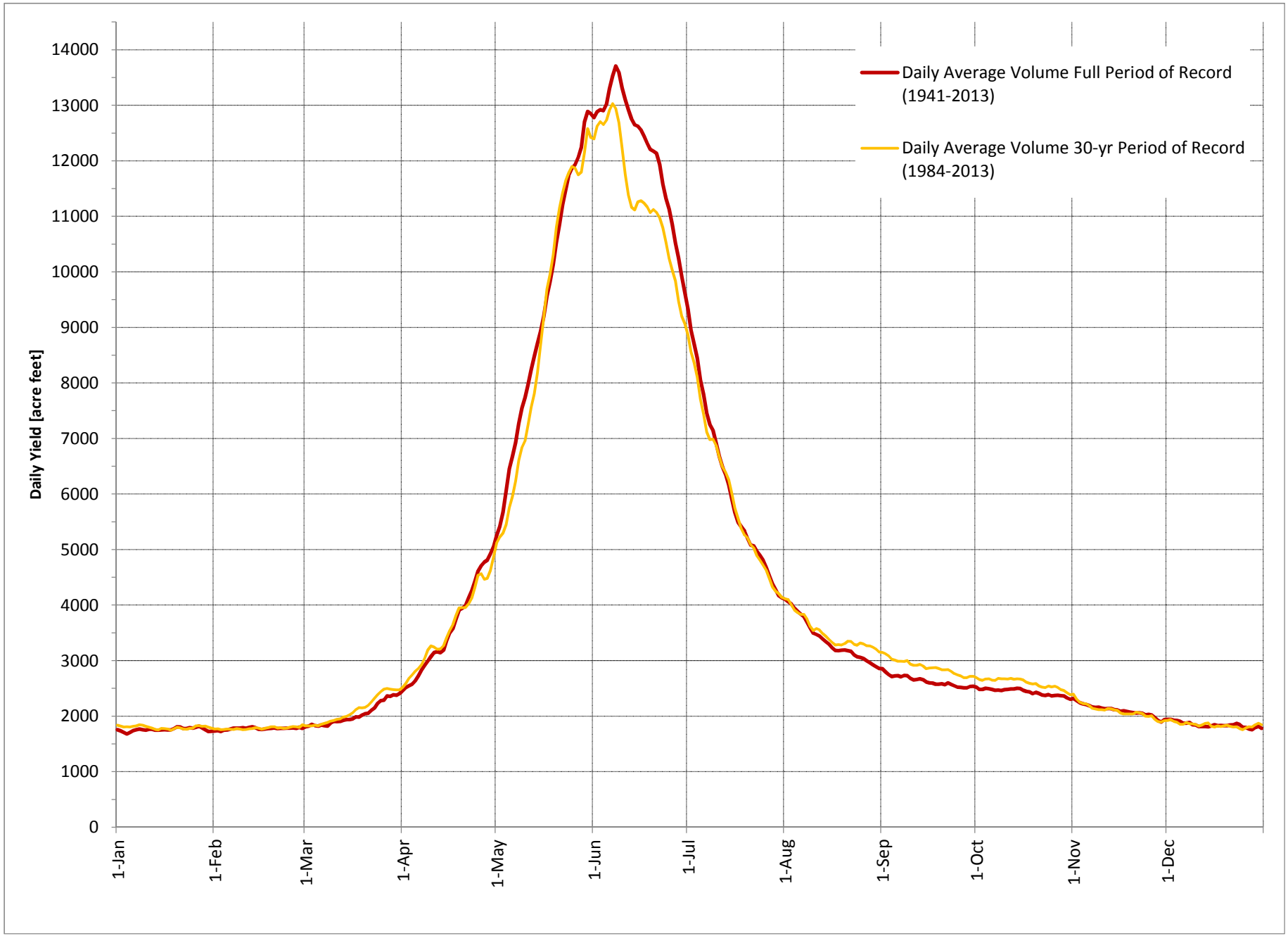
Annual Volume at Dotsero

Wright Water Engineers, Inc.
December 5, 2014

Prpd By: CBB
Chkd By: JMK

Figure 4
Colorado River at Dotsero Hydrographs



4.0 ADMINISTRATION OF RICD WATER RIGHTS

In the Preliminary Report, WWE discussed how the USGS gage near Dotsero was used to evaluate the flow claims. We noted that there was a small percentage of the area tributary to the RICD reaches that was not accounted for at the Dotsero gage. As a result, using the Dotsero gage as an administration site for the RICD flows has the potential for calling additional water to the site(s) due to the tributary inflows below the gage.

From water years 1900 through 1966, there was a streamflow gage located on the Colorado River approximately one-half mile above the confluence with the Roaring Fork. WWE investigated developing a correlation between the Dotsero gage and the Glenwood Springs gage since there were twenty-six years of overlap. As would be expected, the two gages showed a strong correlation, with the Glenwood Springs gage averaging approximately 8 percent higher than the flows recorded at the Dotsero gage. Figure 5a shows correlation of the flows at the two gages for the overlapping period of record (1941 – 1966). Figure 5b shows the same relationship for flows during the period of the proposed RICD (April 1 through September 30). Thus, the Dotsero gage could be used for administrative purposes with the appropriate adjustment.

In any event to address water measurement concerns, the applicant has elected to incorporate a compliance gage into one of the whitewater structures. The Division Engineer could then administer the water right at the structure itself. The gage would be designed into the first of the whitewater parks to be built, but, since all three parks share almost identical hydrologic conditions, it could be used to administer all three sites. The only tributary within the RICD reaches is No Name Creek, which in between the No Name and Horseshoe Bend sites. The contribution of No Name Creek to the flow in the Colorado River is less than one percent, which is within the measurement accuracy of the gage reading. This settlement provision is included as paragraph 22 in the Proposed Ruling.

Figure 5a
Dotsero Gage Data vs Streamflow in Glenwood Springs (1941 - 1966 data)

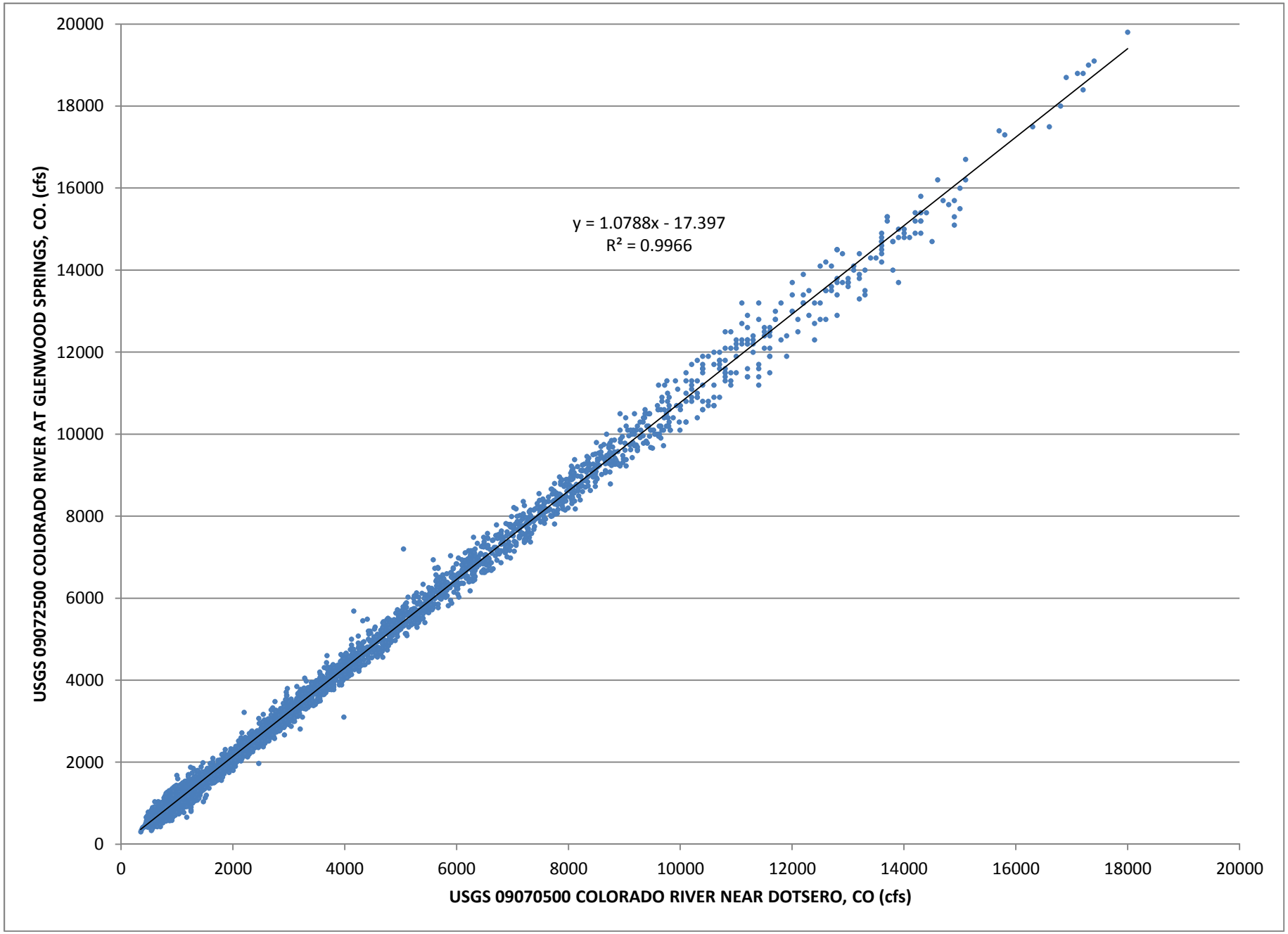
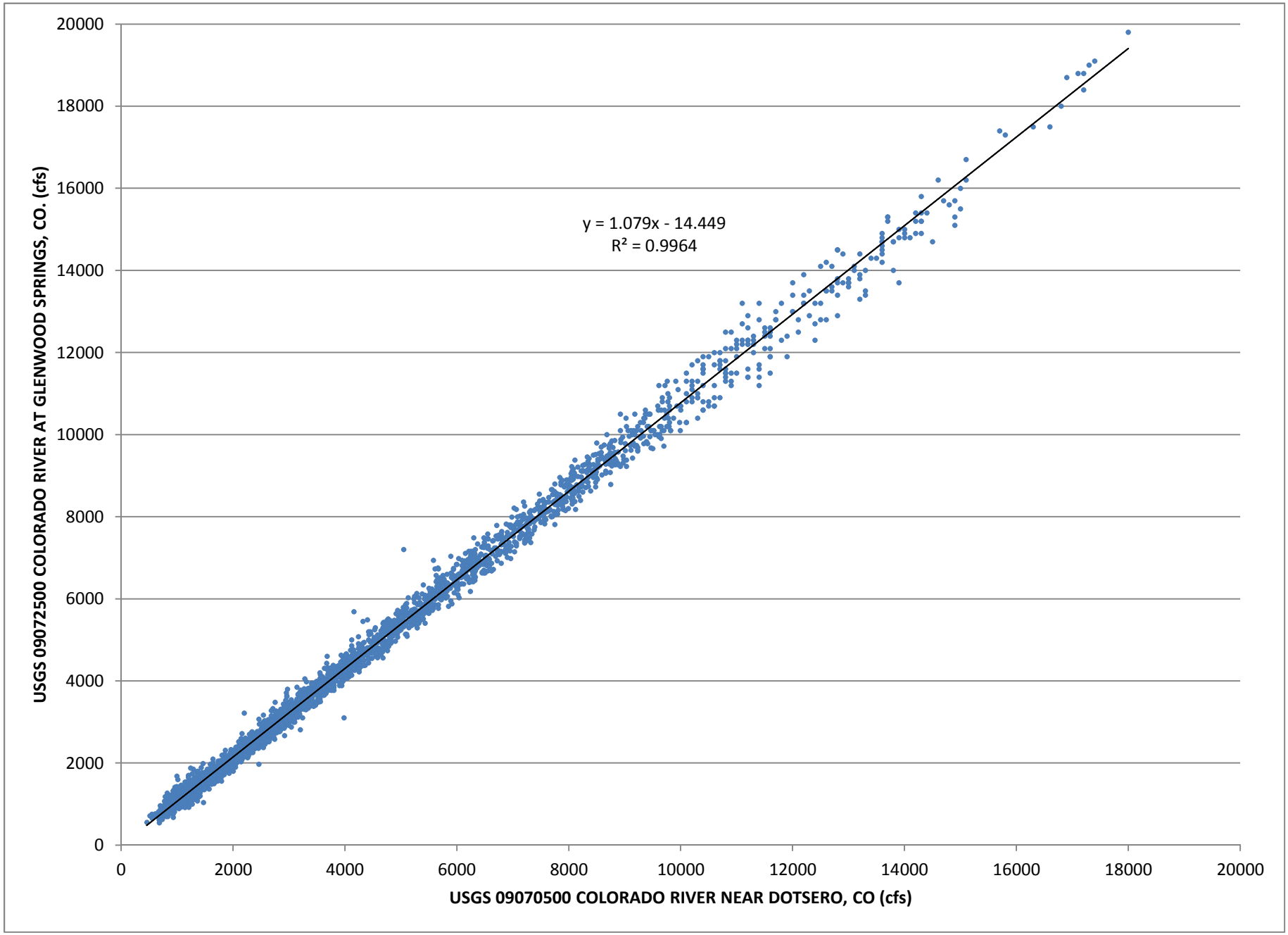


Figure 5b
Dotsero Gage Data vs Streamflow in Glenwood Springs (April through September, 1941 - 1966 data)



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April-Sept

Wright Water Engineers, Inc.
December 5, 2014

Des. By: CBB
Chkd. By: JMK

5.0 COLORADO RIVER HYDROLOGY

Due to numerous objectors' comments regarding the use of the Dotsero gage for calculation of the volume of the flow claims and administration of the RICD water rights, WWE revisited the hydrologic relationship between the Dotsero gaging site and the locations of the proposed whitewater parks. The drainage area between the Dotsero gage and the whitewater park sites is largely comprised of the tributaries within Glenwood Canyon, including Cottonwood and Grizzly Creeks. In between the whitewater park sites, there are no major tributaries, only No Name Creek, which enters the Colorado River between the No Name Whitewater Park and the Horseshoe Bend Whitewater Park[1].

As discussed previously, the USGS maintained a streamflow gage at Glenwood Springs about 1/2 mile above the confluence with the Roaring Fork River from 1899 to 1966 (Gage ID 09072500). WWE evaluated the relationship between the daily streamflows measured at the Dotsero gage (Gage ID 09070500) to those measured at the Glenwood Springs gage during the overlapping period of record: December 1940 through September 1966. According to the USGS remarks, the streamflow records at both gages were considered to be of good quality, which means that 95 percent of the daily discharges are within 10 percent of the actual flow.

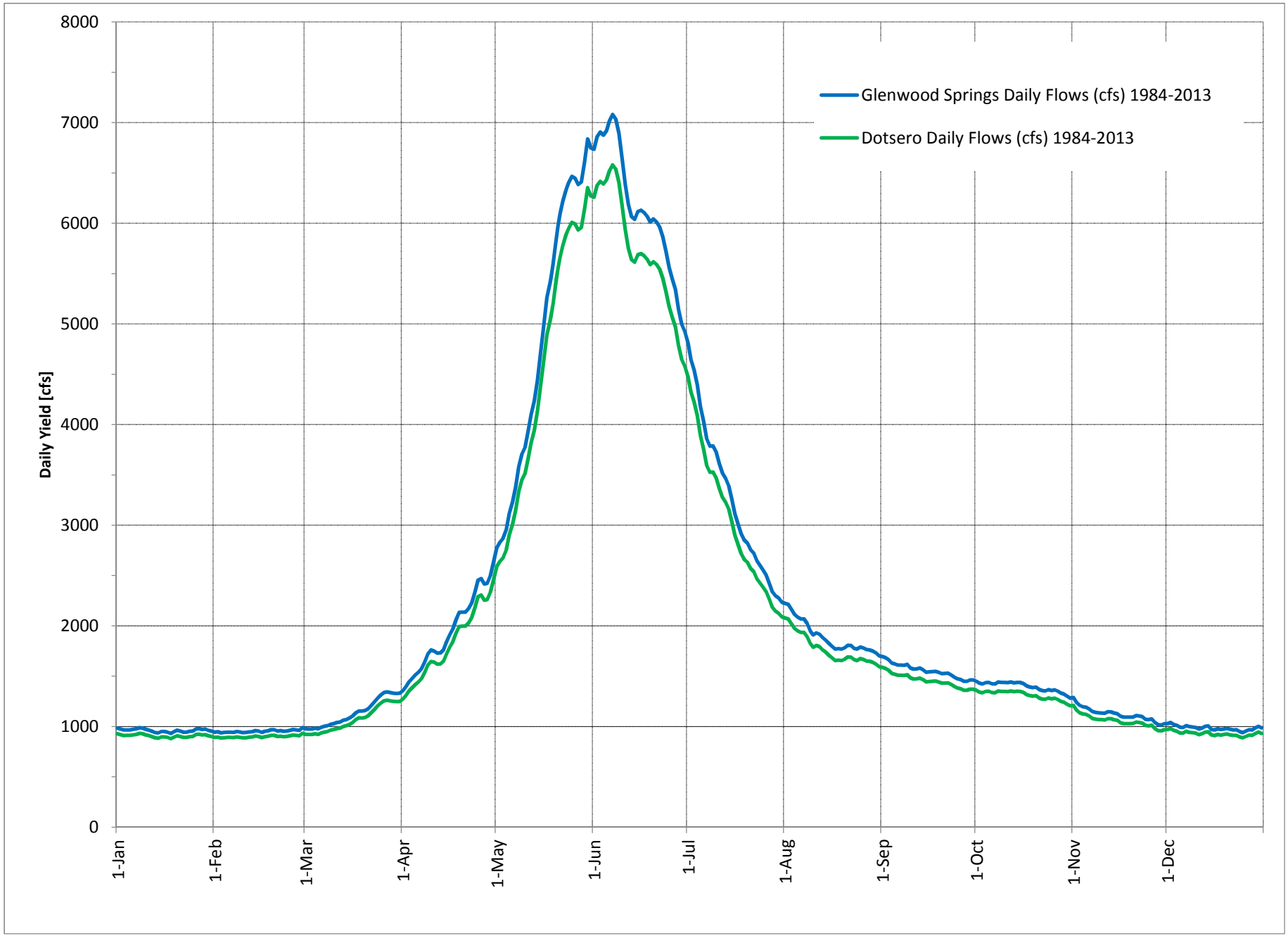
As shown in **Figure 5a**, the correlation of the daily flows for the study period was very strong with an R^2 over 0.99, meaning the liner regression accounted for 99 percent of the observed variance. We also investigated whether the relationship would change if we limited the flows to those observed during the time period of the flow claims (April through September). **Figure 5b** shows that the strength of the correlation was very similar as was the percentage increase of the Glenwood Spring flows over the Dotsero flows. Since the y-intercept is very small compared to the magnitude of the flows, the flows can be estimated to increase by the slope of the linear regression. In the case of both graphs, the slope is 1.079, which means that the flows measured at Glenwood Springs are about 7.9 percent higher than the corresponding flows measured at Dotsero.

[1] Although the contribution of No Name Creek Flows are not available at the No Name Whitewater Park, the yield of the drainage is small enough that it would not materially affect the WWE's hydrologic analysis.

WWE considered whether the relationship between the two gages could have changed since the Glenwood Springs gage was decommissioned in 1966. Since that time, there has been further development of the upstream transmountain diversion projects as discussed in **Section 3.0** that resulted in the selection of 1984 through 2013 as the representative period of record. The flows during this period were slightly less than the full period of record. There have not been any significant developments that would affect the contribution of flows between the Dotsero gage and the Glenwood Springs gage after 1966. Therefore, a correlation developed using the earlier flows from the upper basin above the Dotsero gage would likely underrepresent, if anything, the flows at the Glenwood Springs gage due to the contribution below the gage remaining constant, but the contribution above the gage being slightly lower in the last 30 years.

But due to the strength of the correlations, the linear regression equation for the daily flows was applied to the Dotsero gage daily flow dataset for the last 30 years (1984 through 2013) to get flow estimates at the proposed RICD sites during this period. **Figure 6** compares the measured average flows at the Dotsero gage to the estimated average flows at the historical Glenwood Springs gage for the period 1984 through 2013. This hydrograph of daily flows was used to update WWE's calculations involving the volume of historical flows at the whitewater parks.

Figure 6
Glenwood Springs Average Daily Flow versus Dotsero Average Daily Flow



6.0 TIME PERIODS OF CLAIMED WATER RIGHTS

Since filing the water court application, applicant has refined periods of the flow claims being sought for the three whitewater parks as set forth in the proposed ruling. The reaches containing the proposed whitewater parks already support thriving recreational boating activity that has developed based on the historical flows present. The City's application is intended to protect these existing river flows and to enhance the recreational boating experience through the development of up to three whitewater parks in order to control flows of three different rates that correspond to the City's intended recreational experiences (see **S_2O Report** for additional background on the basis for the three flow claims).

The manner in which the periods of flow claims were presented in the application appears to have resulted in some confusion over whether more than one flow was being claimed during any one period. **Table 3**[2] shows the flow claims and clarifies the timeframes over which the claims apply.

TABLE 3
Time Periods for Flow Claims

Time Period	Duration (days)	Flow (cfs)
April 1 through June 7	68	1,250
June 8 through July 1	24	2,500
July 2 through July 6*	5	4,000
July 7 through July 23	17	2,500
July 24 through Sept 30	69	1,250

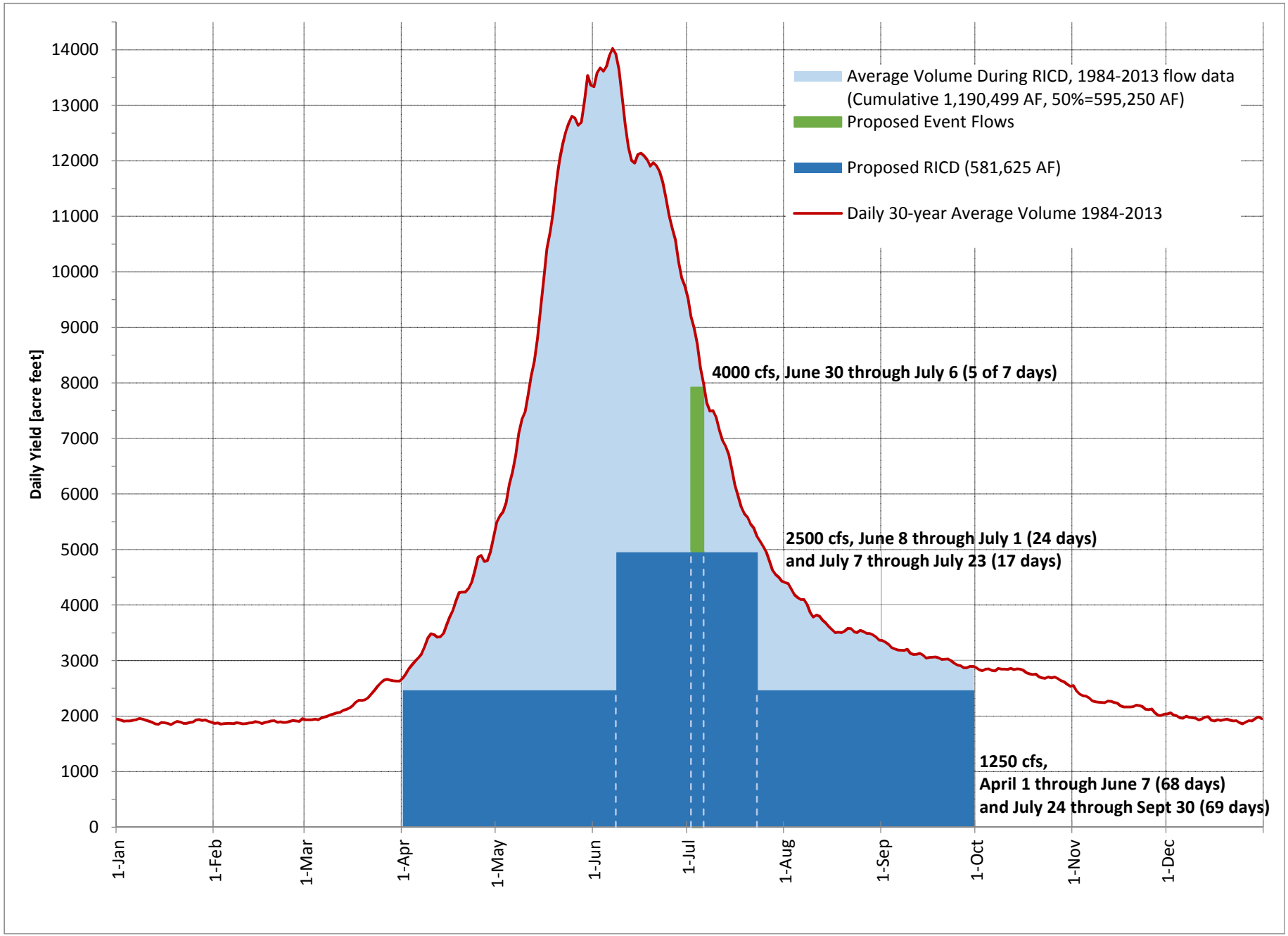
*Event flow will occur on 5 consecutive days within the 7-day time period of June 30 through July 6 depending on which day the Fourth of July falls.

As shown in the above table, there are only 46 days when the flow claims exceed 1,250 cfs. Forty-one days will be at 2,500 cfs and the 5 days of event flows will be at 4,000 cfs. **Figure 7** shows the timing of the flow claims that the City is currently requesting.

The event flows are intended to correspond to the Fourth of July holiday weekend. The event flows will be for 5 consecutive days within a 7-day time period of June 30 through July 6, depending on which day of the week the Fourth of July falls in a given year. **Table 3** shows this 5-day period occurring from July 2 through July 6, which is the latest that it would occur. WWE prepared **Table 4** to demonstrate how the event flow claims would be adjusted within the 7-day window depending on the day of the week that July 4 occurs.

[2] Table 3 details the City's desired result; however, through the process of negotiations, the flow amounts, duration, and/or dates could be modified. We provided the flexibility in the application, and are maintaining that flexibility, to be able to provide these potential adjustments to Table 3, if needed. Under any scenario, the City continues to intend to keep the claimed flow volume less than 50 percent of the historical average flow volume.

Figure 7
Time Periods of RICD Flow Claims



The RICD statutes include in the definition section that "Individual time periods shall not be shorter than fourteen days unless the applicant can demonstrate a need for a shorter time period." (§37-92-103(10.3)). While S_2O is addressing the basis for the event flows, it should also be noted that limiting the event flow duration to 5 days rather than the 14 days also promotes maximum utilization. By limiting the potential call period to only that needed for the event, only the minimum flows needed to satisfy the recreational flow demand are claimed so that no waste occurs.

TABLE 4
Event Flow Time Period Scenarios

Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed
	7/1	7/2	7/3	7/4	7/5			
	6/30	7/1	7/2	7/3	7/4			
		6/30	7/1	7/2	7/3	7/4		
			6/30	7/1	7/2	7/3	7/4	
				6/30	7/1	7/2	7/3	7/4
7/2	7/3	7/4	7/5	7/6				
	7/2	7/3	7/4	7/5	7/6			

The event flow periods are front-weighted with respect to the Fourth of July holiday. This would allow competitors to arrive prior to the event for practice at the higher flow rates. Additionally, the administration of the call could take a couple of days to effectuate. As a result, four of the seven scenarios would likely result in the event flows beginning on June 30. In the event that the event flows were to begin on June 30, two days of flows at 2,500 cfs would shift from the period prior to the event flows to after the event flows. Similarly, when the event flows begin on July 1, one day would shift from before to after the event flows.

Table 5 was prepared to show the calculation of the total volume of the RICD flow claims compared to 50 percent of the historical volume over the period of the claims. As the table demonstrates, 137 days at 1,250 cfs, 41 days at 2,500 cfs, and 5 days at 4,000 cfs yields a volume of 581,625 AF, which is less than 50 percent statutory threshold of 595,250 AF as specified by CRS §37-92-305(13(f).

TABLE 5
Calculation of Flow Claim Volume

				Period of Record 1984-2013 (30 yrs) RICD Period (April 1 through Sept 30)
Cumulative Average Volume (AF)				1,190,499
50% of Cumulative Average Volume (AF)				595,250
Proposed RICD Claim (AF)	April 1 through June 7	68 days	1,250 cfs	168,300
	June 8 through July 1	24 days	2,500 cfs	118,800
	July 2 through July 6*	5 days	4,000 cfs	39,600
	July 7 through July 23	17 days	2,500 cfs	84,150
	July 24 through Sept 30	69 days	1,250 cfs	170,775
			Total	**581,625**

*Event flow will be 5 consecutive days within the 7-day time period of June 30 through July 6 depending on which day the Fourth of July falls.

With the refined representative period of record, using the most recent 30 years, the total volume during the RICD period of April 1 through September 30 is 1,190,499 AF. Therefore, the revised volume of the RICD flow claims of 581,625 AF is less than 50 percent of historical volume of 595,250 AF.

7.0 WATER AVAILABILITY

Some comments received from objectors requested documentation of the water availability to satisfy the RICD flow claims. The historical flows in the Colorado River are substantial due to the large tributary area above the subject reaches and the presence of two sets of senior water rights.

As discussed in the Preliminary Engineering Report (WWE 2014), the Shoshone and Cameo calls both serve to draw flows through the three proposed whitewater parks. The Shoshone Powerplant call is for a non-consumptive hydropower right located a short distance upstream often controls the water rights able to divert in the upper Colorado River basin. Once that right has been satisfied at its senior rate of 1,250 cfs or its total rate of 1,408 cfs, the water is available in the river to be used by downstream appropriators, including the RICD water rights. During

periods when the Shoshone right is not calling, the City could still place a call, but with a significantly more junior priority due to its 2013 filing. All water rights with decreed priorities prior to 2013 would be senior to the RICD.

The downstream Cameo call by the Grand Valley irrigators also has the ability to call water downstream at a typical rate of 1,950 cfs. These rights benefit from having the Roaring Fork River as a source in addition to the tributary basin of the Colorado River above Shoshone. Since the RICD water rights are non-consumptive, they operate similar to an instream flow that is able to benefit from a downstream senior water right placing the stream on call. The concurrent use of the same streamflows for multiple beneficial uses is consistent with the doctrine of maximum utilization.

The Glenwood Springs gage used to develop the historical hydrograph has a tributary area of 4,558 square miles (mi^2). The flow claims are all located below the average hydrograph for the gage over the most recent 30 years of record. This period of record accounts for the effects of senior rights like Shoshone and Cameo placing calls as well as transmountain diversions such as the Colorado-Big Thompson Project and the Moffat Tunnel Collection System.

WWE looked at the frequency that the flow claims would have been satisfied during the 30 year period of record as a measure of the water availability. We compared each daily flow to the claimed daily flow for each of the 30 years. This analysis demonstrated that, at a minimum, the claimed flow would be available 10 out of 30 years, or 33 percent of the time, and the historical flows exceeded the claimed flows 78 percent of the time throughout the 30-year period of record. This demonstrates that there is unappropriated water available to satisfy the RICD flow claims.

8.0 COMPACT ENTITLEMENT

As outlined in Paragraph 11a of the proposed ruling dated December 5, 2014, the City will agree to comply with rules implemented by the State in order to allow the State to fully develop its compact entitlements or to not place a call for all or part of its water rights if no such rules are in place during a period of compact administration.

One factor that the CWCB considers with regard to whether a RICD water right could impair the State's ability to fully develop its compact entitlement is the potential for development of additional upstream diversion or storage projects. By keeping the flow claims below 50 percent of the historically available flow volume, the remaining 50 percent is available for future upstream appropriation. This volume of approximately 595,250 AF exceeds the total of all the transmountain diversions tabulated in **Table 1** (385,000 AF). In addition, the Moffat Collection System and the Windy Gap Diversion (via the Adams Tunnel) recently underwent firming projects to more fully develop their respective water rights. These undeveloped conditional water rights are all senior to the City's RICD filing.

While the subject reaches of the RICD claims have a substantial drainage basin area, there remains an even larger tributary area between the reaches and the state line. A comparison of the flows measured at Dotsero with those measured at the USGS gaging station near the state line (ID 09163500) shows that the flows at Dotsero only represent 35 percent of the flows at the state line. The additional 65 percent of the flow below the City's claims remain available for appropriation and future development of the State's compact entitlement. When factoring in the period of RICD claimed flows (April through September), the percentage of the state line flows potentially affected drops from 35 to 26 percent. Since the City has opted to stay below the 50 percent statutory threshold, the potentially affected flows drops to 13 percent, leaving the remaining 87 percent available for future diversions.

9.0 MAXIMUM UTILIZATION

In balancing the maximum utilization with intended recreational experience, CRS §37-92-305(13)(f) provides more flexibility for claims that do not exceed 50 percent of the historical volume of water. The applicant has opted to limit its claimed volume accordingly to allow for maximum utilization and future upstream diversions, while still achieving the flows necessary for its intended recreational experience.

The location of the proposed whitewater parks immediately downstream of the Shoshone Powerplant and upstream of the Cameo call inherently promotes maximum utilization. The water necessary to satisfy these senior water rights must pass through the stream reaches. Since

the RICD uses are non-consumptive, they can be satisfied by water en route to another calling right, or immediately below in the case of Shoshone. Making multiple uses of the same flow in the river promotes maximum utilization of the waters of the State.

As a practical matter, the water that would satisfy the proposed RICD water right would be comprised of a combination of appropriated flows conveyed through the subject reaches, upstream reservoir releases, and unappropriated flows. While the RICD water right will not be able to call for future reservoir releases, to the extent that they are physically present in the subject reaches allows them to satisfy both the RICD as well as the recipient of the releases. This further demonstrates the maximum utilization of waters of the State by the proposed RICD water rights.

By limiting the City's flow claims to less than 50 percent of the historical flow volume, the City is ensuring that there remains at least 50 percent of the historical flow volume available for future upstream junior appropriations for direct diversion or storage. The recreational boating demand for the 2,500 cfs flows extends throughout the flow claim period of April 1 through September 30. The decision to eliminate the early portion of the higher flow claims was made, in part, to preserve the early season flows for future upstream diversion or storage. By positioning the flow claims on the receding limb of the hydrograph, we have left the more reliable rising limb available for future appropriators, which is typically when upstream storage would occur.

10.0 NO INJURY TO GEOTHERMAL AQUIFER

To address concerns regarding potential injury to the geothermal aquifer, WWE enlisted the assistance of our adjunct scientist Robert Kirkham. Mr. Kirkham was formerly with the Colorado Geological Survey and was the lead geologist on the mapping of the Glenwood Springs Geologic Quadrangle (1995).

On behalf of the Hot Springs Lodge and Pool (HSLP), Zancanella and Associates, Inc. (Zancanella) reviewed and commented on the May 30, 2014 report prepared by S_2O that describes whitewater improvements to the Colorado River proposed by the City of Glenwood Springs. Zancanella described two "key concerns" with the Two Rivers site; the geothermal

aquifer is not an issue at the other two sites. The first concern involved potential impacts to the 100-year floodplain, which is addressed in S_2O's Supplemental Report.

The second concern was the "Potential injury to the geothermal aquifer due to the uncontrolled scour holes caused by the structures and/or due to construction activities". Zancanella recommended that any "direct or inadvertent excavation of the existing river channel material be avoided and/or prohibited", because it is "unknown how close to the surface the heated mineral water may be in any particular location".

Recently developed borehole data in the July 14, 2014 geotechnical report by Yeh and Associates, Inc. (Yeh) on the Grand Avenue replacement bridge provide valuable subsurface data on the geothermal system between Yampa Spring and the proposed Two Rivers whitewater park. Various reports prepared by or for the U.S. Bureau of Reclamation as part of their salinity investigations, particularly the report by Eisenhauer (1986), contain data on the subsurface conditions near and immediately down-valley of the proposed Two Rivers whitewater park. The recent investigation of the geothermal system by WWE (2013) for the Grand Avenue bridge replacement provides additional information relevant to Zancanella's concerns.

On page 7 of the Zancanella report, a deposit of travertine is described as forming a cap over the geothermal aquifer, and the report states that if this travertine layer was "breached or removed in a large manner" the geothermal aquifer could be disturbed, resulting in "a reduced flow or a complete loss of the Yampa Spring." While the travertine layer may be present at Yampa Spring and play an important role in the geothermal system at the spring, data from the 14 boreholes drilled by Yeh clearly demonstrate that a continuous travertine layer does not exist between Yampa Spring and the proposed Two Rivers Whitewater Park.

WWE (2013) advised Jacobs Engineering Group and Yeh of the concern that the HSLP has regarding potential relationships between a travertine layer and the geothermal system prior to undertaking their geotechnical drilling. Due to this concern, Yeh carefully examined the core from their boreholes for evidence of a travertine layer. Thin layers of calcite-cemented gravel and sand (2 to 18 inches thick) were noted in 4 of the 14 boreholes (TH-2, TH-3, TH-6, and TH-8), but the cemented layers appeared to be fragmented and broken. Our examination of the

borehole logs and photographs in the Yeh report supports this interpretation. It is very unlikely that a continuous travertine layer exists between Yampa Spring and the proposed Two Rivers whitewater park.

Additionally, Yeh stated that there is no indication of artesian conditions associated with the calcite-cemented layers. They concluded that it is "unlikely that the calcite cemented soils were acting as a confining layer within the alluvium."

If the geothermal system was capped by a travertine layer, then the temperatures of ground water beneath the calcite-cemented soil in the boreholes should have been high, somewhat similar to the temperature of Yampa Spring. Instead, ground water temperatures gradually increased with depth in all of the 12 boreholes in which they recorded temperature gradients, which included the four boreholes that encountered calcite-cemented sediment. Water temperatures beneath the calcite-cemented layers varied from about 70 to 81^{o} F, whereas temperatures were as high as 123^{o} F at the bottom of these boreholes.

Another of Zancanella's concerns related to the potential for excavations at the whitewater structure and the resulting plunge pool to penetrate into bedrock, which could affect the geothermal system. Based on the boreholes by Yeh and those described by Eisenhauer (1986), as well other various other geotechnical reports, the bedrock beneath the proposed Two Rivers Whitewater Park is estimated to be at least 50 feet deep. The nearest borehole to the proposed whitewater park is GT-11 (Eisenhauer, 1986), located on the north bank of the Colorado River and opposite of the confluence with the Roaring Fork River. The top of bedrock is over 80 feet deep in GT-11. The boreholes by Yeh (2014) that were closest to the proposed park and that were deep enough to reach bedrock are TH-2, TH-5, TH-6, and TH-7. Depth to bedrock in these boreholes ranged from 76 to 87 feet.

In the first paragraph on page 7, Zancanella reports that the whitewater improvements at Two Rivers are located within the mapped geothermal springs and seeps identified by the USGS (Geldon, 1989), and that this location is one of the discharge points of the geothermal aquifer. Geldon calls this location seepage area C (see his Figure 11), and he estimated that 10 gallons

per minute of ground water discharged in this seepage area. Geldon did not report a temperature or chemistry for these seeps (see his Table 2)

WWE (2013) examined the six seepage areas reported by Geldon (1989) as part of their investigation of the geothermal system for Jacobs Engineering and the Grand Avenue replacement bridge. Significant seepage of geothermal water was observed by WWE at five of the six seepage areas, but not at seepage area C. Travertine, tufa, and alluvium cemented by travertine were observed in this area; however, only one very minor seep was noted. The discharge from this minor seep was so small that efforts to estimate the flow or measure the pH and conductivity were unsuccessful. WWE concluded that either the seeps were no longer active in this area, or they are now located below the water level in the river.

In summary, the available evidence suggests that the geothermal aquifer is not regionally confined by layers of travertine, but by the bedrock formation at a depth in excess of 50 feet below the stream channel at the Two Rivers Whitewater Park. Since S_2O does not anticipate construction extending more than 18 feet below the bed channel (S_2O, December 2014), WWE does not believe the HSLP geothermal resource would be adversely affected by the Two Rivers Whitewater Park construction.

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Preliminary Engineering Design Report Supporting the City of Glenwood Springs' Recreational In-Channel Diversion Water Rights Application

May 30, 2014

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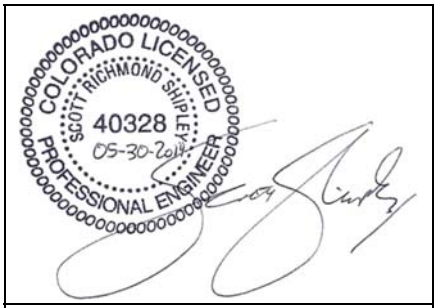

SCOTT SHIPLEY, P.E.

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Abstract

The City of Glenwood Springs desires to construct whitewater improvements in the Colorado River in, or near, the City limits. This preliminary design report details the design, functionality, and physical characteristics of three proposed whitewater parks within the study reach of the Colorado River from the community of No Name downstream to the confluence of the Colorado River with the Roaring Fork River in central Glenwood Springs. The design of the Whitewater Parks was commissioned by the City of Glenwood Springs with the objective of creating a recreational amenity that would serve as an attraction and would create a positive economic impact to the community.

Once created, the City would like to protect the functionality of this recreational amenity as an attraction to locals and visitors alike, and has filed an application for Recreational In-Channel Diversion (RICD) water rights for the proposed whitewater parks. In December of 2013, the City of Glenwood Springs, Colorado, filed its application with the Division 5 Water Court to appropriate flows in the Colorado River for up to six RICD structures, Case No. 13CW1309, Water Division No. 5. The application seeks a decree for the purpose of delivering flows to the RICD structure locations necessary to achieve reasonable recreational experiences, which meet the City's objectives, associated with the eventual construction of the proposed whitewater parks.

The flow rates claimed by the City of Glenwood Springs in the RICD application are the minimum necessary to achieve the reasonable recreational experiences intended by the City. Preliminary design plans, engineering data, and calculations included herein demonstrate the capability of the physical control structures to divert, capture, and control water within the stream channel and put this water to beneficial use. Descriptions and justification of the nature of the recreational experiences sought are also presented in this report. The Preliminary Engineering Report, written by Wright Water Engineers (May 30, 2014), establishes the time of day and season of use sought in the water court application, availability and frequency of flows, and stream gage data used for these analyses.

Introduction

From its headwaters, high in the Rocky Mountains, through Glenwood Canyon and downstream, past the City of Glenwood Springs, the Colorado River is vital to the economies of the communities that line its banks. In Glenwood Springs, much of the spring and summer tourist season revolves around water-based recreational opportunities on the Colorado River. Of particular interest to this study are non-motorized boating activities such as, whitewater kayaking, canoeing, rafting, river surfing, and stand-up paddle boarding that are popular activities that are regularly performed in the reaches surrounding town. As part of its ongoing efforts to improve water-based recreation, the City of Glenwood Springs desires to develop up to three separate whitewater parks on the Colorado River upstream of the river's confluence with the Roaring Fork River. As designed, each of these parks will each consist of two control structures designed to provide a variety of in-stream recreational experiences necessary to attract users from throughout the state, region, and nation.

In recent years, continued improvements in kayak technology and construction of whitewater parks worldwide have increased participation in the sport of kayaking and expanded media coverage of nationally and internationally sanctioned events. The design of these whitewater parks has progressed to where they can reliably provide desired recreational experiences in better venues and locations than had previously been possible. As a result, kayakers and kayak competitions have sought out well-designed whitewater parks, such as those found in Salida, Vail, and Steamboat Springs, as their preferred destinations. Numerous studies have shown that the attraction of these parks for kayakers and spectators represents a significant benefit to local economies. Specifically, these studies show how well-designed whitewater parks act to extend the boating season, attract major events, and provide a daily recreational amenity for residents and tourists, which can infuse millions of dollars annually into local economies.

At the direction of the City of Glenwood Springs, S2o Design and Engineering (S2o), as a part of a larger design team led by Holland and Hart LLP, has conducted a study of a reach of the Colorado River that extends from the No Name community downstream to the confluence of the Colorado and Roaring Fork Rivers to identify suitable locations, develop preliminary designs, and file for RICD water rights. Three initial site visits were performed by S2o to identify specific locations of the Colorado River best suited for the recreational improvements.

During the preliminary site visit, the entire reach was generally evaluated for potential sites. Under the direction of S2o, Sopris Engineering collected survey data at specific locations during the second visit. Detailed site inventories were conducted during the third visit. This report details the design and engineering process to date, including:

Site selection and information gathered or created about the selected sites and proposed designs includes:

- The design process
- The anticipated users
- The recreational experiences sought
- The preliminary design
- The hydrology
- The functionality of the proposed whitewater parks

The Colorado River Through Glenwood Canyon

Figure 1, shown below, illustrates the reach of interest to this study.

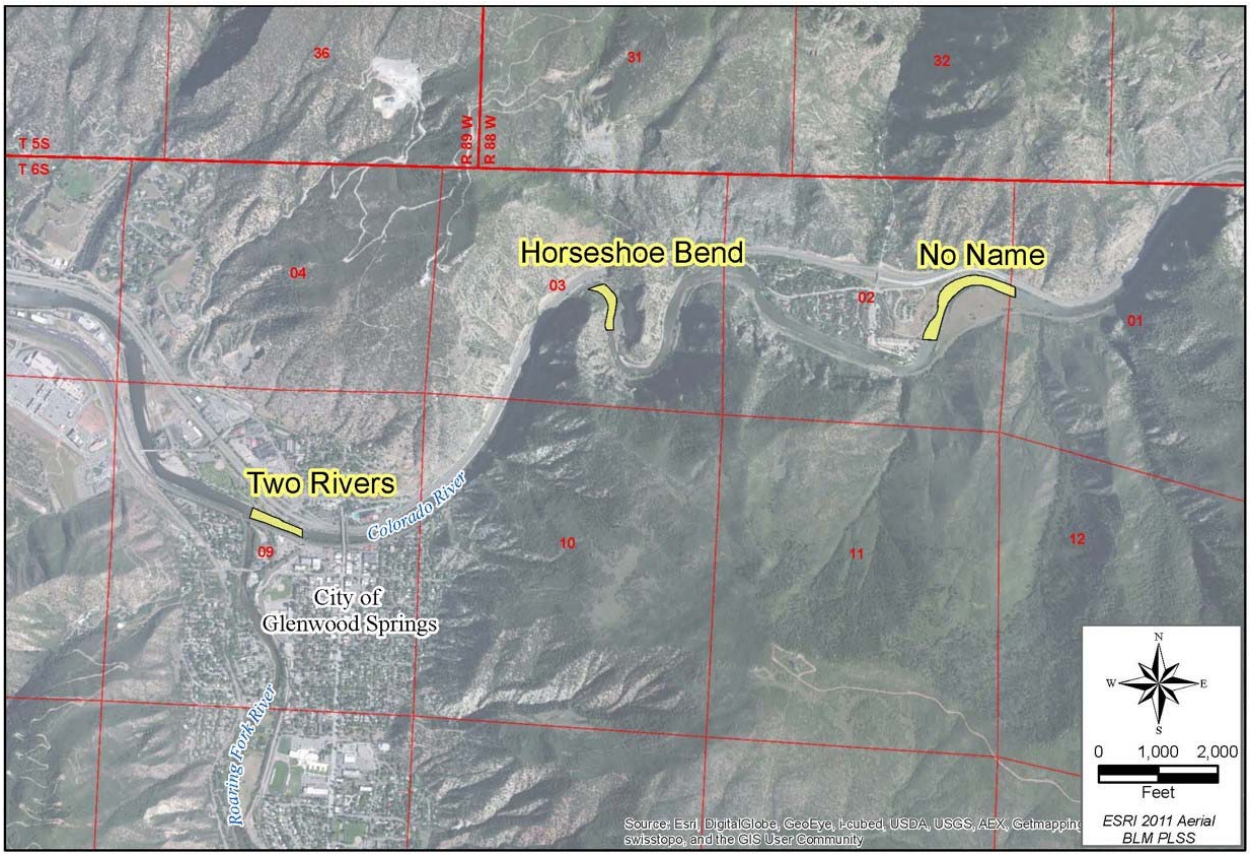

Figure 1 The Overall Reach and Specific Locations Identified for the Filing of the RICD Water Rights

Figure 1 maps the Colorado River from the No Name community downstream to the confluence of the Roaring Fork and Colorado Rivers. The reach of interest to this study is located on the Colorado River between the No Name Rest Area near Interstate 70 (I-70) Exit 121 and the confluence with the Roaring Fork River near I-70 Exit 116. Three preferred alternatives, within this reach, have been selected for developing river recreation enhancements in the community of Glenwood Springs. This reach has adequate gradient, flows, and access to support multiple whitewater features that can provide one of the most extensive seasons in the state for recreational boating opportunities.

Geomorphology of the River Reach

The combined distance along the Colorado River between the RICD whitewater park sites measures 3.25 miles in length. The river drops roughly 60 feet over this length. The reach is moderately sloped, with a calculated average bed slope of 0.35 percent. Visual inspection of the alluvium suggests a well armored coarse riverbed composed largely of sands, gravels, cobbles, and small boulders. Occasional occurrences of medium to large boulders are also present within the reach and are typically associated with rock fall

from the canyon walls or blasted rock used for bank protection of the interstate and railroad embankments. The morphology of the river reach can be described as pool riffle and transitions between entrenched bedrock in Glenwood Canyon and the alluvial deposits found downstream of the canyon mouth.

This is an often beautiful and scenic reach of the river but, in areas, human impacts to the morphology of the Colorado River are apparent. This is particularly within the active floodplain. Here, evidence of channelization and existing in-channel structures are apparent.

In the upper portions of the study reach, upstream of Horseshoe Bend, the channel is largely entrenched, with steep vegetated banks and canyon walls rising up from the river bed at numerous locations. The river channel has been moderately impacted by human activities where parts of this reach are confined to the south by the Union Pacific Railroad or to the north by armoring associated with the highway.

Throughout most of the study reach, Interstate 70 largely parallels the Colorado River. At Horseshoe Bend the river channel bends away from the Interstate in an oxbow for approximately 1.75 miles before returning to its previous westerly direction and the road again parallels the river through the remainder of the reach. The Horseshoe Bend reach of the river is beautiful and largely pristine although the banks were impacted by the previous roadway on the North Bank (now a trail) and the railroad which is located high on the South bank. There are river access points and a riverside shelter in this area.

In the lower portions of the reach—extending downstream from Horseshoe Bend to the confluence with the Roaring Fork River—the most striking characteristic of the river channel is its engineered nature. For nearly the entirety of this reach, the river is bounded to the north by I-70 and to the south by the Union Pacific Railroad tracks. Channelization is common through much of this reach, where riprap bank armoring and floodwalls have been erected to prevent lateral channel migration and overtopping. Numerous other structures have also been constructed in the river channel including culvert outfalls, bridge abutments, bridge piers, and an abandoned bridge footing.

Geothermal activity is also common within the lower portions of the study reach, where numerous springs and seeps discharge into the river.

Hydrology of the River Reach

A full report on the hydrology of the Colorado River, as it pertains to the RICD water rights application, has been prepared by Jonathan Kelly of Wright Water Engineers in addition to this report. Certain aspects of the river's typical flow regime are pertinent to the design of these structures and are included in this report in the interest of supporting the design process.

Stream flow for the river reach is measured at the United States Geological Survey (USGS) stream gage 09070500 (Colorado River near Dotsero, CO). Stream gaging has been performed consecutively at this

site for the past 72 years, since 1941. The hydrology of the reach is generally snow-melt dominated with a mean annual peak stream flow of 9,924 cfs, which typically occurs between May 10th and August 5th (Figure 2). The maximum annual peak stream flow recorded at this gage is 22,200 cfs, which occurred on May 24th, 1984; and the minimum annual peak stream flow recorded at this gage is 2,020 cfs, which occurred on June 1st, 2002.

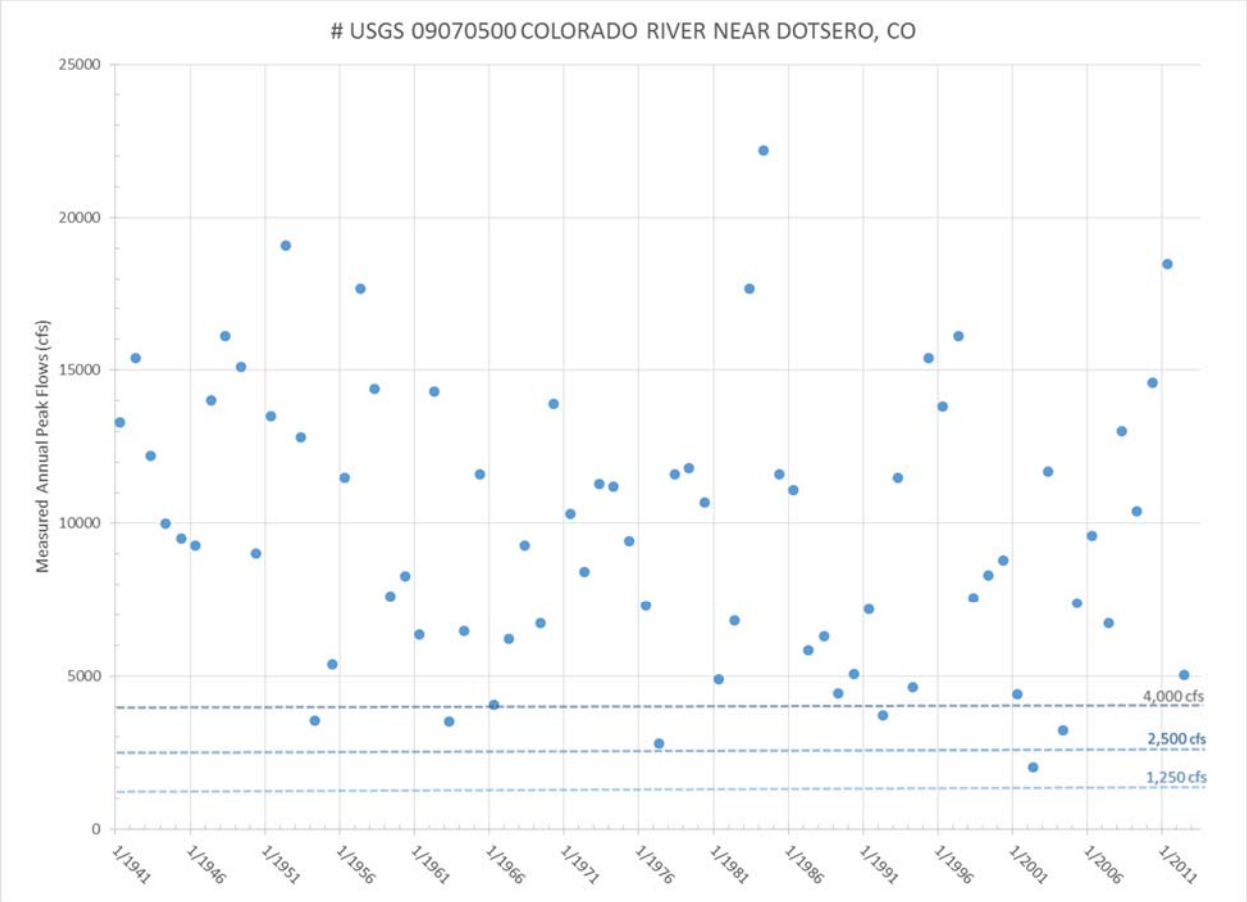

Figure 2 Annual Peak Runoff on the Colorado River as Measured at USGS Stream Gage 09090500 near Dotsero, CO

The mean annual flow was also calculated for the reach using mean daily flow rates measured at the Dotsero gage (09070500). The mean annual flow describes the average flow regime of the river throughout the year. This parameter is critical to understanding the expected flow rate in the river at a particular time in the year. A hydrograph describing the mean annual flow is shown in Figure 3.

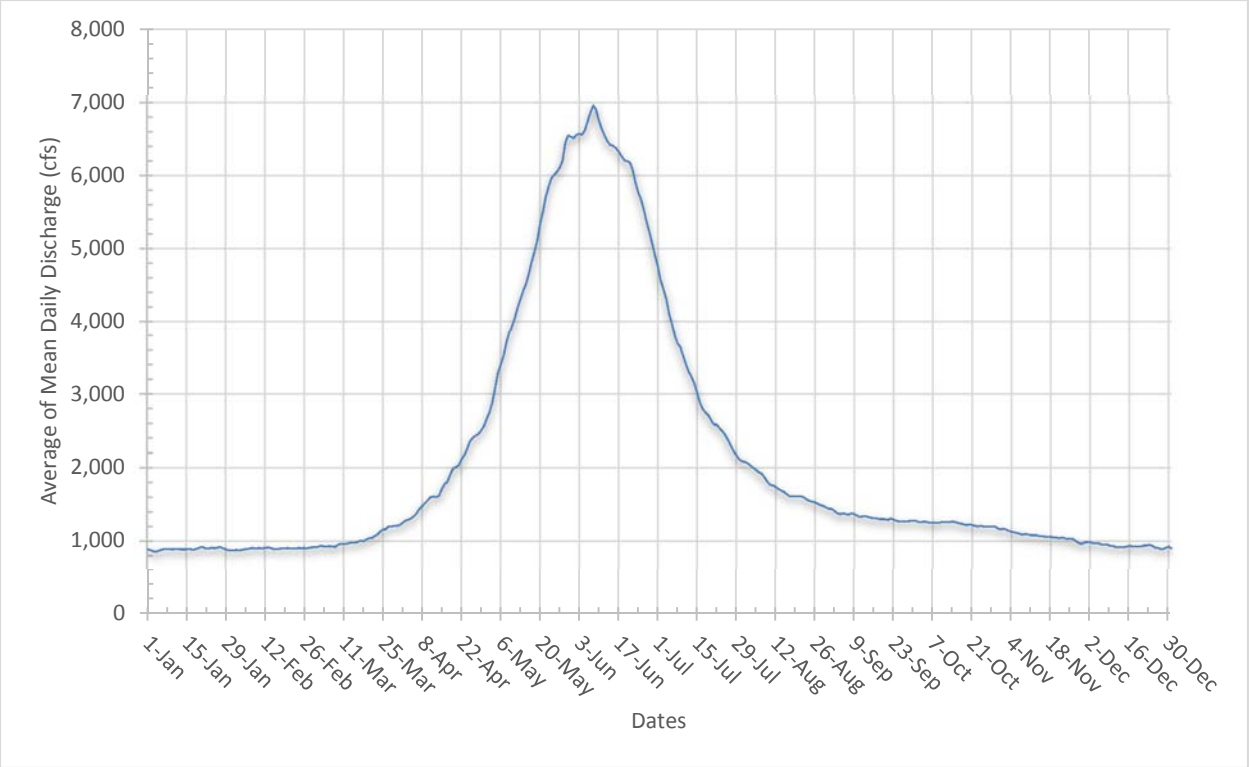

Figure 3 Average of the Mean Daily Discharge Measured at USGS Stream Gage 09070500 near Dotsero, CO

Figure 3 illustrates the mean daily flow rates in the Colorado River near Glenwood Springs. These flows are particularly high when compared to other rivers in the state. Peak average flows in early June are nearly 7000 cubic feet per second (cfs). Even low flow time periods experience flows in the range of 900 to 1100. The available flows in this reach are higher than those seen in other locations in which RICDs have been claimed.

RICD Filing Locations

Three separate sites within the study reach have been selected as preferred locations for whitewater parks and the associated filing of RICD water rights. These sites are shown in Figure 1 and include No Name, Horseshoe Bend, and Two Rivers Whitewater Parks.

To investigate the feasibility of developing whitewater parks at these sites, S2o has performed field reconnaissance to compile engineering data that describes the physical features of the sites, developed preliminary designs, and performed preliminary hydraulic calculations. Stakeholders and regulatory agencies have also been contacted with regard to these RICD filing locations.

No Name

Figure 4 Looking Northeast (Upstream) from the North Bank of the Colorado River at the No Name Site

No Name is the upstream most site of the three proposed whitewater parks (Figure 4). It is located approximately 1.5 river miles upstream of the Glenwood Springs City Limits at the No Name Rest Area. Vehicular access to the site is achieved via the No Name Exit (118) off of I-70, approximately 2.5 miles east of the main Glenwood Springs Exit (116). Pedestrian and bike access to the river would be via the northwest river bank, adjacent to the Colorado Department of Transportation (CDOT) rest area and the Glenwood Canyon Bike Path. Furthermore, downstream float through access to the site can be achieved along the Colorado River from numerous launch sites upstream. Existing parking, bathrooms, and hardened trail access would provide the facilities in support of the proposed whitewater park.

Property ownership at the site is split between CDOT and private property (Appendix B, Figure 2.1). The basis for the property ownership and boundary data are the Garfield County GIS mapping Service (http://garfield-county.com/geographic-information-systems/index.aspx). The northeast river bank is owned by CDOT. A collaborative process with CDOT has been initiated to identify cooperative management opportunities at the rest area to provide for parking, access, and site facilities use. The southeast bank is privately owned and was historically accessed via a cable car crossing the Colorado River. Discussions with the private property owners have also been initiated to identify opportunities for future development of the whitewater park. The downstream property owner is also private.

This site has many advantages. It is easy to find, has ample existing parking and is largely removed from the No Name neighborhood. Due to its current use as a put-in and take-out for many river users, it is well-known to river users. The existing trail access is also advantageous in that it can accommodate significant foot traffic and would also provide access for vehicles under special authorization, if so needed, for events, emergencies, or other purposes.

Preliminary designs at this site (Appendix A, Figure 1.3) demonstrate the compatibility of this reach for the development of a whitewater park. Here, the Colorado River drops between 5.8 and 6.6 feet over the 1,430 foot long No Name RICD reach at the claimed flow rates. The existing channel width also ranges between 110 and 180 feet at 1,250 cfs and 120 and 220 feet at 4,000 cfs. Existing streamflows within the reach are also sufficient to meet all requirements and needs of a whitewater park. The

physical characteristics of this site offer the opportunity to create play features that would enhance Glenwood Spring's reputation as a boating destination.

Horseshoe Bend

Figure 5 Looking South (Upstream) from the North Bank of the Colorado River at the Horseshoe Bend Site

Horseshoe Bend is located at the upstream-most point of the Glenwood Springs City Limits along the Colorado River (Figure 5). The proposed whitewater park site can be seen from the No Name Tunnel on I-70 when traveling eastbound into Glenwood Canyon. The Horseshoe Bend site would be accessed via I-70 exit 118 (No Name) and would require that users transit through a portion of the No Name neighborhood along US Highway 6 & 24 (No Name Lane), formally known as State Highway 4. At the end of No Name Lane, an access gate currently blocks motorized vehicular traffic from continuing along Highway 6 & 24. From this point downstream, the Highway 6 & 24 ROW is currently used as a hardened trail for bike and pedestrian traffic. Historically, this ROW was the main vehicular access from Denver to Grand Junction, until recent construction of the Glenwood Canyon Section of I-70. The location of the Horseshoe Bend RICD control structures is approximately 0.6 miles downstream of the access gate along the bike path.

The City of Glenwood Springs owns the land along both banks of, and under, the river where the RICD control structures would be constructed (Appendix B, Figure 2.2). Immediately downstream of the City parcel, along the north river bank, the CDOT ROW parallels the Colorado River downstream to the center of town. Immediately upstream the Bureau of Land Management (BLM) manages the property and has developed a covered picnic area and boulder weir to produce a large river eddy.

Access to the site along the north bank can be achieved through various means. Pedestrian and bike access can occur from upstream or downstream along the existing Glenwood Canyon Bike Path. Float through river access can also be achieved from numerous boat launches upstream.

This site also has many advantages. It is owned in its entirety by the City of Glenwood Springs. Furthermore, the site is visually stunning. It is surrounded by steep canyon walls and is largely secluded but for the Interstate passing through the north end. There is ample flat land space available near the proposed whitewater park to provide for the development of facilities, parking areas, and a vehicular turn-around.

Preliminary designs (Appendix A, Figure 1.4) show the physical characteristics of the Horseshoe Bend site are also appropriate for the development of a whitewater park. The Colorado River through this reach drops between 2.7 and 3.0 feet over its 929 foot length. The existing channel width also ranges between 100 and 140 feet at 1,250 cfs and 105 and 160 feet at 4,000 cfs. Existing streamflows within the reach are also adequate to meet all requirements and needs for the construction of a whitewater park.

Two Rivers

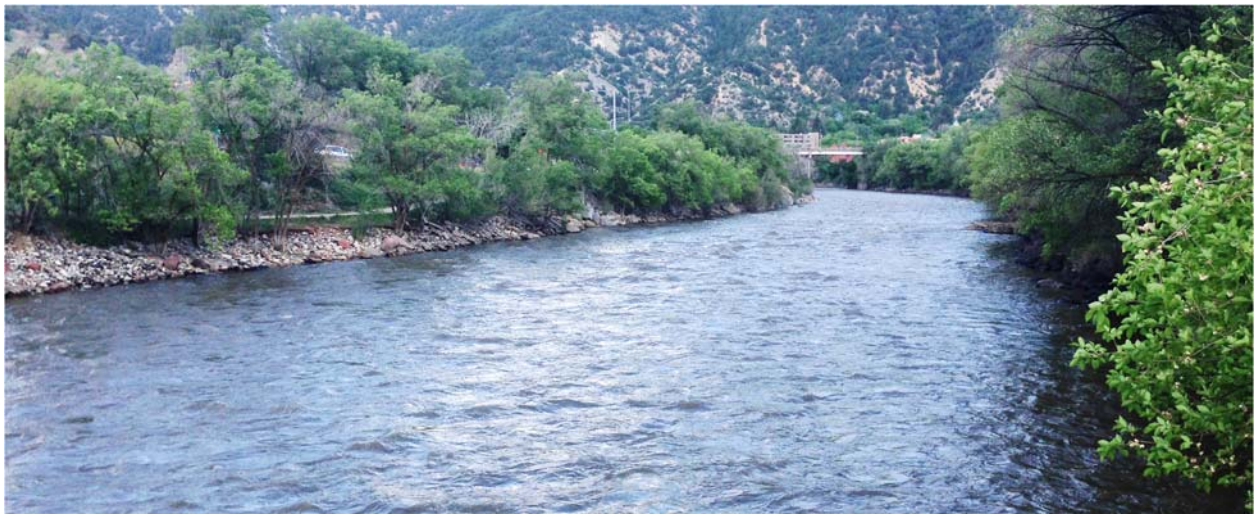

Figure 6 Looking East (Upstream) from the South Bank of the Colorado River at the Two Rivers Site

Two Rivers Park is the downstream-most location of the three proposed whitewater parks (Figure 6). This site is located near downtown Glenwood Springs, just upstream of the confluence between the

Colorado and Roaring Fork Rivers. Of the locations considered, this site is the closest to the Central Business District of Glenwood Springs.

The City of Glenwood Springs owns the land along the north bank of the river, from the existing pedestrian bridge at Two River Park to approximately 225 feet upstream (Appendix, B Figure 2.3). Beyond this point, the north river bank falls within the CDOT ROW. Along the south bank, from the pedestrian bridge to approximately 900 feet upstream, the land is within the Union Pacific Railroad ROW. Currently, a city bike path passes under the Railroad ROW through an existing agreement/easement.

Vehicular access to the site is achieved via Two Rivers Park. Here ample parking, bathrooms, and hardened trails would provide support facilities for the proposed whitewater park. Pedestrian and bike access can occur from Two Rivers Park on the north bank or from the Roaring Fork River bike path on the south bank. Float through river access can be achieved from numerous boat launches upstream. A collaborative process with CDOT has already been initiated to define additional access and construction opportunities at the site.

The advantages of developing a whitewater park at the Two Rivers site include existing and historical use, physical characteristics, and existing infrastructure. Two Rivers Park is highly utilized as a put-in and take-out along the Colorado River and provides parking and direct access via hardened trails to the proposed RICD structures. Additionally, ongoing plans to redevelop the former city wastewater treatment plant, located adjacent to the proposed whitewater park, may offer new opportunities for parking, restrooms, and facilities to support this site.

Historically, a railroad bridge was located near the upstream end of this site. This is evidenced by an abandoned bridge abutment, located approximately 750 feet upstream of the pedestrian bridge along the south bank, and an abandoned pier footing, located approximately 575 feet upstream of the pedestrian bridge found within the main river channel. Additional structures, currently in use, are also found at the site. These include the abutments of the pedestrian bridge and the culvert outfall for the Glenwood Hot Springs. Furthermore, shattered concrete and riprap line the river's banks through this reach.

Preliminary designs (Appendix A, Figure 1.5) demonstrate the compatibility of this reach for the development of a whitewater park. Here, the Colorado River drops between 2.8 and 4.0 feet over its 801 foot length. The existing channel width also ranges between 110 and 140 feet at 1,250 cfs and 130 and 160 feet at 4,000 cfs. Existing streamflows within the reach are also adequate to meet all requirements and needs for the construction of a whitewater park.

Glenwood Canyon/Colorado River User Groups

The reaches of the Colorado River through Glenwood Canyon and downstream to the confluence of the Roaring Fork River have been used by various "User Groups" over the past several decades. These

groups have a vested interested in the outcome of this process and any proposed changes to this section of the Colorado River. For this reason, target user groups have been identified along with the associated design criteria to address group-specific interests for the purposes of this design. The following list of currently identified users includes, but is not limited to:

- The City of Glenwood Springs;
- Local Residents and Businesses;
- Land Owners;
- Spectators;
- Fisheries and Fishing Groups;
- Commercial Rafting;
- Recreational Boating;
- River Floating; and
- Advanced Boating.

The City of Glenwood Springs

The City of Glenwood Springs has a significant interest in the manner in which the Colorado River is utilized through the reaches surrounding the City. The City currently uses the river for flood conveyance, aesthetics, wildlife habitat, recreation, and tourism amongst other uses. As part of this project, the City has expressed a desire to improve opportunities for tourism and local recreational amenities through the creation of whitewater recreational enhancements while simultaneously protecting local property and citizens from flooding, maintaining or improving aquatic and riparian habitat, and preserving and enhancing the City's reputation as a travel destination.

Glenwood Springs is well-known as a hub for tourism in Colorado. The City is currently home to many attractions, including Sunlight Mountain Resort, Glenwood Hot Springs, Hotel Colorado, and Glenwood Caverns Adventure Park. Hiking and biking trails are also common in Glenwood Canyon and the surrounding region. The Glenwood Springs Whitewater Activity Area, located approximately two miles downstream of downtown, features renowned high water waves that serve to attract freestyle whitewater enthusiasts from around the globe during annual high stream flows each year.

These attractions draw tourism to the area, which is a major contributor to the economic growth and stability of the City and is a significant aspect of the City's brand. The Colorado River, as it cuts through Glenwood Canyon immediately upstream of town, is yet another vital facet of tourism to the City. Commercial and recreational boaters alike use the Class II-IV rapids of the Colorado River for whitewater recreation and, as a result, the City has a primary interest in creating whitewater attractions in the reach that maintain and grow usage of the river near the City.

The City's primary objective in this process is to create new whitewater features that will efficiently use available stream flow to draw additional users to Glenwood Springs and, through efficient design, will also enhance and improve the quality of whitewater available at times other than peak runoff,

producing a larger window of opportunity and extended stay times for users. The proposed features are anticipated to enhance Glenwood Springs' reputation as a destination for whitewater recreation by providing new recreational opportunities for various user types and levels. The RICD will simultaneously protect existing use in the river corridor. Economic benefits associated with the proposed whitewater parks are also anticipated to improve the standard of living for local residents.

Associated Design Criteria

The following design criteria address specific interests of the City in the development of this design:

- The improvements should be designed to attract multiple user groups while accommodating existing users;
- The improvements should serve as an attraction to local users and provide additional river-based recreation opportunities for local residents and tourists;
- The improvements should serve to further market Glenwood Springs' brand as an outdoor recreation community and premier whitewater travel destination;
- The improvements should expand the season for in-stream recreation, producing a larger window of opportunity and extended stay times for users;
- The improvements should not increase flood risk to adjacent properties; and
- The improvements should enhance local aquatic and riparian habitats.

Local Residents and Businesses

Studies show that whitewater parks can have a significant impact on local communities, which may include the local and regional economy, quality of life, and draw for new residents among others. Local residences and businesses expect the proposed whitewater parks to maximize the benefits to their community.

These whitewater parks are to be located in the community of Glenwood Springs and, as such, must be designed to be considerate of current uses. Existing businesses, facilities, parks, infrastructure, roads, and walking paths in Glenwood Canyon and along the river near town are used extensively by local residents and tourists, and thus these users have an interest in any proposed improvements to the river channel and its banks.

Residents and businesses seek a project that will positively impact the local economy by attracting new visitors and extending stay times, thereby increasing expenditures at local businesses, to the direct benefit of the community. These users also expect the improvements to align with the existing community and to improve the quality of life for local residents in addition to catering to visitors.

Associated Design Criteria

The following design criteria address specific interests of Residents and Businesses in the development of this design:

- The improvements should contribute to the quality of life for residents of Glenwood Springs;
- The improvements should further the City's connection with an outdoor recreational lifestyle and, as such, act as a beacon for new residents and business;
- The improvements should be designed to attract new visitors to the area and expand stay times;
- The improvements should be designed to enhance river access, seating, and viewing opportunities to the direct benefit of residents and visitors; and
- The improvements should be designed to maximize the economic benefits to local residents and businesses.
- The improvements should be designed to protect existing beneficial uses, such as fishing, which already provide an economic benefit to the community.

Land Use Compatibility

Whitewater park development within the RICD reaches will need to be compatible with present and future uses of the Union Pacific Railroad and I-70 corridors. Through the broader study reach, the Colorado River has been channelized between the railroad and I-70, decreasing overbank flooding and lateral channel migration. Several of the primary land use compatibility issues at the whitewater park sites revolve around river access, channel stability and flooding. In order to address these issues, whitewater park improvements should not increase flood risks relative to existing conditions nor should channel modifications destabilize the river banks or bed. The whitewater parks should also be designed to respect private property near the project.

Associated Design Criteria

The following criteria address the interests of existing land uses in the development of this design:

- There should be no net-negative impacts from the whitewater park to the regulatory floodplain;
- The improvements should be developed to maintain or improve stream channel and bank stability within the proposed whitewater park reaches; and
- Access to and circulation within the whitewater parks will need to be developed to prevent unauthorized trespass onto private property.

Spectators

Whitewater parks are typically visited by a large number of spectators who come to the park to view the paddlers in their daily usage, events, festivals, and competitions. These users also tend to visit City businesses and can have a significant economic benefit for the City.

Even without advertised events, spectators commonly frequent whitewater parks to view the facility, river, and activities. Often these spectators arrive without a specific agenda and may spend extended periods of time watching the informal activities. This user group constitutes a large cross-section of the general community and may have varying needs, including food, restrooms, and transportation, and would desire seating and shade with a view of the activities. Often, these users may also seek alternative activities, including nearby dining and shopping opportunities.

Associated Design Criteria

The following criteria address understood interests of Spectators in the development of this design:

- The improvements should include comfortable, shaded seating with a good view of the water activities;
- The site should accommodate Spectators who would access the site, watch events or take part in festivals, use the facilities and depart the site;
- The site should have convenient parking, access, and restrooms; and
- The site should provide access to local businesses and restaurants.

Fisheries and Fishing Groups

Private fishermen and commercial fishing outfitters are key stakeholders in any proposed physical changes to the river. At least ten commercial fishing outfitters are located within or around the City of Glenwood Springs. Many of these outfitters offer float trips down the Colorado. These trips run varying sections of the Colorado, depending on water quality, seasonal flows, and insect hatches, and can extend from Glenwood Canyon as far downstream as South Canyon. The fishing season on these reaches can last year-round, depending on the severity of the winter, fishing restrictions, and regulations. Private and commercial fishing float trips typically use inflatable rafts or fiberglass drift boats to navigate the river, though other river craft can also be used. Existing bank fishing opportunities and fishing access should also be considered in the development of this design. The inclusion of terraced banks, expanded access, and ADA fishing piers are means by which a whitewater park can improve fishing opportunities. Commercial and recreational fishermen alike use the Colorado River for industry and recreation and subsequently have a vested interest in protecting their existing use of the river corridor while simultaneously seeking to establish new opportunities to expand its use.

The needs of the existing fishery will be considered when designing this whitewater park. In general, the ideal habitat for cold-water fish species includes spawning grounds, appropriate water quality, opportunities for upstream and downstream mobility, shaded pools and riffles, and holding eddies. One

of the primary objectives of this project should be to protect and improve in-stream habitat as well as allow for fish passage.

Associated Design Criteria

The following criteria address the interests of Fisheries and Fishing Groups as part of the development of this design:

- The improvements should provide improved bank fishing access and allow for boat passage without altering the character of the existing reach;
- The improvements should be designed to allow for environmentally sensitive construction techniques and to minimize temporary construction impacts; and
- The improvements should provide aquatic habitat and accommodate fish passage.

Commercial Rafting

Commercial rafting outfitters have an economic stake in the outcome of this project as well. At least seven commercial outfitters use the Colorado River for trips between the Shoshone and Grizzly sections of Glenwood Canyon to numerous public and private boat launches downstream. Commercial rafting draws a significant number of users to the Glenwood Springs area and the rafting experience is an existing and valued attraction to the City.

A typical whitewater rafting trip is guided, meaning several inexperienced rafters paddle and float the river in a single inflatable raft under the direction of a guide. This user has sufficient safety equipment and aid, in the form of lifejackets, helmets, ropes, and additional boats, to ensure the safe navigation of rapids of moderate to intermediate difficulty. In general, this user is capable of, and seeks out, the types of whitewater features found in a whitewater park and is knowledgeable in the safe navigation and use of whitewater parks. Often, the recreational experience of this user is benefited from man-made whitewater features that create added splash factor and may extend the whitewater season by providing additional rapids at lower flows when other parts of the river are less thrilling.

Commercial outfitters also offer “duckie” trips downstream of the Grizzly Creek boat launch. Typically, duckies are inflatable one-or-two-person open kayaks of comparable construction to inflatable river rafts, only smaller. Similar to whitewater rafting, duckies that float the river as part of a commercial operation would generally be grouped and guided and possess sufficient safety equipment and resources to ensure safe and knowledgeable passage through a typical whitewater park. These users would also often seek out the type of attractions found in whitewater parks.

To protect existing uses and provide additional benefit to commercial rafters and duckies, improvements should be designed to form exciting whitewater waves at a variety of flows and to create attractive features outside of the regular boating season. Furthermore, because these craft tend to be less maneuverable than hard kayaks, these users desire clear and obvious lines through which to navigate.

Associated Design Criteria

The following criteria address the desires of Commercial Rafters and duckies as part of this design:

- The improvements should provide exciting whitewater waves at a variety of flows and create attractive features outside of the regular boating season;
- The improvements should be navigable for guided whitewater rafting and duckie trips with clear and obvious routes; and
- The improvements should not impair the existing commercial rafting experience.

Recreational Boating

The Colorado River through Glenwood Canyon experiences heavy use from recreational boaters due to the regionally unique seasonal boating window afforded by the Shoshone Power Plant and the expansive Colorado River Watershed. Numerous public raft and kayak launches are available to users upstream, within, and downstream of the City. In general, these users have adequate experience to navigate typical rapids created by the park, locate designated access points, and identify appropriate ingress and egress to the river. Furthermore, these users typically possess sufficient safety equipment in the form of lifejackets, helmets, and ropes to safely navigate rapids of intermediate difficulty. These users typically transport large amounts of gear to and from the river in the form of kayaks, rafts, stand-up paddle boards, and associated equipment, and therefore desire parking areas in close proximity to the river.

Recreational rafting is also popular in the reaches of the Colorado River near and through Glenwood Springs. Whitewater rafting is typically performed using inflatable rafts either mounted with a frame and oars or with a group of paddlers. These users often seek out similar whitewater features to those found in whitewater parks and are knowledgeable in the safe navigation and use of whitewater parks. Man-made whitewater features benefit these users by creating additional rapids to navigate, often times at sites where limited opportunities previously existed. Moreover, the extension of the whitewater season and increased splash factor provide further benefit to these users. To protect this existing use and create additional benefits, improvements should be designed to provide intermediate passage to whitewater rafts and other forms of river craft by establishing clear and obvious lines through which to navigate throughout the range of flows anticipated in these reaches.

Of specific interest in this discussion is the nature in which hard-shell boaters may use this section of the Colorado River. A typical outing may take one of two forms: either parking-and-playing or river running. Park-and-play boaters select a single destination whitewater feature and will remain there for the entire duration of their outing; this is a typical usage of whitewater parks. This user is looking for an attractive play wave that offers moderate freestyle whitewater opportunities. Recovery pools, recirculating eddies, access to and from this feature, riverside viewing, staging, restrooms, changing stations, and resting places are also key for park-and-play boating.

River-running boaters typically also stop and play at a whitewater feature as part of their outing, but are generally en route to a separate destination take-out from an upstream put-in. These boaters typically descend through extended sections of the river, stopping from time to time to play and rest. Sometimes these users are challenged in descending specific rapids within the river sections and may require well defined eddies for rest and preparation.

Typically, both of these users desire dynamic whitewater features that vary in difficulty both seasonally and between features within the park. In general, freestyle whitewater "play" features should provide for ease of access and non-violent surfing and freestyle kayaking opportunities. Often, park-and-play kayakers may use the whitewater park for shortened periods of time (such as after work or during lunch breaks). Additionally, these users will seek to extend the duration of the whitewater paddling season through the use of the whitewater park's more efficient design.

In general, both of these types of boaters will be attracted to Glenwood Springs and catering the final design of the project to their interests will maximize benefits to the City.

Associated Design Criteria

The following criteria address the interests of Recreational Boaters as part of the development of this design:

- The improvements should provide a variety of quality whitewater activities in an attractive setting across a wide range of flows;
- The improvements should create whitewater features that vary in difficulty from novice to advanced expert users;
- The improvements should be easily accessible and nearby parking in close proximity to the park is desired;
- The improvements should anticipate a steady flow of downstream river traffic and not create barriers to existing river use;
- The improvements should serve to extend the whitewater season through the reach and create increased splash factor for downstream users;
- The improvements should be designed to provide safe passage to downstream users, by establishing clear and obvious lines through which to navigate; and
- The improvements should include recovery pools, recirculating eddies, access to and from the feature, riverside viewing, staging, restrooms, changing stations, and resting places.

River Floating

General river float traffic currently utilizes this reach of the Colorado and will need to be considered in the whitewater park design. These users tend to have limited river experience and include inner-tubers, stand-up paddle boards, duckies, or even inflatable pool toys. Many of these users are not well versed in river navigation, lack safety and rescue equipment, and are unfamiliar with river etiquette. Due to the casual and loosely organized fashion in which this user group accesses and floats the river, assessing the impacts of these improvements on them is challenging. General assumptions about this user can be

gleaned from the design of the existing Glenwood Springs Whitewater Activity Area, which includes a boater bypass/beginner level attraction adjacent to each whitewater feature. This bypass channel serves to provide passage to novice river users, reducing the challenge of navigating the rapids.

In general this user requires easily achieved and obvious routes of navigation, which allow for passage of all typical river craft. Signage should be posted well upstream of any river improvements to provide adequate warning and direction to novice river users. Furthermore, the park should be designed to direct appropriate usage by pushing float traffic into the least challenging routes. Consideration of this user group is key to this design to protect this existing use and to avoid the creation of undue hazards.

Associated Design Criteria

The following criteria address the interests of River Floaters as part of the development of this design:

- The improvements must provide easily achieved and obvious routes of navigation;
- The improvements should include obvious signage to be posted well upstream, warning of downstream rapids and providing clear direction; and
- The improvements may include a safety bypass channel to provide novice passage through the whitewater park.

Advanced Boating

Advanced boaters are also anticipated to increase their current use of these reaches. These users will typically park and play at a whitewater park, though they may also paddle through as part of a longer run. Generally, they possess appropriate safety equipment in the form of lifejackets, helmets, and ropes and are competent to navigate expert rapids. This user group will quickly acquire advanced knowledge of the whitewater park and its features, and does not typically require rescue or guidance on the water.

The expectations of these users for the character of the whitewater park are commensurate with their ability. They typically desire challenging whitewater that offers the opportunity to hone their boating skills. Furthermore, they desire whitewater features that include recirculating eddies, standing waves, and retentive hydraulics to perform various freestyle tricks. Additional components of a park that will serve the interests of this user include convenient access to and from this feature, nearby parking, riverside viewing, staging areas, restrooms, and banks to rest. This is anticipated to be one of the primary users of the whitewater park. Often times, they will use the features well beyond the usual boating season. This user will be attracted to Glenwood Springs for the seasonally unique freestyle whitewater opportunities.

To accommodate for advanced users, preliminary designs of the whitewater park include both a novice/intermediate feature and a more advanced/intermediate feature. These features are deigned to create differing recreational experiences at the various claimed flow rates for the purpose of providing recreational opportunities of differing skill level and for various advanced user. Creating play features that serve their interests will maximize benefits to the City.

Advanced boaters often take part in whitewater competitions. These competitions may involve professional athletes, local competitors, sponsors, and spectators. Whitewater parks typically host festivals and competitions, because they tend to offer the necessary support facilities as compared to wilderness areas. Often times, these events draw numerous spectators, which can have a significant benefit to a local economy. In order to provide for the needs of these events, appropriate site planning and design should be performed that anticipates and accommodates their use.

Associated Design Criteria

The following criteria address the interests of Advanced Boaters as part of the development of this design:

- The improvements should include challenging whitewater features that offer the opportunity for advanced boaters to hone skills;
- The improvements should create whitewater features that include recirculating eddies, standing waves, and retentive hydraulic jumps;
- The improvements should include convenient access to and from this feature, nearby parking, riverside viewing, staging areas, restrooms, and banks to rest;
- The improvements should offer season long freestyle whitewater opportunities; and
- The improvements should provide a freestyle whitewater venue capable of hosting large competitive events.

Proposed Improvements

Process

A larger section of the Colorado River upstream of its confluence with the Roaring Fork, was initially evaluated in an effort to identify preferred locations for a whitewater park, or parks. A thorough process was then enacted to identify the most favorable sites within the study reach for the proposed whitewater parks and associated filing of a water court application for RICD water rights. This process resulted in the identification and ultimate filing for the three distinct whitewater park sites described herein. Each of the three selected sites are designed to function as a standalone whitewater park, capable of diverting, capturing, controlling and placing to beneficial use the decreed flows.

Regulatory agencies, including the BLM, CDOT, the CPW, and the United States Army Corps of Engineers, have been preliminarily contacted and their input has been considered in the site selection and preliminary design of the whitewater parks.

U-Structures

RICD control structures for use in the Glenwood Springs whitewater parks are a typical U-structure design. U-Structures have been the basis for many RICD applications and are the predominant type of structure used for in-stream whitewater parks throughout the United States. These structures have predictable rating curves and have been proven in water court, numerous times, to adequately capture,

control, divert the river, and place the flows to beneficial use. These types of structures have been determined to meet all statutory requirements. The design of these RICD control structures is pertinent to this discussion and explains how the same structure can provide various recreational experiences at different flow rates.

The U-Structure name is derived from the arch shape taken by the structure when viewed from above. This configuration has resulted from the continued refinement, over numerous field applications, of the structures to maximize stability and function over the entire anticipated flow range. The structure features an arched shape laid in the plane defined by the riverbed with its footing keyed into the riverbed and riverbank in a manner that is designed to withstand the required loads, shear stress, and scour. The arch is a classic support structure that dates back to Roman civilization. This structure has two properties that make it desirable for in-stream use. The first is that it is extremely strong and stable. This structure can sustain very high and very imbalanced loads without becoming unstable. The second property of arches that makes them desirable for in-stream use is that all stresses induced in the arch due to external loading on the top face are compressive. This property, along with the general design and layout of the structures, allows for the construction of structures that are robust and appropriate for the materials out of which they are constructed.

In addition to the central section of the U-structure, the structure also includes wings that gradually increase in elevation as they transition into the native riverbanks. These wings are terraced to create seating, stairs, and patios. Most critically though, wings on both the left and right bank create recirculating eddies, allowing river users to attain back upstream to the features without exiting their boat.

The U-Structures also feature a downstream pool. These pools serve a critical role in the formation of the wave, creating the downstream sub-critical flow section necessary for a hydraulic jump to occur. The elevation of the floor of the pool is typically set 3-5 feet below the invert elevation of the exit cross section and is then armored with riprap to prevent degradation. These pools are also beneficial in providing in-stream habitat for aquatic species. The energy associated with the hydraulic jump works to mobilize sediments from immediately below the structure, acting to maintain relatively cool, deep, aerated pools, which provides opportunities for fish holding and other aquatic life.

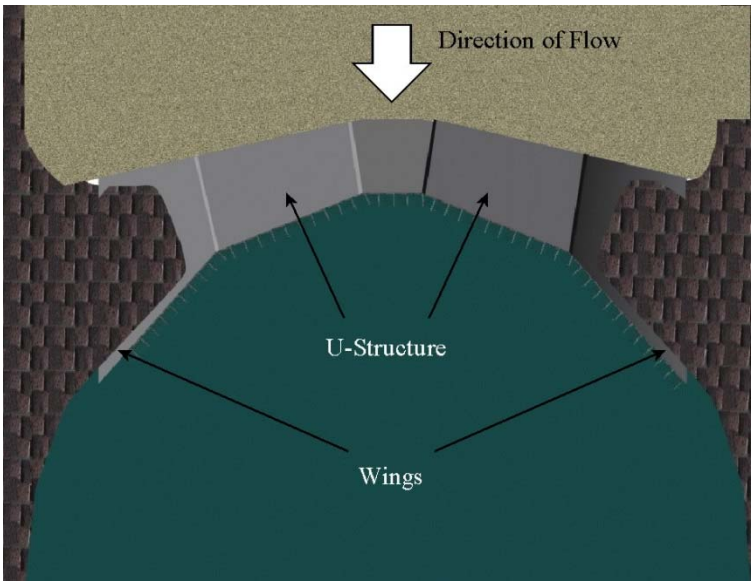

Figure 7 Plan view of a 3-D Computer Model of a U-structure Demonstrates Its Arched Design

Figure 7 shows the plan view of a typical U-structure. These control structures are used to create a river wide "drop" by constricting the river into defined flow channels, marked by distinct breaks in slope across the cross-section of the structure, sufficient to increase the velocity of the flow through a critical state, thereby generating a hydraulic jump. Hydraulic jumps occur when a relatively slow moving deep flow (sub-critical flow) is constricted and accelerated through a critical state, resulting in relatively fast shallow flow (super-critical flow), which in turn enters back into a downstream subcritical flow (Figure 8). The resulting hydraulic jump is commonly known as a “wave”, “hole” or “wave hole” by river users.

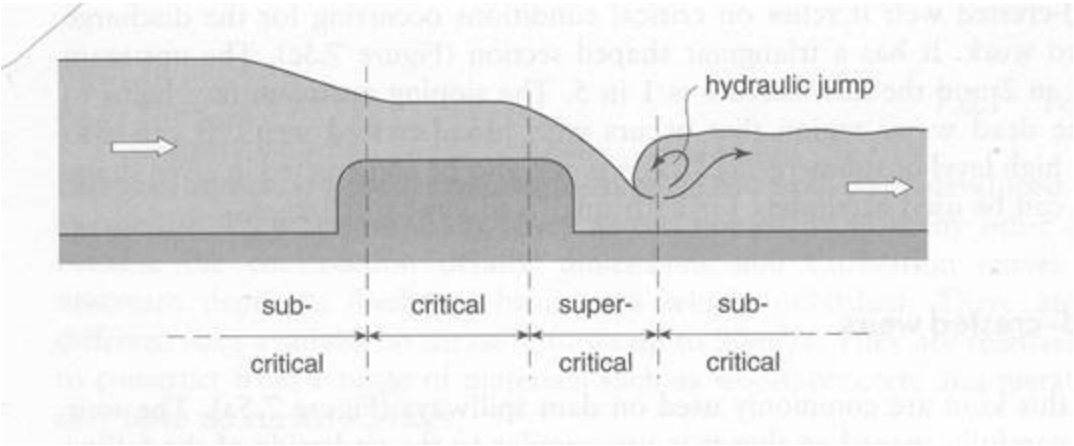

Figure 8 Profile of a Hydraulic Jump at a Typical Broad-Crested Weir

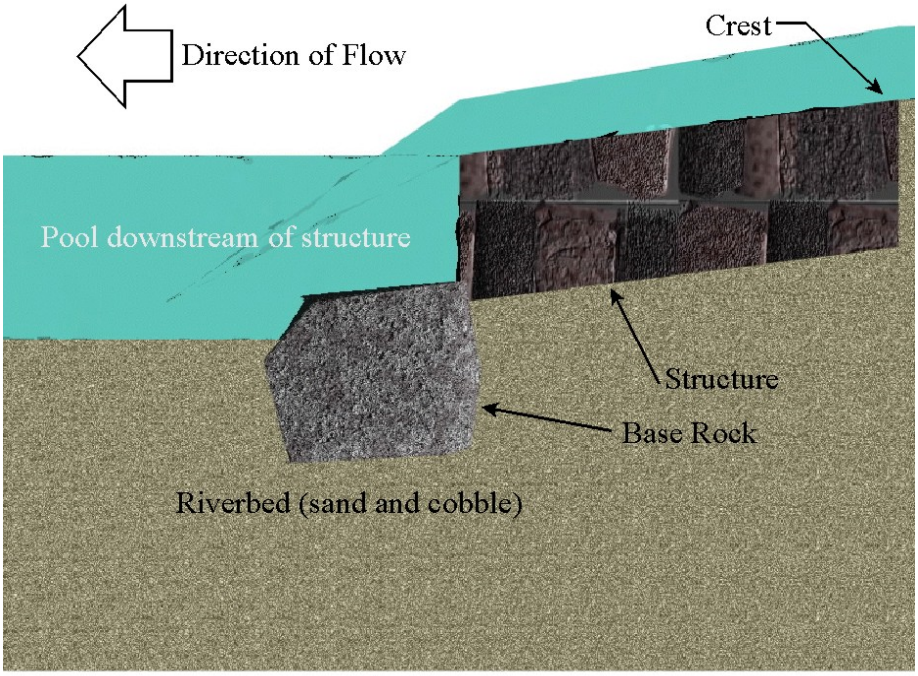

Figure 9 Profile view of the apex of the U-structure.

Figure 9 shows a longitudinal profile view of the apex of the arch. Note that the structure is sunk into the riverbed such that the crest of the structure, which is the highest point on the upstream side, is approximately even with the existing riverbed.

Boulder cutoff walls are also constructed as part of the U-Structure and are located at the upstream and downstream extents. The base rock of the cutoff wall is set below the maximum calculated scour depth or keyed into shallow bedrock and the grouted boulder walls are typically set at a 1:1 slope. The cutoff walls reinforce the structure and protect it from erosion resulting from eddy currents and the hydraulic jump.

These structures are designed such that the waves are functional throughout a range of streamflows. Figure 10 shows a cross sectional view of a typical U-structure looking upstream. This view highlights the versatile design of these structures. The low-flow channel can be designed to provide deep passage and a usable hydraulic feature during typical low flows. During the mid-range flows, the low-flow channel and part of the high-flow channel would typically be submerged. During run-off, the high-flow channel would create a larger, more usable hydraulic feature (a hydraulic jump or wave train) and, at extreme flooding, the river would overflow the shoulders of the structure. The downstream side of these shoulders are terraced to provide steps, seating, and patios during normal flows and to prevent the formation of dangerous hydraulics during extreme flooding. In the case of the Glenwood Springs whitewater parks, the preliminary structure design is intended to create a recreational experience for low, mid, and high-water levels.

RICD control structures, at all three whitewater parks, have been preliminarily designed to accommodate various users and abilities. Furthermore the structures within each of the distinct whitewater parks will have slight geometrical differences sufficient to create varied recreational experiences at each of the claimed flow rates. By altering the cross sectional geometry and ramp slope of the structures, differing wave forms can be created, tailoring the recreational experience for beginner/intermediate or advanced users.

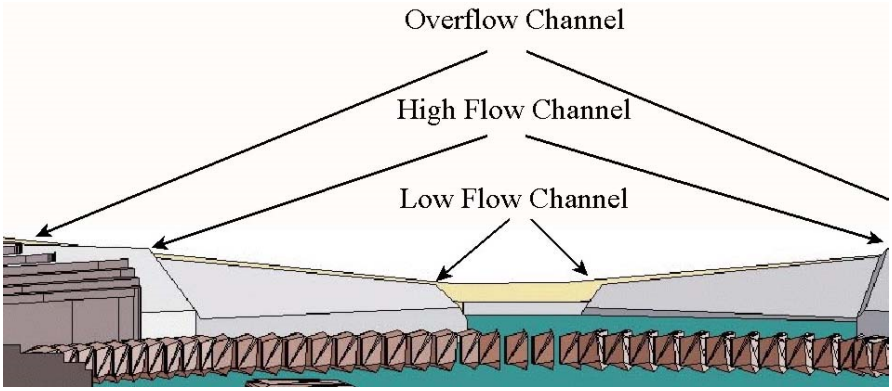

Figure 10 Upstream view of the U-structure shows how it is designed to accommodate varying flow levels

Calculated Depth of flow

The geometry of the U-structure is developed during the design process to create the desired recreational experience at the minimum possible flow rate while simultaneously demonstrating the ability to divert, capture, and control all specified flow rates. In order to achieve this goal, one of the most critical variables to be calculated is the flow depth. For this analysis, the Weir Equation calibrated for a broad-crested weir, is used:

$$Q = Cbh^{1.5}$$

Where Q is the flow rate, C is an empirically determined constant, b is the river width as defined in the analysis section and h is the depth of the flow. A broad-crested weir can generally be described as a relatively flat-crested structure, where the downstream length of the crest is significantly greater than that of the flow depth as it passes over the weir. Furthermore, for a weir to be considered broad crested, flows in the longitudinal direction must remain in contact with the face of the weir, never breaking away to create an aerated nappe. The principal assumption in the application of the broad-crested weir equation, to calculate the depth of flow upstream of the weir, is that when the crest becomes sufficiently "broad", the streamlines flowing over the weir are parallel and the pressure distribution above the crest is hydrostatic. Because the design geometry of the U-structure is consistent with the above-mentioned assumptions and field verifications performed by S2o confirm the applicability of this approach, the weir equation has been used to calculate the upstream depth of flow relative to specific design discharges claimed in the RICD water rights application. However, it must be noted that this equation is empirical and does not represent an exact relationship. The actual depth of

flow as the water flows over the structure can vary due to a number of variables, including upstream current velocity, channel roughness, or three-dimensional flow fields.

Base Flow

Base flows are defined as the minimum flow rate observed within a watercourse at a defined location on an annual basis. Based on the period of record for the Colorado River, a base flow of 500 cubic feet per second (cfs) was selected as the minimum flow rate anticipated within this reach. For this project the base flow channel has been designed to allow for boat passage of all typical watercraft at this level.

Low Flow

The sizing of the flow channels in the proposed whitewater parks are based on existing flows seen in the river during the seasons that flow is claimed. The lowest claimed flow is 1,250 cubic feet per second. This flow rate is inclusive of the flows which will pass through the base flow channel as well. The low flow channel is designed to capture, control, and put to beneficial use the flows of the Colorado River at 1,250 cubic feet per second.

Medium Flow

The medium flow channel is designed to capture, control, and put to beneficial use the flows of the Colorado River at 2,500 cubic feet per second.

High Flow

The High flow channel is designed to capture, control and divert the flows of the Colorado River at 4,000 cubic feet per second.

The Low, Medium, and High flow channels are designed to differing dimensions depending on the river's geometry at that particular location.

Approximate Dimensions and Functionality of the RICD Control Structures

The final design of the U-Structures for individual hydraulic characteristics at each of the six RICD control structure locations has not yet been performed. This design will include site-specific hydraulic analysis of the proposed conditions geometry at each of the RICD control structures using HEC-RAS software to refine control structure geometry necessary to demonstrate no net impact to existing Base Flood Elevations (BFEs), as regulated by the Federal Emergency Management Agency (FEMA), due to the construction of one or more of the proposed whitewater parks. Due to the ongoing revisions to the FEMA Flood Insurance Study (FIS) in Garfield County an analysis of the Proposed Conditions geometry within the Effective FEMA model cannot yet be performed. However, a preliminary hydraulic design of the whitewater features has been conducted to demonstrate no net rise in calculated Water Surface Elevations (WSEL) when comparing existing conditions to proposed conditions. This one-dimensional (1D) flow model will also provide valuable information regarding specific flow depths and average velocities within each whitewater park.

At this preliminary stage of the design, the Weir Equation can be used to calculate the shape of the structures necessary to divert, capture, and control the claimed flow rates. Furthermore, it can generally be used to balance the proposed stepped cross sectional bottom widths and depths to be consistent with the existing channel geometry. It should also be noted that final design of the RICD control structures may include safety bypass channels for downstream users, which are not currently shown in the preliminary geometry.

No Name Whitewater Park

There are two U-Structures proposed for the No Name Whitewater Park. Due to differing overall channel widths as measured at the two RICD control structure locations, the preliminary geometry of the flow channels varies between the upper and lower features. Specifically, the less constricted nature of the river channel at Structure #1 allows for wider, shallower flow channels as compared to the more constricted channel geometry at Structure #2. As the existing channel geometry at Structure #1 is wider and flatter, the less constrictive aspect ratio of the RICD control structure is appropriate for the setting. Table 1 and Table 2 show the calculations, using the Weir Equation, used to compute flow depths as a function of channel width and flow rate at No Name Structures #1 and #2, respectively. This analysis was performed using the commercially available Microsoft Excel software package.

No Name Structure #1 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base $Flow_{middle}$	500	3	60.0	2.0	1.5
Base $Flow_{total}$	500		60.0	2.0	
Low $Flow_{middle}$	1071	3	60.0	3.3	1.5
Low $Flow_{step1}$	179	3	40.0	1.3	1.5
Low $Flow_{total}$	1250		100.0	3.3	
Medium $Flow_{middle}$	1849	3	60.0	4.7	1.5
Medium $Flow_{step1}$	547	3	40.0	2.7	1.5
Medium $Flow_{step2}$	104	3	20.0	1.4	1.5
Medium $Flow_{total}$	2500		120.0	4.7	
High $Flow_{middle}$	2661	3	60.0	6.0	1.5
High $Flow_{step1}$	977	3	40.0	4.0	1.5
High $Flow_{step2}$	272	3	20.0	2.7	1.5
High $Flow_{step3}$	89	3	20.0	1.3	1.5
High $Flow_{total}$	4000		140.0	6.0	

Table 1 Broad-crested weir calculations for RICD control structure #1 at the No Name Whitewater Park

The calculated base flow bottom width, for a flow of 500 cfs, is 60 feet and the associated flow depth is 2.0 ft. The bottom width of the low-flow channel was calculated by adding the first step bottom width of 40 ft to the base flow bottom width of 60 ft, resulting in a combined bottom width of 100 ft. Flow depth, for a discharge of 1,250 cfs, was calculated by simultaneously solving for the depth of flow in the base flow channel and the depth of flow in the low-flow channel, such that the computed water surface elevations were equal between the two flow areas. The combined depth of flow for the low-flow channel as measured from the bottom of the base flow channel to the calculated water surface is 3.3 ft. The medium-flow bottom width of 120 ft was determined in the same manner as the low-flow bottom width, by summing the combined widths of the three channel segments. The combined flow depth for the medium-flow channel was calculated in a similar manner to the low-flow channel with the addition of a third flow tier. Again, the flow depths for the three channels were solved simultaneously such that they produced common water surface elevation between them. The calculated flow depth, for a discharge of 2,500 cfs, contained within the medium-flow channel is 4.7 ft. The high-flow bottom width of 140 feet and the corresponding center flow depth of 6.0 ft for a flow of 4,000 cfs was calculated in the same manner as the previous two channel segments with the addition of a fourth flow tier. These preliminary dimensions are appropriate for the character and geometry of the No Name site and this geometry will create the desired recreational experience desired by the anticipated users of this park as defined in this report.

No Name Structure #2 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base Flow$_{middle}$	500	3	50.0	2.2	1.5
Base Flow$_{total}$	500		50.0	2.2	
Low Flow$_{middle}$	1084	3	50.0	3.7	1.5
Low Flow$_{step1}$	166	3	30.0	1.5	1.5
Low Flow$_{total}$	1250		80.0	3.7	
Medium Flow$_{middle}$	1871	3	50.0	5.4	1.5
Medium Flow$_{step1}$	503	3	30.0	3.1	1.5
Medium Flow$_{step2}$	126	3	20.0	1.6	1.5
Medium Flow$_{total}$	2500		100.0	5.4	
High Flow$_{middle}$	2679	3	50.0	6.8	1.5
High Flow$_{step1}$	888	3	30.0	4.6	1.5
High Flow$_{step2}$	327	3	20.0	3.1	1.5
High Flow$_{step3}$	105	3	20.0	1.5	1.5
High Flow$_{total}$	4000		120.0	6.8	

Table 2 Broad-crested weir calculations for RICD control structure #2 at the No Name Whitewater Park

The calculated base flow bottom width at No Name structure #2 is 50 feet and the associated flow depth is 2.2 ft. The combined low-flow bottom width was calculated as 80 ft with an accompanying total flow depth of 3.7 ft. The combined medium-flow bottom width was determined to be of 1070 ft with an associated total flow depth of 5.4 ft. The combined high-flow bottom width of 120 feet and the corresponding center flow depth of 6.8 ft were calculated for the total flow rate of 4,000 cfs. All flow depths were calculated in an identical manner to those of Structure #1. These preliminary dimensions are appropriate for the character and geometry of the No Name site and this geometry will create the recreational experience desired by the expected users of this park.

Figure 11 and Figure 12 illustrate the design features used at No Name Whitewater Park to divert, capture, and control the flows of the Colorado River up to 4,000 cfs. The upper structure (Structure #1) at the No Name whitewater park, will feature a wider and flatter aspect ratio as compared to the lower structure (Structure #2). There are several reasons for the differences in aspect ratio at the two locations. The primary reason is that the existing aspect ratios of the existing river are currently different at the two locations. The imposition of a wider, flatter aspect ratio at the lower structures could result in increased sedimentation and/or erosion and may alter the existing channel morphology at the site. The converse is also true for the upper structure. Use of a narrower, steeper geometry at Structure #1 could result in increased flood risk and/or increased scour in the lower pool. It is also the opinion of the designer that the wider aspect ratio at the upper structure will provide for increased variety across the face of hydraulic and that the narrower, yet slightly deeper aspect ratio of the lower structure will provide a similar attraction through increased power and surge potential

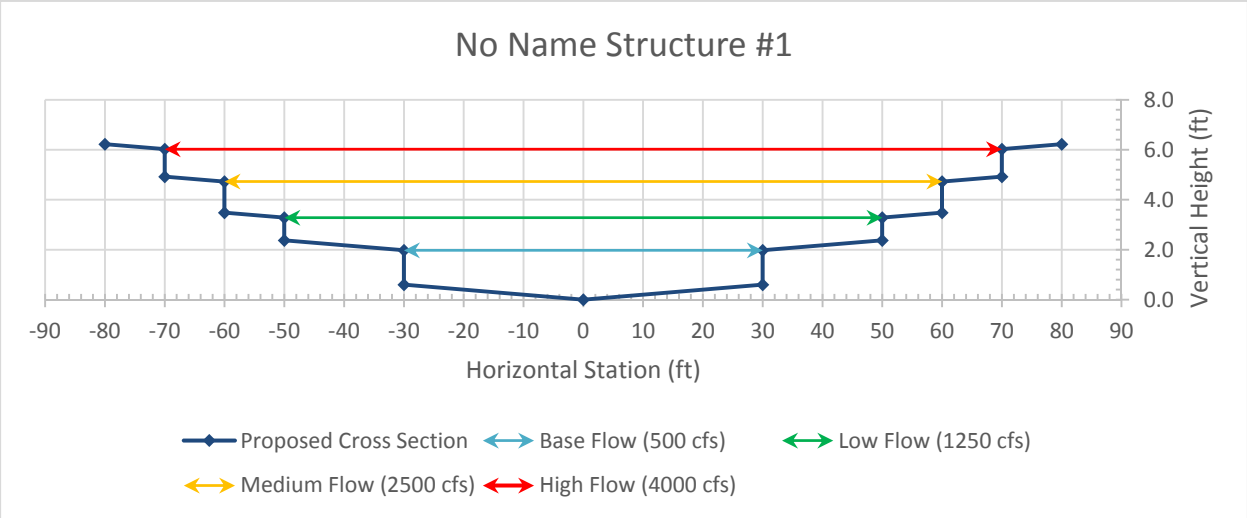

Figure 11 Preliminary geometry of the U-Structure for RICD control structure #1 at the No Name Whitewater Park (overbank geometry is for illustrative purposes only)

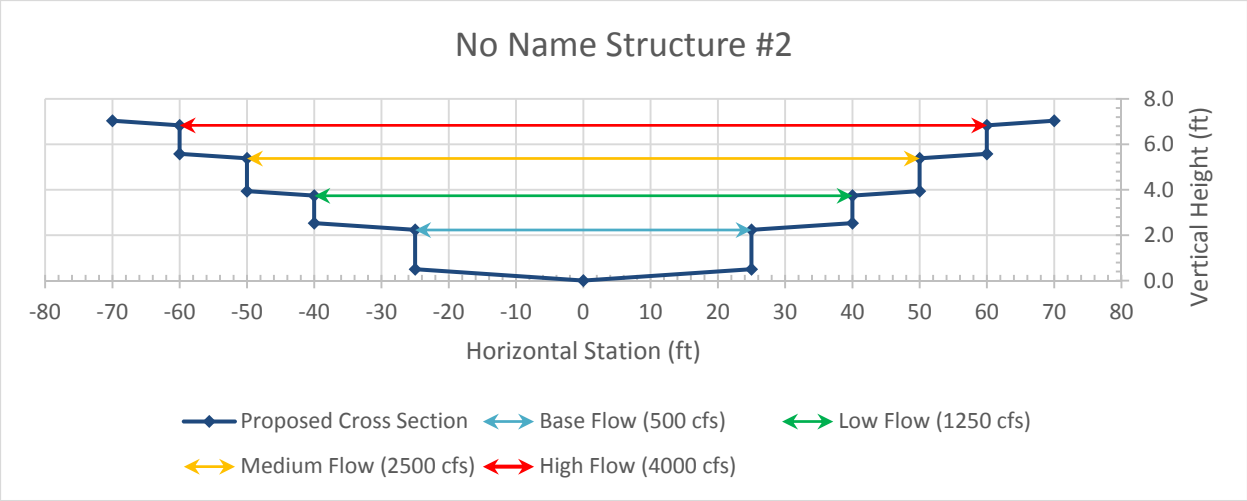

Figure 12 Preliminary geometry of the U-Structure for RICD control structure #2 at the No Name Whitewater Park (overbank geometry is for illustrative purposes only)

Horseshoe Bend Whitewater Park

Field inspection and geometric analysis were also performed at the Horseshoe Bend Whitewater Park to help define the preliminary control widths and heights of the proposed RICD structures. A similar process was used to size these drop structures. Table 3 and Table 4 show the calculations used to determine approximate flow depths as a function of channel width and flow rate at the Horseshoe Bend structures.

Horseshoe Bend Structure #1 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base $Flow_{middle}$	500	3	50.0	2.2	1.5
Base $Flow_{total}$	500		50.0	2.2	
Low $Flow_{middle}$	1084	3	50.0	3.7	1.5
Low $Flow_{step1}$	166	3	30.0	1.5	1.5
Low $Flow_{total}$	1250		80.0	3.7	
Medium $Flow_{middle}$	1871	3	50.0	5.4	1.5
Medium $Flow_{step1}$	503	3	30.0	3.1	1.5
Medium $Flow_{step2}$	126	3	20.0	1.6	1.5
Medium $Flow_{total}$	2500		100.0	5.4	
High $Flow_{middle}$	2708	3	50.0	6.9	1.5
High $Flow_{step1}$	902	3	30.0	4.7	1.5
High $Flow_{step2}$	335	3	20.0	3.1	1.5
High $Flow_{step3}$	55	3	10.0	1.5	1.5
High $Flow_{total}$	4000		110.0	6.9	

Table 3 Broad-crested weir calculations for RICD control structure #1 at the Horseshoe Bend Whitewater Park

The base flow bottom width at Horseshoe Bend structure #1 was calculated to be 50 ft and the associated flow depth is 2.2 ft. The combined low-flow bottom width was calculated as 80 ft with an accompanying total flow depth of 3.7 ft. The combined medium-flow bottom width was determined to be 100 ft with an associated total flow depth of 5.4 ft. The calculated combined high-flow bottom width is 110 feet and the center flow depth is 6.9 ft.

Horseshoe Bend Structure #2 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base $Flow_{middle}$	500	3	60.0	2.0	1.5
Base $Flow_{total}$	500		60.0	2.0	
Low $Flow_{middle}$	1105	3	60.0	3.4	1.5
Low $Flow_{step1}$	145	3	30.0	1.4	1.5
Low $Flow_{total}$	1250		90.0	3.4	
Medium $Flow_{middle}$	1923	3	60.0	4.9	1.5
Medium $Flow_{step1}$	439	3	30.0	2.9	1.5
Medium $Flow_{step2}$	138	3	25.0	1.5	1.5
Medium $Flow_{total}$	2500		115.0	4.9	
High $Flow_{middle}$	2771	3	60.0	6.2	1.5
High $Flow_{step1}$	778	3	30.0	4.2	1.5
High $Flow_{step2}$	358	3	25.0	2.8	1.5
High $Flow_{step3}$	93	3	20.0	1.3	1.5
High $Flow_{total}$	4000		135.0	6.2	

Table 4 Broad-crested weir calculations for RICD control structure #2 at the Horseshoe Bend Whitewater Park

The base flow bottom width of the Horseshoe Bend structure #2 was computed to be 60 feet with a corresponding flow depth of 2.0 ft. The combined low-flow bottom width was calculated to be 90 ft with an accompanying total flow depth of 3.4 ft. The combined medium-flow bottom width was determined to be of 115 ft and the associated total flow depth was calculated to be 4.9 ft. The computed combined high-flow bottom width is 135 feet and the center flow depth is 6.2 ft. All flow depths were calculated in an identical manner to those of the No Name Whitewater Park. These dimensions, like those of the No Name Whitewater Park, are preliminary and are consistent with the existing character and geometry of the Horseshoe Bend site. The RICD control structure geometry at the Horseshoe Bend site was developed using identical methods to those of the No Name Whitewater Park.

Figure 13 and Figure 14 illustrate the design features used at the Horseshoe Bend Whitewater Park to divert, capture, and control the flows of the Colorado River up to 4,000 cfs. The upper structure (Structure #1) will feature a wider and flatter aspect ratio as compared to the lower structure (Structure #2). There are several reasons for the differences in aspect ratio at the two locations. The primary reason is that the existing aspect ratios of the existing river channel geometry are different between the two locations. Construction of a wider, flatter aspect ratio at the lower structures could result in increased sedimentation and/or erosion and may alter the existing channel morphology at the site. The

converse is also true for the upper structure. Use of a narrower, steeper geometry at Structure #1 could result in increased flood risk and/or increased scour in the lower pool.

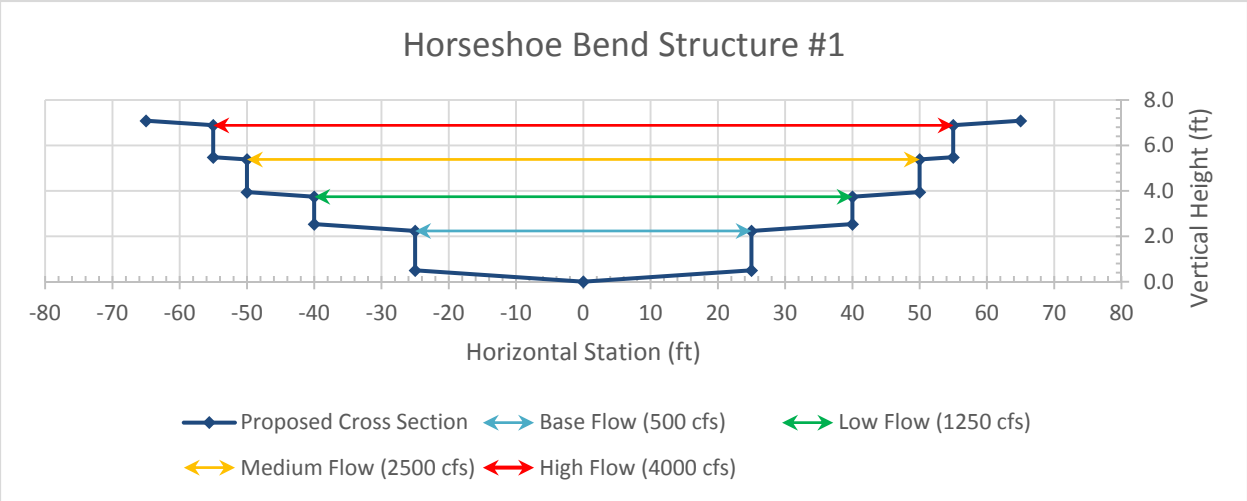

Figure 13 Preliminary geometry of the U-Structure for RICD control structure #1 at the Horseshoe Bend Whitewater Park (overbank geometry is for illustrative purposes only)

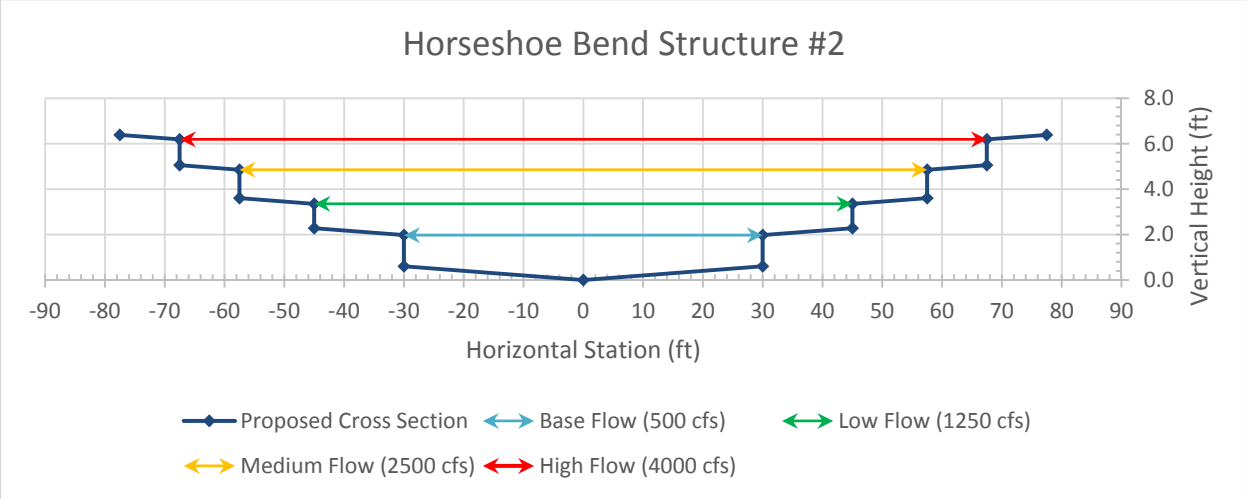

Figure 14 Preliminary geometry of the U-Structure for RICD control structure #2 at the Horseshoe Bend Whitewater park (overbank geometry is for illustrative purposes only)

Two Rivers Whitewater park

Field inspection and geometric analysis at the Two Rivers Whitewater Park was also performed to aid in the design of the preliminary control widths and heights of the RICD control structures. At this site, the aspect ratios of both the upper structure (Structure #1) and the lower structure (Structure #2) were

determined to be wider and flatter than those of the proposed structures upstream. Table 5 and Table 6 show the calculations used to determine flow depths as a function of channel width and flow rate at the Two Rivers structures.

Two Rivers Structure #1 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base Flow$_{middle}$	500	3	50.0	2.2	1.5
Base Flow$_{total}$	500		50.0	2.2	
Low Flow$_{middle}$	1084	3	50.0	3.7	1.5
Low Flow$_{step1}$	166	3	30.0	1.5	1.5
Low Flow$_{total}$	1250		80.0	3.7	
Medium Flow$_{middle}$	1871	3	50.0	5.4	1.5
Medium Flow$_{step1}$	503	3	30.0	3.1	1.5
Medium Flow$_{step2}$	126	3	20.0	1.6	1.5
Medium Flow$_{total}$	2500		100.0	5.4	
High Flow$_{middle}$	2693	3	50.0	6.9	1.5
High Flow$_{step1}$	895	3	30.0	4.6	1.5
High Flow$_{step2}$	331	3	20.0	3.1	1.5
High Flow$_{step3}$	81	3	15.0	1.5	1.5
High Flow$_{total}$	4000		115.0	6.9	

Table 5 Broad-crested weir calculations for RICD control structure #1 at the Two Rivers Whitewater Park

The base flow bottom width of the Two Rivers structure #1 was calculated to be 50 feet and the associated flow depth is 2.2 ft. The combined low-flow bottom width was calculated as 80 ft with an accompanying total flow depth of 3.7 ft. The combined medium-flow bottom width was determined to be 100 ft with an associated total flow depth of 5.4 ft. The calculated combined high-flow bottom width is 115 feet and the center flow depth is 6.9 ft.

Two Rivers Structure #2 Preliminary RICD Control Structure Design Geometry Calculator					
Designed By:	Scott Shipley				
Designed on:	5/27/2014				
	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base Flow$_{middle}$	500	3	60.0	2.0	1.5
Base Flow$_{total}$	500		60.0	2.0	
Low Flow$_{middle}$	1055	3	60.0	3.3	1.5
Low Flow$_{step1}$	195	3	45.0	1.3	1.5
Low Flow$_{total}$	1250		105.0	3.3	
Medium Flow$_{middle}$	1794	3	60.0	4.6	1.5
Medium Flow$_{step1}$	584	3	45.0	2.7	1.5
Medium Flow$_{step2}$	122	3	25.0	1.4	1.5
Medium Flow$_{total}$	2500		130.0	4.6	
High Flow$_{middle}$	2571	3	60.0	5.9	1.5
High Flow$_{step1}$	1044	3	45.0	3.9	1.5
High Flow$_{step2}$	321	3	25.0	2.6	1.5
High Flow$_{step3}$	63	3	15.0	1.3	1.5
High Flow$_{total}$	4000		145.0	5.9	

Table 6 Broad-crested weir calculations for RICD control structure #2 at the Two Rivers Whitewater Park

The base flow bottom width of Two Rivers structure #2 was calculated to be 60 feet with a corresponding flow depth of 2.0 ft. The combined low-flow bottom width was calculated to be 105 ft with an accompanying total flow depth of 3.3 ft. The combined medium-flow bottom width was determined to be of 130 ft and the associated total flow depth was calculated to be 4.6 ft. The computed combined high-flow bottom width is 145 feet and the center flow depth is 5.9 ft. All flow depths were calculated in an identical manner to those of the No Name and Horseshoe Bend whitewater parks. These dimensions, like those of the other whitewater parks, are preliminary and are consistent with the existing character and geometry of the site. All RICD control structure geometries were developed using identical methods to those of the previous two sites.

Figure 15 and Figure 16 illustrate the design features used at the Two Rivers Whitewater Park to divert, capture, and control the flows of the Colorado River up to 4,000 cfs and place those flows to beneficial use. The upper structure (Structure #1) will feature a narrower and steeper aspect ratio as compared to the lower structure (Structure #2). There are several reasons for the differences in aspect ratio at the two locations. The primary reason for the variation in the aspect ratios is the difference in the existing channel geometry. Construction of a wider, flatter aspect ratio at Structure #1 could result in increased sedimentation and/or erosion and may alter the existing channel morphology at the site. Conversely,

construction of a narrower, steeper geometry at Structure #2 could result in increased flood risk and/or increased scour in the lower pool.

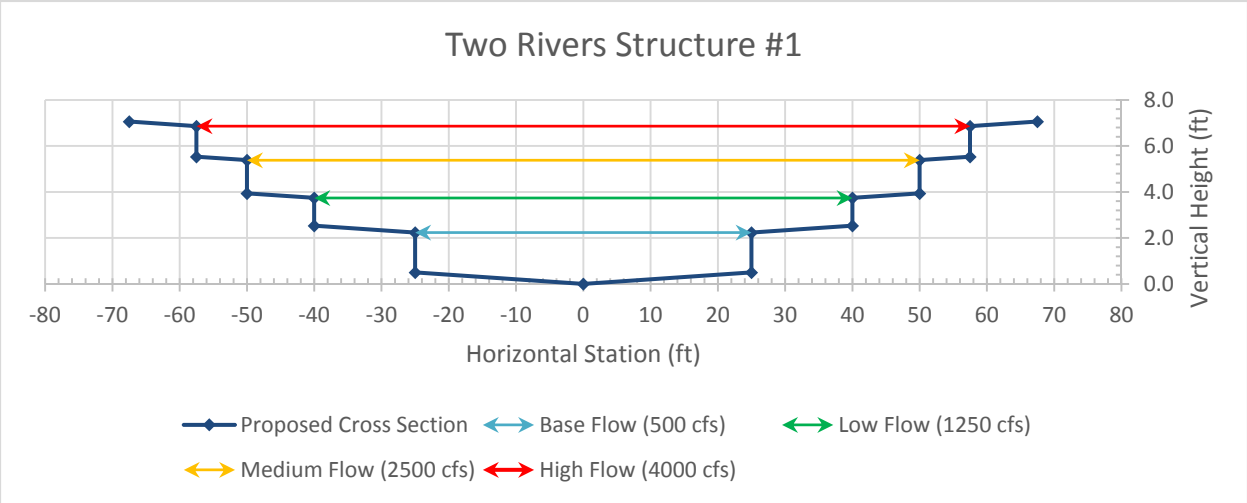

Figure 15 Preliminary geometry of the U-Structure for RICD control structure #1 at the Two Rivers Whitewater Park (overbank geometry is for illustrative purposes only)

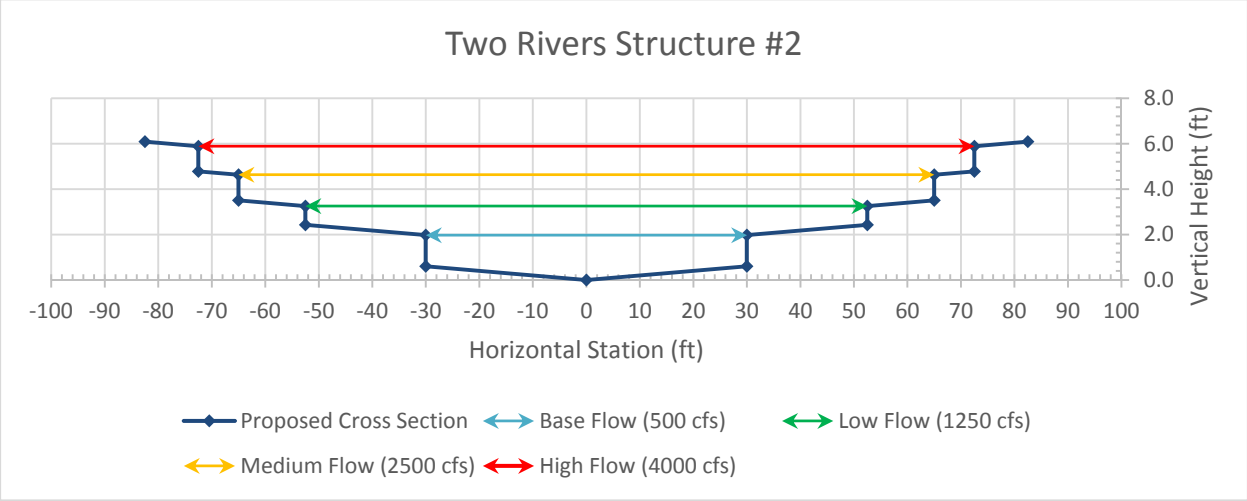

Figure 16 Preliminary geometry of the U-Structure for RICD control structure #2 at the Two Rivers Whitewater Park (overbank geometry is for illustrative purposes only)

U-Structures are designed to draw the water through critical depth at the crest of each structure and to capture, control and divert the entire flow of the river, from the upstream edge through to the bottom scour pool, over the entire range of design flows. Comparable structures have been found to function similarly to the proposed structures over the expected range of flows in this reach of the Colorado River. These types of structures, designed for related river conditions, have also been shown not to impact 100-year flood BFE, when designed at grade. Furthermore, RICD control structures, within the three

whitewater parks described in this report, are currently being analyzed using HEC-RAS software, to ensure that there will be no net impact to the regulatory floodplain.

Environmental Impacts

Environmental impacts resulting from the construction of the RICD control structures have been considered for both short-term and long-term effects. Short-term temporary impacts are anticipated to occur during construction of the whitewater park. Construction activities may create periodic increases in turbidity and/or temporary bank erosion. Best Management Practices (BMPs), including turbidity curtains, oil booms, pumped water settling ponds, silt fences, erosion logs, equipment access ramps, and construction sequencing, can be utilized to manage temporary impacts. Furthermore the U-Structures shall be constructed within fully contained pumped coffer dams to minimize temporary impacts to the aquatic resource. The capture and relocation of trapped fish, following the coffer dam construction, should also be performed and coordinated with the Colorado Parks and Wildlife (CPW). Immediately following construction activities, any potential increase in turbidity and erosion will rapidly dissipate.

No long-term aquatic impacts are anticipated as part of this project. Sediment continuity and channel morphology will not be altered through the construction of one or all three whitewater parks. The final drop structure designs shall mimic the river's existing morphology allowing for fish passage and sediment transport. Furthermore, bypass channels at each of the RICD control structures may be developed to promote upstream passage of fish and other aquatic organisms.

The final RICD control structures designs will be developed to be stable under the extreme forces imparted by flood events in the Colorado River. Typically the 100-year flood event is the design flow for structures of this type. At flood events greater than the 100-year recurrence interval, overall channel stability outside of the influence of the whitewater park can potentially be compromised due to the powerful and often unpredictable nature of flood events. In general, all structures in the river environment (including bridges, head gates, and bank stabilization) often require maintenance following significant channel altering flood events.

Necessary Flows for the Glenwood Springs Boating Parks

Whitewater Parks from throughout the world utilize varying flow rates depending on several factors including:

- Available flow
- Size of the river
- Desired recreational experience

In this instance the City is claiming flows through the typical flow season extending from the first of April, when average flows begin to significantly rise above typical winter levels to the 30th of September

when average flows recede to typical winter levels. Figure 17, shown below, illustrates Glenwood Springs' claimed flows:

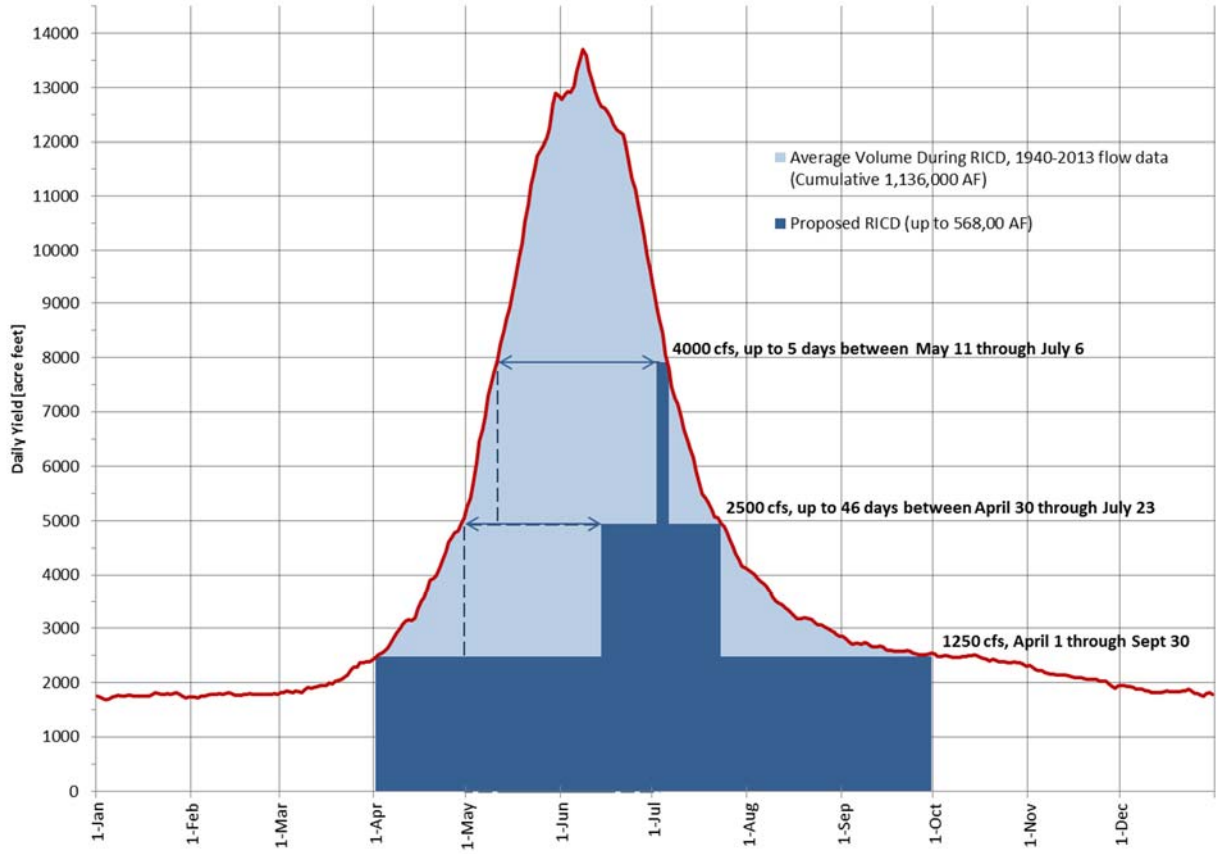

Figure 17 Glenwood Springs' claimed flows in comparison to the average flows in the Colorado River at this location.

Boaters may use the whitewater parks throughout the year but usage will increase dramatically during the claimed flow season. In general, more boaters use whitewater parks when the weather is warmer and during the summer months when they are also more likely to take a vacation.

Whitewater parks increase in power as the flows in the river increase. At lower flows the river is shallower and narrower and less powerful. In general, boating is easier and more predictable at these lower flows. As flows increase, so does the power of the water and the difficulty level of playing, surfing, and navigating whitewater parks.

Knowledgeable whitewater boaters tend to visit whitewater parks based on flow rates, power and suitability of the features, which often vary from park-to-park and feature-to-feature. Therefore boaters are attracted to a whitewater park when the flow rate and power of the park are in a range that is attractive to them based on personal preference, ability, and desired recreational experience.

In general, lower flows such as the 1,250 cfs claimed flow rate are utilized by beginner and instructional boaters who visit the park to work on basic skills or to navigate the park when the difficulty is commensurate with their skill level. Boaters of all levels may also visit at lower levels based on a variety of reasons including training opportunities, limited regional paddling options, attractiveness of the whitewater features at these levels, and desired recreational experience, amongst others.

As the flows increase and become more powerful, such as the flows claimed at the 2,500 cfs level, intermediate and advanced paddlers will be more likely to visit the parks in order to surf, play in the features, and challenge themselves in the waves and eddies of the parks. Given that these intermediate flows are higher than comparable flows within rivers in the surrounding region they will be a significant attraction and will bring boaters from around the state and region as well as some paddlers nationally and internationally.

At high flows, such as the proposed 4,000 cfs competition flows, the proposed structures will be a significant attraction capable of hosting major international events such as national championships and world championships. At these flows the whitewater parks will feature hydraulics of an appropriate nature that will be an attraction to boaters of various levels of ability.

The whitewater park design, in combination with the claimed flows, anticipates a tiered flow regime in which the park accommodates a variety of users with a variety of abilities who will visit the park at different times of the year in order to pursue recreational boating at a desired level of difficulty.

There are several components of the design and claimed flow rates that will make the proposed Glenwood Springs whitewater parks in particular a significant attraction. These include:

- **Magnitude of Flows:** the Colorado River is a large river with significant flows. In general, whitewater parks with greater flows offer a greater attraction than those with lesser flows.
- **Timing of Flows:** The bulk of significant whitewater events in the State of Colorado are in the spring and early summer. Most of these events are held prior to the FIBArk event typically held on the third week of June. On average, flows begin to decrease in the State after this date and paddlers tend to visit other locations to pursue events and competitions. The timing of the 4,000 cfs event flow allows for an event after the FIBArk, which would be a significant attraction and would not need to compete with other events in the State for visitors.
- **Gamut of Flows:** The existing Glenwood Springs wave tends to be a significant freestyle attraction at high flows and for very knowledgeable paddlers. In comparison, the design of these parks anticipates being attractive at much lower flow rates, providing for a variety of experiences at flows that are more commonly seen and for users who might not brave the 5000 cfs or higher flows necessary for the existing feature.
- **Reliability of Flows:** In order to function as a regional and national attraction, particularly one that is attractive to organizing bodies for large competitive events, flows need to be reliable. The average flows in the Colorado river are significant and will be attractive to governing bodies such as USA Canoe/Kayak who seek reliable venues for events such as National Championships and National Selection Events.

Summary

Three whitewater parks have been designed to meet all the requirements for a Recreational In-channel Diversion. A preliminary design at each of these sites is the basis of the RICD application. These designs were created by a licensed Engineer in the State of Colorado with extensive experience in whitewater park design. The preliminary design and claimed flows are the minimum required to meet the City's intended purpose as outlined in this report. In addition, the following facts support the City's claims for the RICD water rights:

- The proposed whitewater parks will be designed using HEC-RAS to adequately pass all flows up to and including the 100-year flood event without causing adverse impacts to upstream, downstream, or adjacent property owners. Similar parks have demonstrated the feasibility of this approach;

- The design will be constructed of large grouted boulders and will be keyed into the river bed and banks. All structures shall be keyed below the calculated maximum scour depth of the hydraulic jump, using grouted boulder cutoff walls. These structures are designed to adequately withstand stream forces for all flows up to and including the 100-year flood stream flow so that damage to and failure of the boating course can be prevented;

- The design and construction of the proposed whitewater parks will comply with all applicable federal, state, and local regulatory requirements;

- The structures are designed to provide the recreational experiences that the City of Glenwood Springs desires.

- The structures proposed for the whitewater parks are designed to capture, control, and divert the claimed flows of the Colorado River. Structures of this type meet all definitions of hydraulic control and are being used to provide for similar intended uses in other whitewater parks in the State of Colorado;

- The proposed whitewater parks are located in areas specifically selected for the ability to provide access, parking, and other amenities;

- Improvements to the whitewater parks represent aquatic habitat improvements. These include stabilization of the stream banks, possible riparian zone enhancements, and the creation of deep, cool aerated pools that can improve in-stream habitat; and

- The proposed whitewater parks are expected to have minimum temporary environmental impacts associated with construction. BMPs will be utilized to minimize short-term environmental impacts during construction. No long-term environmental impacts are anticipated as a result of the channel modifications proposed.

Appendix A: Preliminary Drawings

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Appendix B: Parcel Ownership

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THE GLENWOOD SPRINGS' RICD WHITEWATER PARKS

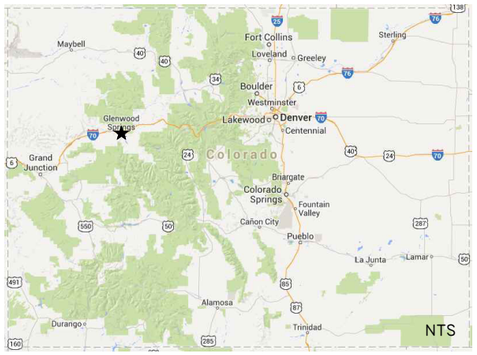
LOCATED IN SECTIONS 2, 3, & 9 OF TOWNSHIP 6S, RANGE 89 W, N.M.P.M.
CITY OF GLENWOOD SPRINGS, COLORADO
MAY 30, 2014

PREPARED FOR:

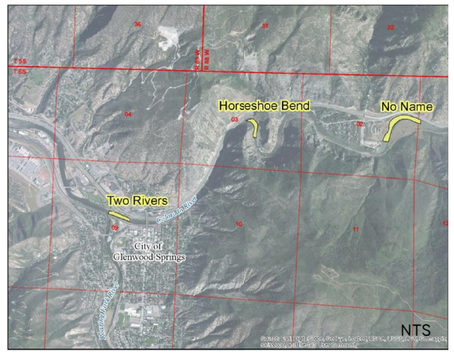
PREPARED BY:

S2O
REINVENTING WHITEWATER

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
1.0	TITLE PAGE
2.0	SITE PLAN
3.0	NO NAME WHITEWATER PARK
4.0	HORSESHOE BEND WHITEWATER PARK
5.0	TWO RIVERS WHITEWATER PARK



VICINITY MAP



LOCATION MAP

GENERAL NOTES:

1. THE CONTRACTOR SHALL LOCATE ALL UTILITIES ON-SITE, COORDINATE CONSTRUCTION WITH ALL UTILITY OWNERS AND BE RESPONSIBLE FOR PROTECTING ALL UTILITIES DURING CONSTRUCTION. THE CONTRACTOR MUST SCHEDULE ANY REQUIRED UTILITY ADJUSTMENTS WITH THE UTILITY OWNER TO ELIMINATE CONFLICTS.
2. THE CONTRACTOR SHALL CONFORM TO ALL PLAN AND SPECIFICATIONS SHOWN HEREIN AND NOTIFY THE ENGINEER (S2O) IMMEDIATELY UPON THE DISCOVERY OF CONFLICTS OR CHANGES NOT CONSISTENT WITH THE CONTRACT DOCUMENTS.
3. THE CONTRACTOR SHALL HAVE COPIES OF ANY REQUIRED PERMITS ON SITE AT ALL TIMES AND COMPLY WITH ALL REQUIREMENTS OF THE ALL PERMITS AT ALL TIMES. THESE PERMITS INCLUDE THE USACE 404 PERMIT AND THE EPA 401 WATER QUALITY CERTIFICATION.
4. THE CONTRACTOR IS RESPONSIBLE FOR, BUT NOT LIMITED TO, SUBMITTING PLANS FOR DELIVERY AND STORAGE OF MATERIALS AND SITE EQUIPMENT AS WELL AS FOR SITE ACCESS, EROSION CONTROL, TRAFFIC CONTROL, WATER CONTROL AND DE-WATERING PLANS, PRIOR TO CONSTRUCTION.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING SITE INFRASTRUCTURE AND VEGETATION, INCLUDING BUT NOT LIMITED TO, CONCRETE, ASPHALT, SITE CIRCULATION PATHS, CURB AND GUTTER, TREES, SHRUBS, GRASSES AND ALL SOFT OR HARDSCAPE OUTSIDE OF THE IMMEDIATE CONSTRUCTION AREA AND ITS REPLACEMENT IN THE EVENT OF DAMAGE TO EQUAL OR BETTER CONDITION.
6. THE CONTRACTOR WILL PROVIDE ALL SURVEYING EQUIPMENT, STAKING, CONTROL POINT LOCATIONS AND ELEVATIONS, FOR THE PROJECT. A REPRESENTATIVE OF S2O MUST CHECK AND APPROVE ALL PROPOSED CONTROL POINT LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.
7. IN AREAS OF DISTURBANCE, THE CONTRACTOR SHALL REMOVE AND STOCKPILE THE TOP 6" OF TOPSOIL AND REPLACE AND RE-VEGETATE AFTER CONSTRUCTION. SALVAGED TOPSOIL SHALL BE STOCKPILED IN AREAS THAT SHALL NOT INTERFERE WITH CONSTRUCTION PHASES AND AT LEAST 15 FEET AWAY FROM AREAS OF CONCENTRATED FLOWS OR PAVEMENT. THE SLOPES OF THE STOCKPILE SHALL NOT EXCEED 2:1 HORIZONTAL TO VERTICAL. A SILT FENCE OR OTHER ADEQUATE EROSION CONTROL SHALL BE INSTALLED AROUND THE PERIMETER OF EACH STOCKPILE. TOPSOIL FROM ANY RIPARIAN AREAS SHALL BE STOCKPILED SEPARATELY FROM OTHER TOPSOIL AND SHALL BE REINSTALLED IN RIPARIAN AREAS.
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10. ALL CONSTRUCTION ACTIVITIES MUST OCCUR DURING A PRE-ESTABLISHED CONSTRUCTION WINDOW. IT IS EXPRESSLY UNDERSTOOD AND AGREED, BY AND BETWEEN THE CONTRACTOR AND THE CITY OF GLENWOOD SPRINGS, THAT THE ESTABLISHED CONSTRUCTION WINDOW IS ADEQUATE FOR THE COMPLETION OF THE WORK DESCRIBED HEREIN, TAKING INTO CONSIDERATION THE CLIMATIC AND OTHER FACTORS PREVAILING IN THE LOCALITY OF THE WORK. EVERY EFFORT SHALL BE MADE BY THE CONTRACTOR TO COMPLETE THE PROJECT WITHIN THE ESTABLISHED CONSTRUCTION WINDOW SHOWN IN THE BID, QUOTE OR PROPOSAL. THE ESTABLISHED CONSTRUCTION WINDOW ANTICIPATES "NORMAL" WEATHER AND CLIMATE CONDITIONS IN AND AROUND THE VICINITY OF THE PROJECT SITE DURING THE TIMES OF YEAR THAT THE CONSTRUCTION WILL BE CARRIED OUT.
11. THE CONTRACTOR MUST MEET ALL REQUIREMENTS FOR BMP'S AS SHOWN IN THE SECTION 401 WATER QUALITY CERTIFICATION.
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13. THE CONTRACTOR SHALL OBTAIN AT THEIR EXPENSE ANY AND ALL DISCHARGE PERMITS NECESSARY TO PERFORM THE WORK DESCRIBED HEREIN, WHICH MAY BE SUBJECT TO THE PROVISIONS OF THE COLORADO WATER QUALITY ACT AND THE COLORADO DISCHARGE PERMIT REGULATIONS.
14. ANY ADDITIONAL COSTS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

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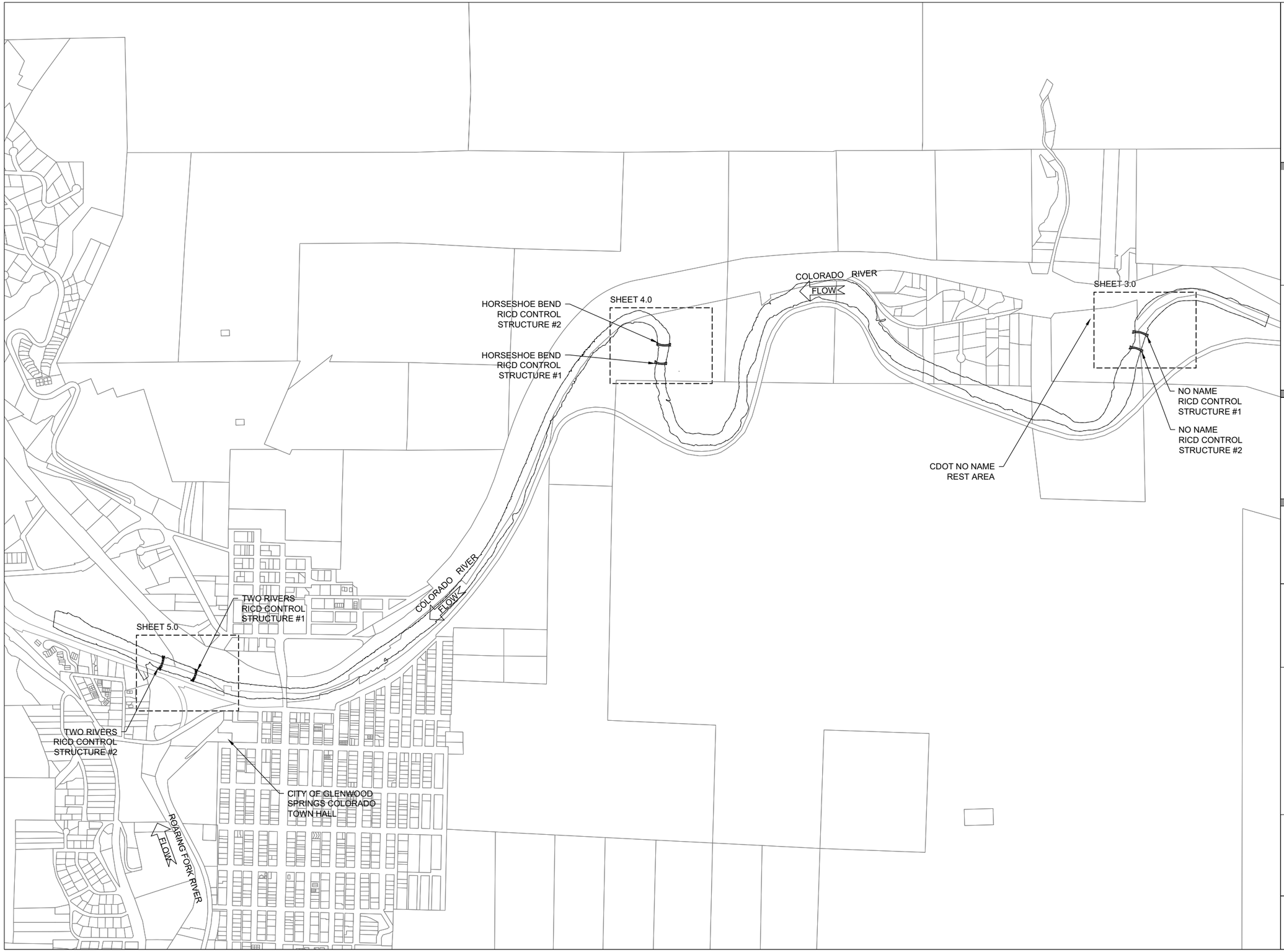

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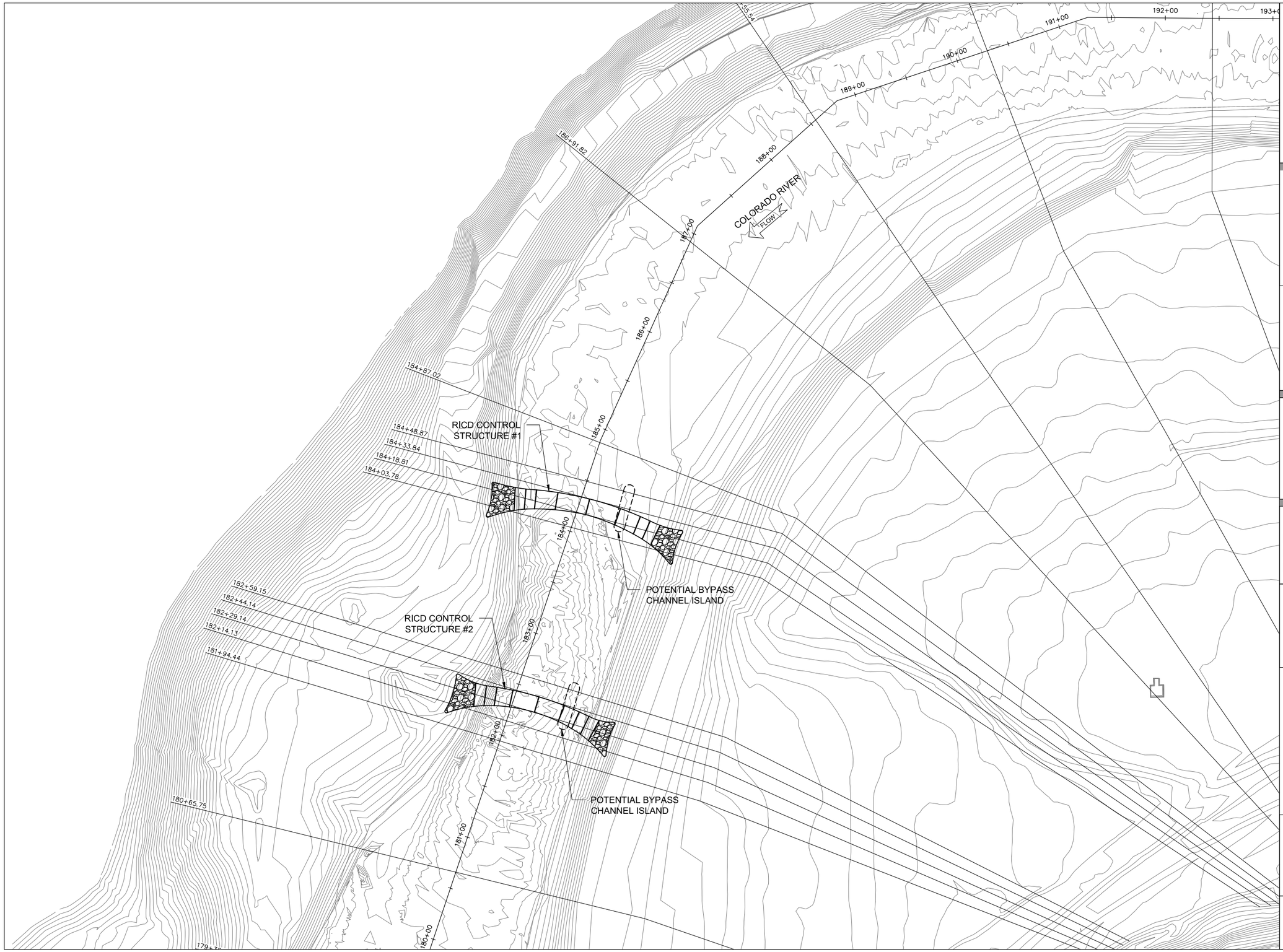

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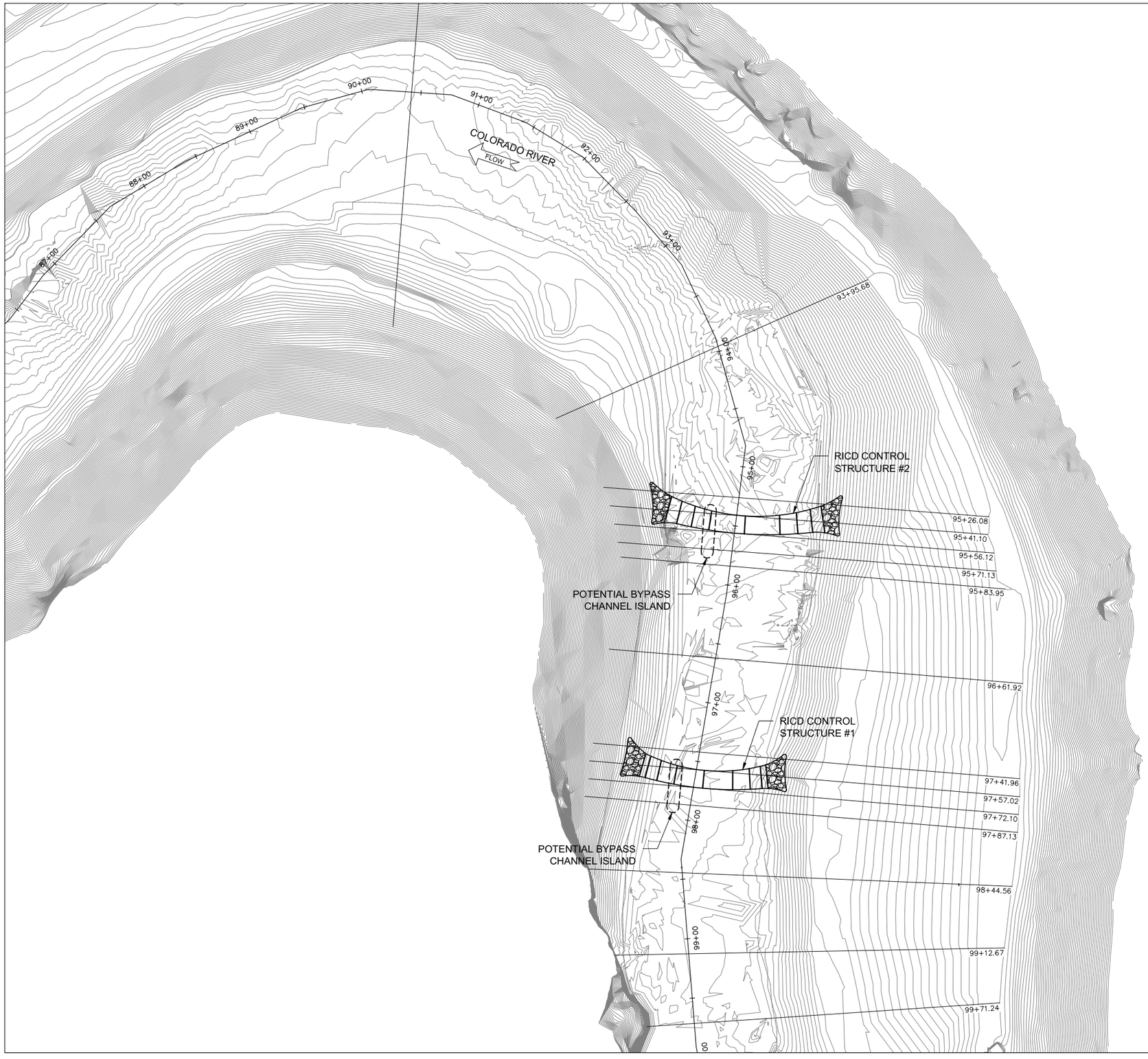

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PLAN VIEW:
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TWO RIVERS WHITEWATER PARK

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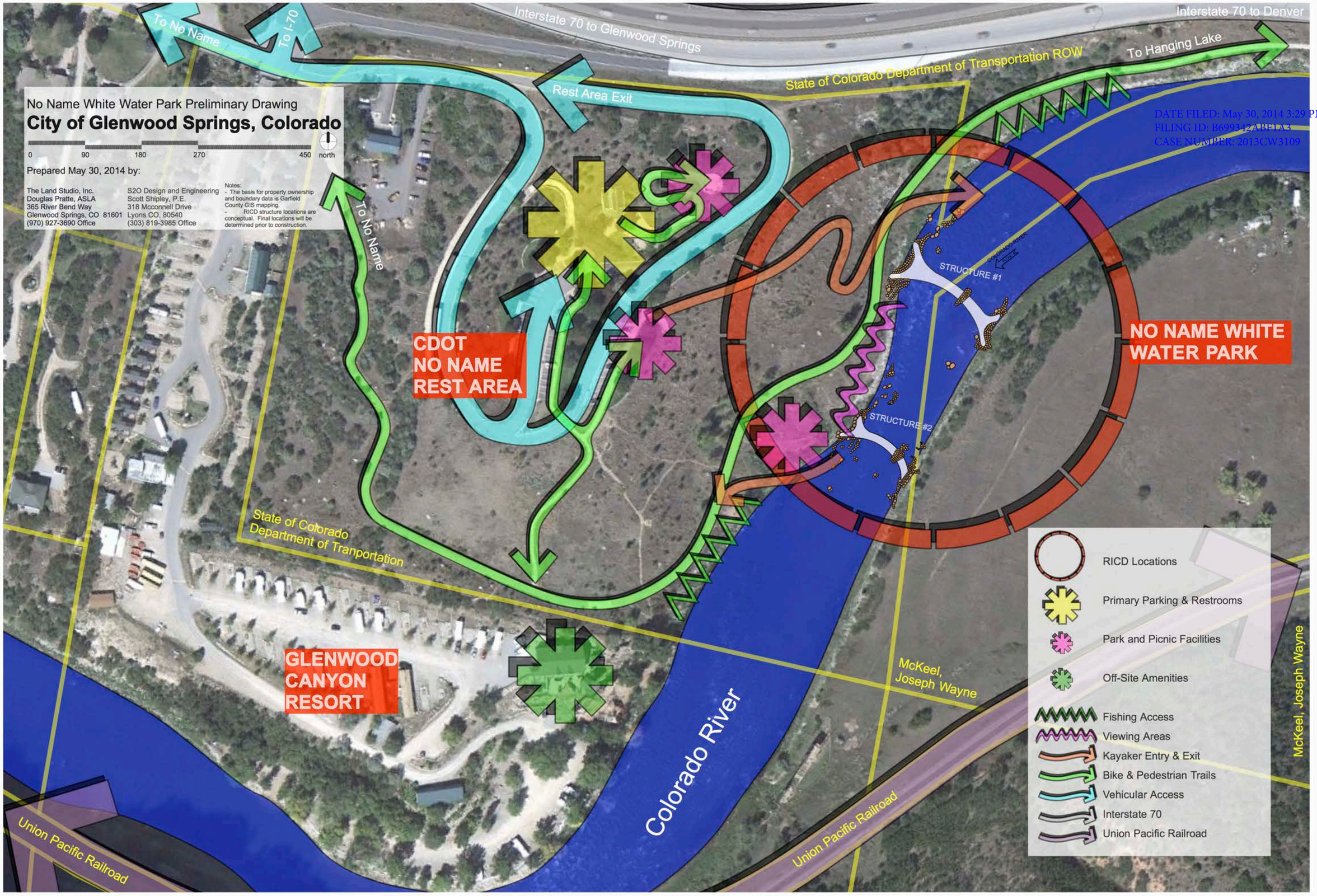

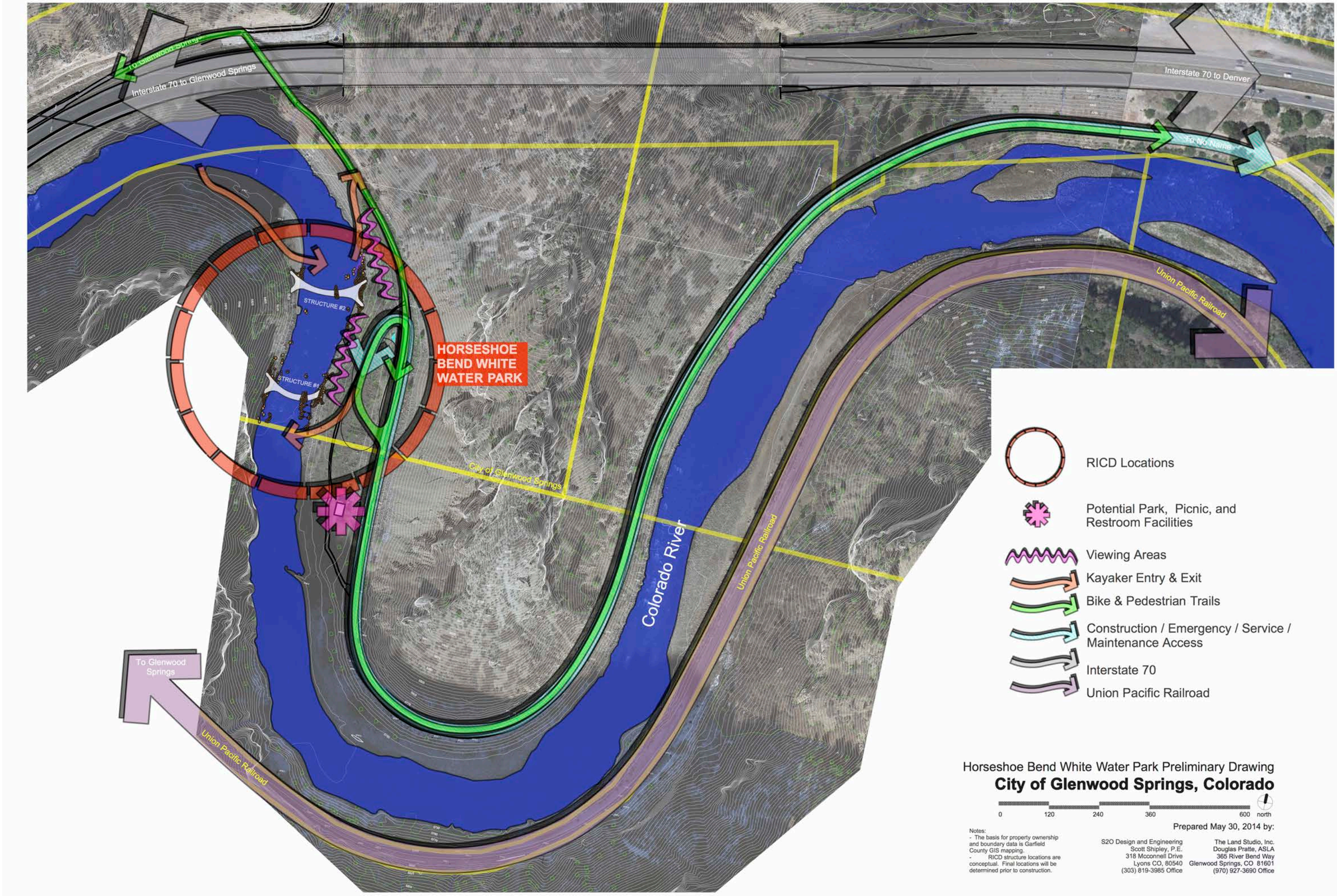

Horseshoe Bend White Water Park Preliminary Drawing

City of Glenwood Springs, Colorado

0 120 240 360 600 north

Prepared May 30, 2014 by:

Notes:
- The basis for property ownership and boundary data is Garfield County GIS mapping.
- RICD structure locations are conceptual. Final locations will be determined prior to construction.

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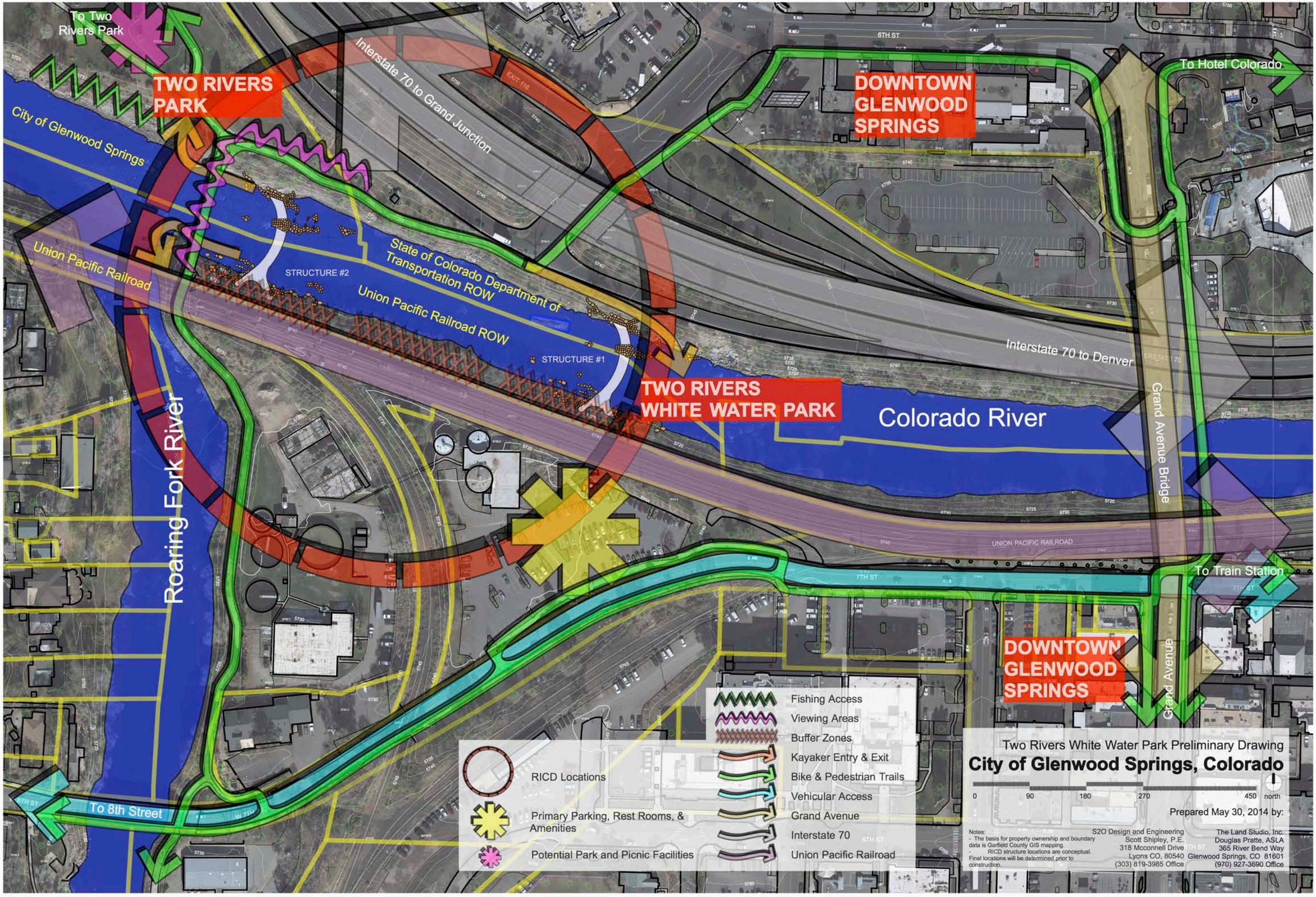
To Two Rivers Park
TWO RIVERS PARK
City of Glenwood Springs
Interstate 70 to Grand Junction
EXIT 116
6TH ST
DOWNTOWN GLENWOOD SPRINGS
To Hotel Colorado
Union Pacific Railroad
STRUCTURE #2
State of Colorado Department of Transportation ROW
Union Pacific Railroad ROW
STRUCTURE #1
Interstate 70 to Denver
TWO RIVERS WHITE WATER PARK
Colorado River
Grand Avenue Bridge
Roaring Fork River
UNION PACIFIC RAILROAD
7TH ST
To Train Station
DOWNTOWN GLENWOOD SPRINGS
Grand Avenue
To 8th Street
8TH ST
RICD Locations
Primary Parking, Rest Rooms, & Amenities
Potential Park and Picnic Facilities
Fishing Access
Viewing Areas
Buffer Zones
Kayaker Entry & Exit
Bike & Pedestrian Trails
Vehicular Access
Grand Avenue
Interstate 70
Union Pacific Railroad
Two Rivers White Water Park Preliminary Drawing
City of Glenwood Springs, Colorado
0
90
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north
Prepared May 30, 2014 by:
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Supplement to Preliminary Engineering Design Report Supporting the City of Glenwood Springs' Recreational In-Channel Diversion Water Rights Application

December 5, 2014

REPORT PREPARED FOR:

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1. Introduction

This report is supplementary to the Preliminary Engineering Design Report (Preliminary Report), dated May 30th, 2014, prepared by S2o Design and Engineering in support of the City of Glenwood Springs' Recreational In-Channel Diversion water rights application Case No. 13CW1309, Water Division No. 5. This supplement to the Preliminary Report (Supplementary Report) is intended to address comments received from various objectors to the proposed RICD water rights.

As set forth below, the intended season of use, recreational experiences sought, and minimum flows necessary to achieve the intended recreational experiences are described herein. The RICD control structures have been designed to provide for the intended recreational experiences at 1,250, 2,500, and 4,000 cfs, as claimed in the water rights application. These are the minimum amounts of water necessary to provide for the reasonable recreational experiences sought.

2. Intended Recreational Experiences Sought

As described in S2o's Preliminary Report, the City of Glenwood Springs is seeking to establish a water right to protect existing recreational uses of the Colorado River through Glenwood Canyon and to provide for additional non-motorized boating uses at the RICD control structures to include both downriver floating as well as "park-and-play" freestyle whitewater recreation. The RICD control structures have been designed to generate a range of freestyle whitewater recreational experiences for beginner, intermediate, and advanced users while also providing for existing float-through traffic through the inclusion of a safe bypass/fish passage channel at each structure. These recreational experiences will vary through the claimed flow rates but have been designed for the minimum flow rates necessary to provide the reasonable recreational experiences sought.

The RICD control structures will capture and control the claimed flow rates and accelerate flows through critical depth, sufficient to generate a "hydraulic jump". Hydraulic jumps used for freestyle river recreation are often termed "waves", "holes" or "wave holes" by river users, offer attractive recreational experiences for both downriver (paddle-through) and park-and-play river recreation. Freestyle river recreation can include kayaking, canoeing, stand-up paddle boarding (SUP), river surfing, and boogie boarding. Non-motorized river craft are used to surf within the stationary hydraulic jump (feature) created by the RICD control structure. Use of the features can occur spontaneously during informal nonevent use or during formal event use.

It is typical that users of varying abilities utilize the structures at differing flow rates with more experienced users seeking out higher water experiences while less experienced users seek out the lower, and less powerful, flows. The types of experiences typically sought by various users are described herein.

a. Intent of the Appropriator

It is the intent of the City of Glenwood Springs to create whitewater parks at the proposed sites that will produce a surfing and boating attraction for all types of visitors while protecting the existing floating and rafting experiences through this reach. U-structures have been shown to provide for a full gamut of users in Colorado's Rivers due to the seasonality of flows typically seen in the state.

The features proposed for the Glenwood Springs whitewater parks are sized to accommodate the 1250 cfs flows throughout the bulk of the season. At these lower flows the proposed whitewater structures will capture and control the flows of the Colorado River and create a hydraulic jump that is attractive for both beginner and intermediate use. The features will be low in energy and will allow paddlers to develop their skills while practicing elementary whitewater maneuvers. The park was designed to accommodate this type of paddler at 1250 cfs based on the reasonable conclusion that the river flows at this rate or greater throughout the claimed season under the current average flow regime.

As the flows increase during run-off the structures have been designed to accommodate a second tier of flows at 2500 cfs. At this flow rate the power and size of the wave will increase significantly as will the depths of flow in the structure. The speed and power will provide a wave that is attractive for intermediate use and allows for more dynamic tricks such as aerials, loops, and other freestyle maneuvers.

The events flow of 4000 cfs will provide a significant attraction to advanced and elite boaters while still attracting intermediate users as well. At these flows there will be sufficient energy in the feature to compare to other Colorado events, such as Salida, that have been shown to attract elite paddlers from around the country (and world) and that have also been shown to attract significant spectators and spending to the community that hosts this type of event. At the event flows, the whitewater parks will be a national attraction.

i. Beginner Experiences

Beginner freestyle recreational experiences are generally characterized by calmer more predictable waves, eddies, and pools. The type of hydraulic jump often desired for this recreational experience is typically a simple feature that is of low power and that has well defined eddies, wave trains, and pools. These waves are designed to be less dynamic whitewater features where fewer freestyle maneuvers (tricks) can be achieved. "Front surfing" and "spinning" are common freestyle tricks associated with this recreational experience and require relatively low energy features to be performed. The features can also provide recreation for run-of-the-river users who will value the thrill of "shooting-the-rapids" through an easily navigable drop structure with clear and obvious lines of navigation. The chutes of water, eddylines, and eddy currents also provide a venue for beginner paddlers. The proposed

whitewater parks will also provide an appropriate venue for novice river users to practice river navigation skills in addition to freestyle tricks.

ii. Intermediate Experiences

Intermediate freestyle recreational experiences are typically characterized by features of increasing power. The intermediate whitewater experience is generally defined by waves, eddies, and holes of increasing power and size in comparison to features that are defined as beginner experiences. The types of hydraulic jumps consistent with this experience often include standing waves, holes, and wave holes that are of increased size, power, and complexity in comparison to a beginner feature. These types of features create more dynamic hydraulics that offer greater variability in the types of tricks that can be performed and require a greater level of skill to execute. Of note, hole based freestyle kayaking tricks including "cartwheeling" and "looping" amongst other tricks and can often be performed in hydraulic jumps of an intermediate level. During this intermediate experience the safety bypass/fish passage channels will provide for easily recognizable and navigable routes around the central portions of the hydraulic jumps.

iii. Advanced Experiences

Advanced freestyle recreational experiences are characterized by more powerful and dynamic waves, eddies, and holes. Similar to intermediate recreational experiences, the key distinguishing factor for an advanced experience is the continued increase in the power and size of the features. The larger and more powerful features offer the greatest variability in the types of freestyle tricks that can be performed. Aerial freestyle tricks in particular require high velocity features sufficient for water craft to hydroplane on the water surface and skip off the waves face to become airborne. Once the boat is free from the water, numerous freestyle tricks can be performed. River surfers, boogie boarders, and SUPs also seek out high velocity waves necessary to execute specific freestyle maneuvers. Despite the fact that the proposed structures will create advanced experiences in the central part of the hydraulic jump, it should be noted that the safety bypass/fish passage channels will provide for easily recognizable and navigable routes around the central river feature.

b. Existing River Classification

The three proposed Glenwood Springs Whitewater Parks are located on the same reach of the Colorado River between Grizzly Creek and Two Rivers Park. All three sites will provide sufficient access, facilities, and whitewater to provide for the intended recreational experiences that will attract significant numbers of users. The structures are of appropriate dimensions and design to provide for all existing and proposed uses in the Colorado River and will not change the difficulty rating of the proposed reach.

The International Scale of River Difficulty is a rating system used to compare river difficulty throughout the world. The system was created to define difficulty to navigate and risks associated with a particular

rapid or reach of the river. The system is inexact but is based, for example, on the width and technical difficulty of the easiest route down a rapid and the risk of injury to a boater when they attempt this route. In general, flow rate and river classification are intrinsically connected, and when a section of river of a given classification flows higher, the associated difficulty classification often increases as well.

The proposed RICD control structures will utilize clearly marked bypass chutes that are designed to provide a route that is easily recognizable and navigable with low to medium sized waves, which provides for a concurrent less difficult recreational experience. Furthermore, the creation of large recovery pools following the RICD control structures will improve recovery opportunities for users.

The difficulty ratings of the proposed RICD control structures are consistent with the class II+ to class III rating of the existing Grizzly Creek reach and the proposed structures will not change the difficulty rating of the reach. American Whitewater rates the reach as a class II+ to class III (American Whitewater, 2014). The most recent kayaking guidebook, Whitewater of the Southern Rockies, rates the run from class II+ (500 cfs) to Class III (>6,000 cfs) (Stafford & McCutchen, 2007). The complete difficulty rating table as described by Stafford and McCutchen is listed below:

Table 1: The difficulty rating from Stafford and McCutchen for the Grizzly Creek to Two Rivers reach

	Minimum	Low	Medium	High
Flow (cfs)	500	1,800	4,000	6,000
Class	II+	III-	III-	III

c. Season of Use

The boating season on the Colorado River through Glenwood Canyon is dictated by climate and weather. Flows are typically at or above 1,250 cfs between April 1st and September 30th. Existing use is evidenced by several commercial rafting and fishing outfitters who advertise daily trips being offered through September 30th, and some even note that trips are available through October, but that these trips are weather dependent (Whitewater Rafting, LLC, 2014). Local kayaking schools and clubs also use the river through Glenwood Canyon later into the season. The Colorado Rocky Mountain School (CRMS), for example, offers both a recreational kayaking club and a competitive kayaking team for their students. These groups regularly travel to the Colorado River to paddle, train, and compete throughout the school's paddling season, which extends well into the fall, depending on weather.

Numerous private boaters also take advantage of the late season flows in the Colorado River, with boat launches between Shoshone and Two Rivers Park at high capacity through September and even into October. These private users include rafting and fishing groups, kayakers, SUP, and duckies. Some kayakers even paddle the Shoshone Rapids throughout the winter, including an annual informal event held on New Year's Day. Appendix A includes letters of support substantiating both the existing and

proposed non-motorized boating season, after September 1st, for the Colorado River through Glenwood Canyon.

d. Floodplain

Preliminary floodplain modeling of the RICD control structures has demonstrated their ability to be designed to create no-rise in the regulatory floodplain. The most current FEMA Flood Insurance Study for Garfield County indicates that only the Two Rivers site has a delineated floodplain, calculated Base Flood Elevations, or Flood Insurance Rate Maps (FIRM). The Horseshoe Bend and No Name sites are not located in areas where any known flood studies have occurred.

Upon initiation of final design and FEMA's release of the most recent Flood Insurance Study for Garfield County, final proposed conditions flood models of the Glenwood Springs whitewater parks will be iteratively developed with the intent of designing to a no-rise constraint. Where feasible, proposed conditions hydraulic models will be developed from FEMA's Effective Model to include increased resolution channel geometry, hydraulic roughness, and bank stations at the whitewater park sites. In other locations the proposed conditions will be compared to an Effective Model created by S2o that will model existing conditions in the reach.

Once final design has been completed, the proposed Glenwood Springs whitewater parks, as with all whitewater parks in the United States, will ultimately require regulatory approvals and permits prior to construction. A No-Rise Certification or Conditional Letter of Map Revision (CLOMR) will be performed once final hydraulic design of the structures and associated flood modeling has been performed. The analyses will be performed to meet FEMA regulatory standards and we expect the designs to be issued floodplain development permits.

3. Minimum Flows Sought for Intended Recreational Experiences

S2o believes the best approach to designing RICD control structures for the proposed Glenwood Springs whitewater parks is to use proven structures that have been shown to capture, control, divert and place to beneficial use waters of the State of Colorado. In order to compare design choices made for similar whitewater parks across different settings and with different flows, S2o has developed the "Freestyle Surface Index" [1]. This Index was used to compare known recreational experience at existing RICD control structures to recreational experiences sought at the proposed Glenwood Springs RICD control structures. The following analysis demonstrates that the claimed flows of 1,250, 2,500, and 4,000 cfs are

[1] Note that the author acknowledges that this is not a unique metric of his own invention. The name has been modified to provide clarity in this discussion.

the minimum necessary to achieve the appropriator's desired recreational experiences at each location identified.

a. Freestyle Surface Index

The Freestyle Surface Index is similar to the "Power Index", which was initially proposed by the CWCB for RICD water rights cases (CWCB Recreational In-Channel Diversion Policy Regarding Technical Criteria, 2003). The Power Index is one proposed method for evaluating power across a river reach and comparing it to other reaches. While available power can be roughly approximated across a reach using this index, the Power Index alone ignores the fact that a single drop structure, or multiple drop structures located within an extended low-slope reach, can be designed to create a significant freestyle whitewater attraction. The Power Index is based solely on the slope of the entire reach and expected flow. Furthermore, it ignores surface roughness altogether, a flaw that has made it problematic when used in this application. The Power Index can be written as:

$$PI = 100\frac{(discharge)(drop)}{length} \qquad (1)$$

An earlier metric from which the Power Index was derived is the "Power Surface Index", created by Goodman and Parr (R. Goodman, 1994), which considers more factors, including width of the river channel and boundary roughness. This metric measures the available power normalized by the dominant factor that cause diffusion of this power, namely roughness over the surface area of the river channel. Though the Power Surface Index is more appropriate for evaluating the design of whitewater parks as compared to the Power Index, it suffers from its origins as a tool for the evaluation of sites for extended slalom course designs and was not intended to consider uses like freestyle, river surfing, or other types of "park and play" (as opposed to run-of-the-river) freestyle river recreation.

The Power Surface Index, for smooth concrete channels, can be expressed as:

$$\Psi = \frac{(discharge)\times(Drop)\times 10000}{(Length)\times(Width)} \qquad (2)$$

and for roughened natural channels as:

$$\Psi = \frac{(discharge)\times(Drop)\times 10000}{2(Length)\times(Width)} \qquad (3)$$

S2o has adapted this metric with regard to freestyle river recreation, as was seen in the Durango Whitewater Park's RICD water rights application. This adapted metric, called the Freestyle Surface Index, expressed as,

$$\Psi = \frac{(discharge)\times(Drop)\times 10}{(Length)\times(Width)} \qquad (4)$$

is a modified Power Surface Index, for smooth channels, with the exception that the constant of 10,000 [2] has been changed to 10 to scale the numbers to a range more easily understood.

Both the Power Index and the Power Surface Index were developed to quantify the available power within a slalom/whitewater park reach and compare it to other reaches, whereas the Freestyle Surface Index has been developed to quantify the available power within an RICD control structure and compare it to other RICD control structures. Figure 1 shows a comparison of calculated Freestyle Surface Index values for various RICD control structures in Colorado with decreed RICD water rights to a representative structure for the Glenwood Springs Whitewater Parks.

An analysis of three other whitewater parks with decreed RICD water rights has been performed to compare calculated Freestyle Surface Index values. This analysis evaluated whitewater parks at: (1) Steamboat Springs; (2) Salida; and (3) Durango. These three parks were selected because they are located in relatively large river channels, are capable of conveying significant flows, and had similar objectives to this project.

[2] Note that in Equations 2 and 3 the value of 10,000 has replaced the published value of 10^{-4} from Goodman and Parr's document. Recalculation of their table revealed that this constant was listed incorrectly.

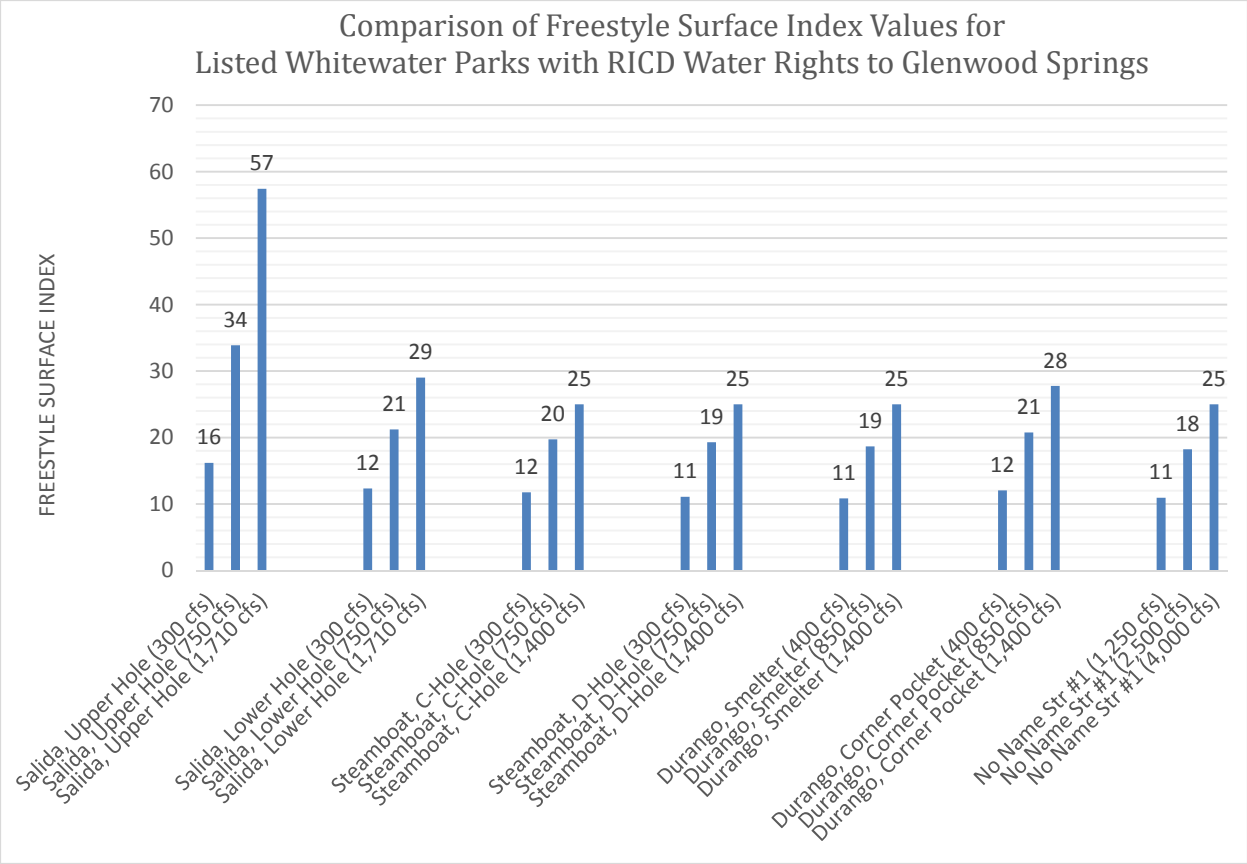

Figure 1: The Freestyle Surface Index values for various RICD control structures in Colorado with decreed RICD water rights.

Figure 1 shows two interesting facts about RICD structures. The first is that as the flows increase the power in these structures also increases. The second is that relative recreational experiences correlate well with the Freestyle Surface Index. Beginner experiences that correlate to early season paddling and late season paddling such as 300 cfs at Salida and Steamboat Springs and 400 cfs at Durango have FSI index values that are at a minimum of 11-12. Intermediate experiences such as the friendly flow agreement rate of 750 cfs in Salida, 750 cfs in Steamboat Springs, or 850 cfs in Durango show FSI index values of between 18 and 21. Advanced experiences such as 1400 cfs in Durango or Steamboat Springs, or the 1710 event flow at the lower hole in Salida are generally in the range of 25-29[3].

The Freestyle Surface Index values for the proposed Glenwood Springs Whitewater Parks are shown in Figure 2. A comparison of the Freestyle Surface Index values shown in Figure 1 and Figure 2 demonstrates that the flows claimed for the Colorado River at the three RICD sites are comparable to other RICD sites and that RICD control structures, in relation to the other structures, are in roughly the

[3] The Salida Event Flows at the Competition Feature have an exceedingly high FSI in comparison to other whitewater parks.

same range of power consumption. Furthermore, if the power were needed to be increased, then the structures would, in fact, need more flows in the Colorado River to do this.

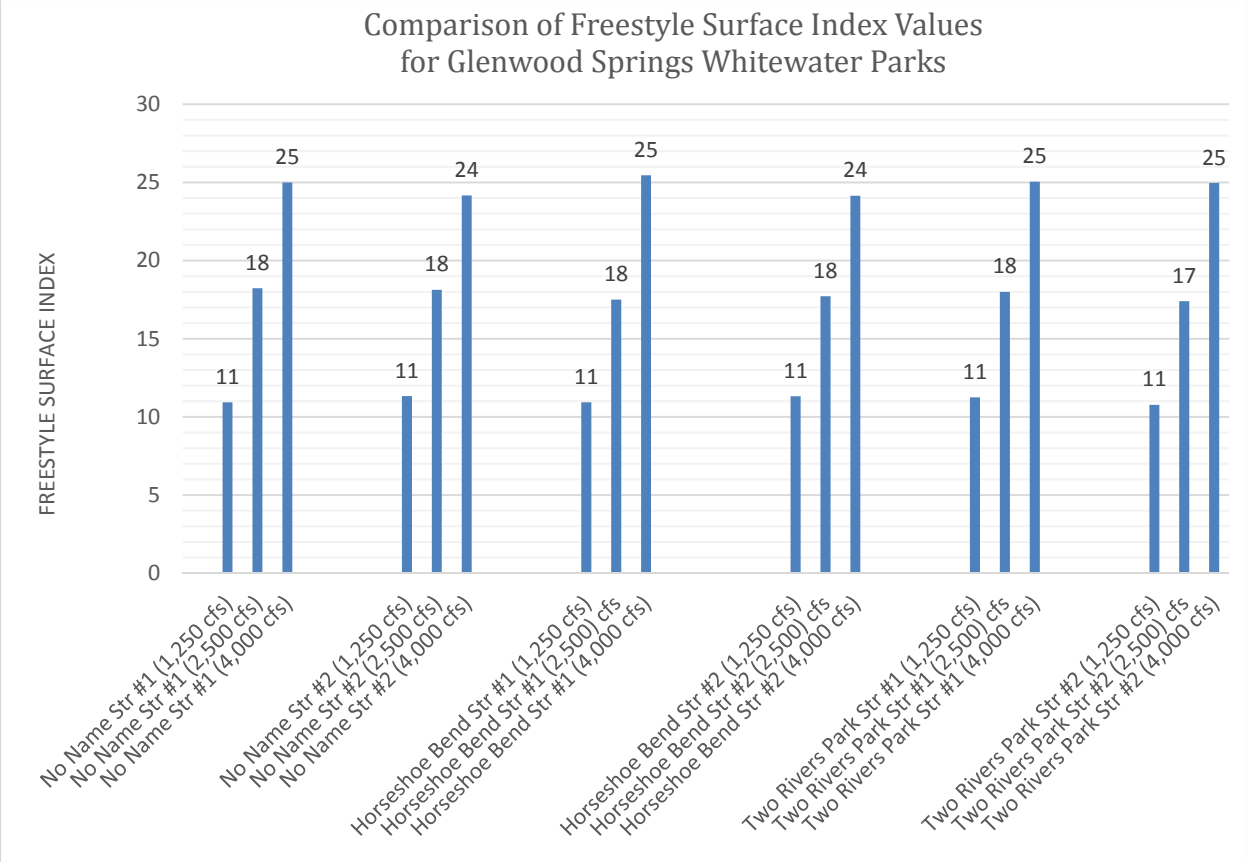

Figure 2: The Freestyle Surface Indices for the proposed Glenwood Springs Whitewater Structures

When the Freestyle Surface Index of all of the proposed Glenwood Springs RICD control structures are compared it can be seen that all of the proposed control structures are at the minimum Freestyle Surface Index values of comparable RICD control structures in other whitewater parks at each of the claimed flow rates. Furthermore, because the Glenwood Springs RICD control structures were designed to correspond to the minimum Freestyle Surface Index values observed at other whitewater parks with decreed flows, it can be deduced that these structures are also efficient. The Freestyle Surface Index values for the Glenwood Springs whitewater parks during the claimed event flows are significantly lower than those claimed in Salida at the upper hole over their event period. A similar conclusion can also be reached when applying the Power Surface Index or the Power Index to these RICD structures over the same event period. This analysis demonstrates that while the flows claimed may be higher in Glenwood Springs, the calculated Freestyle Surface Index values are in fact conservative while simultaneously providing for the appropriator's desired recreational experiences.

iv. No Name

Three recreational experiences have been claimed for the two RICD control structures proposed for the No Name Whitewater Park. The recreational experiences sought and minimum flows required are shown in Table 2.

Table 2: Claimed flow rates, periods, and recreational experiences for the No Name Whitewater Park

RICD Control Structure	Flow Rate (cfs)	Recreational Experience
No Name Structure #1	1250	Beginner
	2500	Intermediate
	4000	Event
No Name Structure #2	1250	Beginner
	2500	Intermediate
	4000	Event

The No Name Whitewater Park will create a hydraulic jump throughout the regularly occurring range of flows observed on the Colorado River. However, the recreational experiences sought will begin to occur at the three distinct flow rates claimed. This is evidenced by the Freestyle Surface Index values calculated for the two structures. Figure 3 shows that one or both of the No Name RICD control structures achieve a Freestyle Surface Index value of 11 at minimum flow of 1,250 cfs, 18 at minimum flow of 2,500 cfs, and 25 at minimum flow of 4,000 cfs.

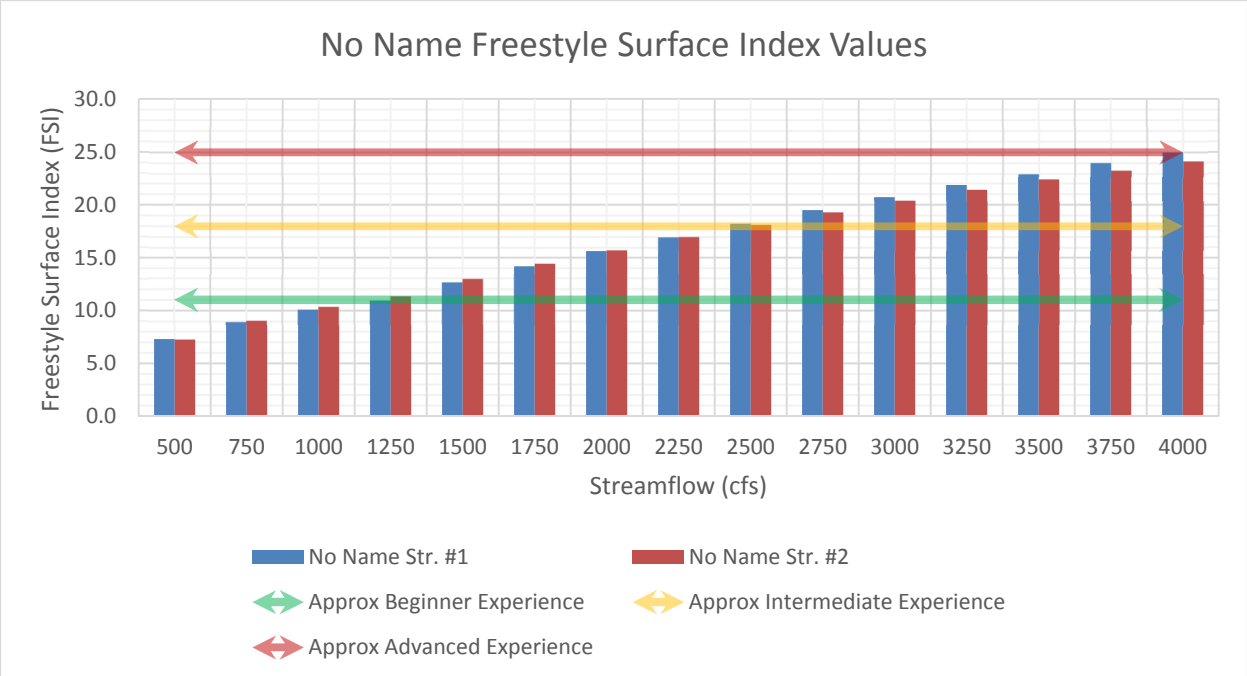

Figure 3: No Name Whitewater Park calculated Freestyle Surface Index values

v. Horseshoe Bend

The same three recreational experiences have been claimed for the two RICD control structures proposed for the Horseshoe Bend Whitewater Park. The recreational experiences sought and minimum flows required are shown in Table 3.

Table 3: Claimed flow rates, periods, and recreational experiences for the Horseshoe Bend Whitewater Park

RICD Control Structure	Flow Rate (cfs)	Recreational Experience
No Name Structure #1	1250	Beginner
	2500	Intermediate
	4000	Event
No Name Structure #2	1250	Beginner
	2500	Intermediate
	4000	Event

The Horseshoe Bend Whitewater Park will also create a hydraulic jump throughout the regularly occurring range of flows observed on the Colorado River. Like the No Name Whitewater Park, the recreational experiences sought will also begin to occur at the three distinct flow rates claimed. This is also shown by the Freestyle Surface Index values calculated for the two structures. Figure 4 shows that one or both of the Horseshoe Bend RICD control structures achieve a Freestyle Surface Index value of 11 at minimum flow of 1,250 cfs, 18 at minimum flow of 2,500 cfs, and 25 at minimum flow of 4,000 cfs.

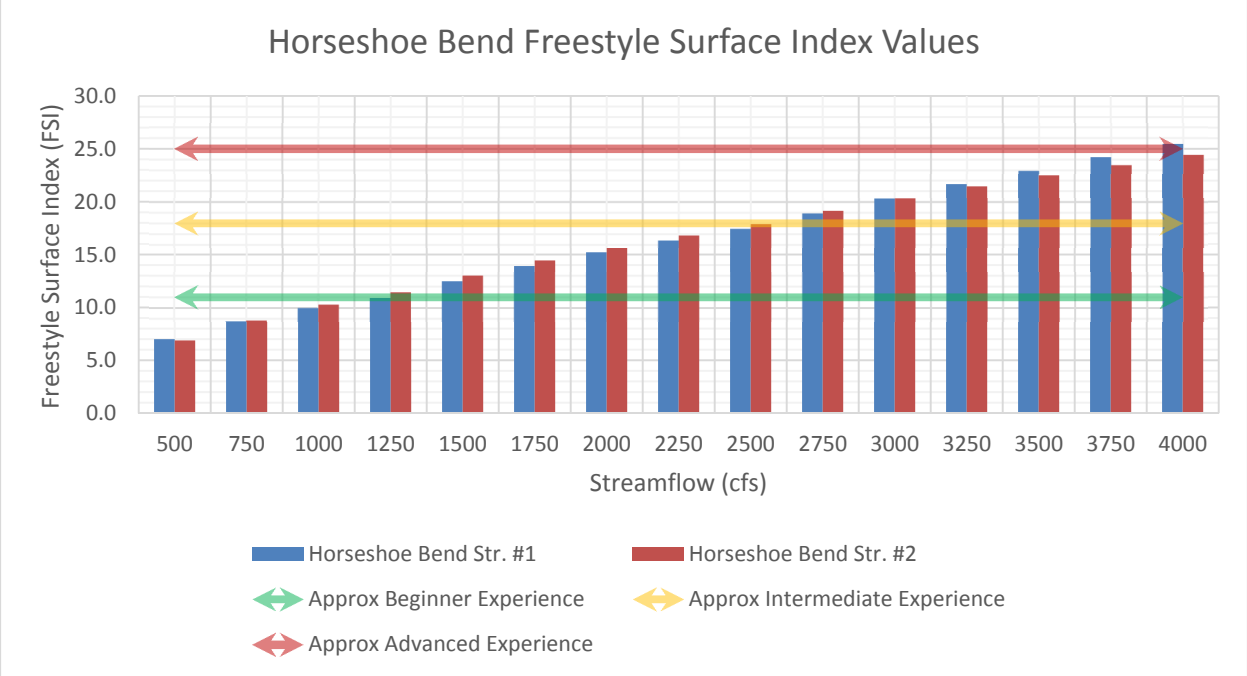

Figure 4: Horseshoe Bend Whitewater Park calculated Freestyle Surface Index values

vi. Two Rivers

The same three recreational experiences were also claimed for the two RICD control structures proposed for the Two Rivers Whitewater Park. The recreational experiences sought and minimum flows required are shown in Table 4.

Table 4: Claimed flow rates, periods, and recreational experiences for the Two Rivers Whitewater Park

RICD Control Structure	Flow Rate (cfs)	Recreational Experience
Two Rivers Structure #1	1250	Beginner
	2500	Intermediate
	4000	Event
Two Rivers Structure #2	1250	Beginner
	2500	Intermediate
	4000	Event

The Two Rivers Whitewater Park will also create a hydraulic jump throughout the regularly occurring range of flows observed on the Colorado River. Like both the No Name and Horseshoe Bend Whitewater Parks, the recreational experiences sought will also begin to occur at the three flow rates claimed. This is again evidenced by the Freestyle Surface Index values calculated for the two structures. Figure 5 shows that one or both of the Two Rivers RICD control structures achieve a Freestyle Surface Index value of 11 at minimum flow of 1,250 cfs, 18 at minimum flow of 2,500 cfs, and 25 at minimum flow of 4,000 cfs.

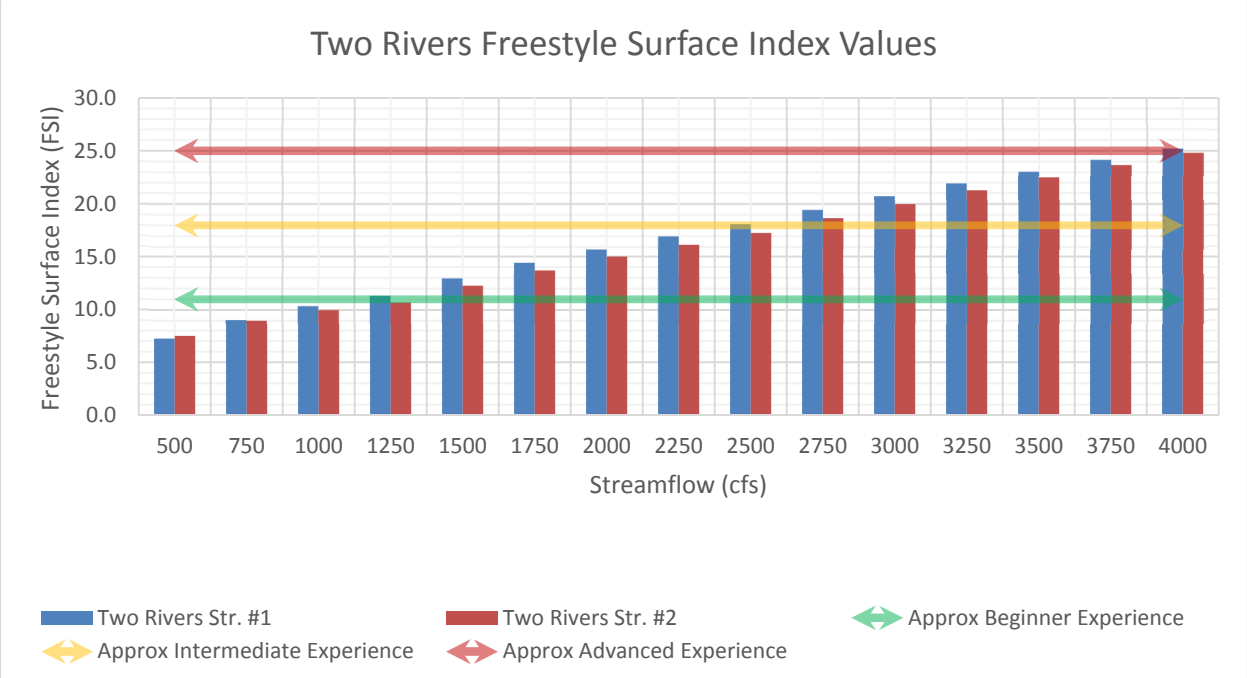

Figure 5: Two Rivers Whitewater Park calculated Freestyle Surface Index values

b. Structure Design

The U-structures proposed for the Glenwood Springs whitewater parks will be similar in nature to other RICD control structures that have been used successfully throughout the state including Golden, Pueblo, Steamboat Springs, Salida, Buena Vista and Durango. These structures have been shown to create the desired recreational experiences while remaining navigable to all types of non-motorized river craft at a variety of river flows.

To further enhance the navigability of the RICD control structures, they will also include a safety bypass/fish passage channel. Similar to the bypass channel located at the existing Glenwood Springs Whitewater Activity Area (West Glenwood Wave), the proposed bypass channels will be located in parallel with the whitewater channel. This design approach has proven very successful in bypassing novice river users around the more challenging hydraulics formed within the main flow of the West Glenwood Wave located downstream of the proposed whitewater parks. Furthermore, a significant recreational experience is achieved by the boat chute at the West Glenwood Wave, it creates a desirable standing wave for river surfers, SUPs, and boogie boarders at higher flows. A similar recreational experience is also anticipated for the proposed Glenwood Springs whitewater parks.

The safety bypass/fish passage channel concept was also used at the top RICD control structure in the Durango Whitewater Park. In this situation, the bypass channel pre-dated the design of the RICD control structures and for this reason was maintained in the final design. This bypass channel provides a less powerful alternative to novice users who may wish to bypass Smelter Rapids. None of the other three drop structures in Durango have bypass channels. The Durango bypass channel has also been recognized by Colorado Parks and Wildlife (CPW) as a significant improvement for fish passage over the structures.

The design of the proposed RICD control structures for the Two Rivers site is appropriate and will not affect the geothermal aquifer located below Glenwood Springs. Wright Water Engineers (WWE) has evaluated the subsurface borings performed for the proposed realignment and construction of the Highway 82 Bridge crossing over the Colorado River in Glenwood Springs, described in their Supplementary Report (Kelly, 2014). WWE concluded that the depth to the bedrock formation that serves as the confining layer for the geothermal aquifer, is at least 50 ft below the stream bed at the Two Rivers site. Based on S2o's experience in designing similar whitewater structures, we anticipate the maximum depth of disturbance for the construction of the cutoff wall to be no greater than 18 ft, resulting in no effect to the geothermal aquifer.

4. Reasonableness of Intended Recreational Experiences and Claimed Amounts

a. Benefits to the Community

S2o's Preliminary Report lays out the design criteria for expected users of the proposed whitewater parks. The RICD control structure designs, which utilize U-structures, have been developed to balance the needs of each distinct user group. These proposed U-structures are similar in nature to designs utilized for the majority of whitewater parks throughout the nation. U-structures have been shown to provide for all of the proposed users defined in S2o's Preliminary Report including beginner, intermediate, and advanced boating, tubing, rafting, float-through boating, events, fishing and all of the other objectives cited for this project. Similar parks, in similar locations, have been shown to provide significant economic benefit to the communities in which they reside.

Commercial and private whitewater rafting and guided fishing trips represent a significant portion of the outdoor recreation based economy throughout the State of Colorado. In 2013 the state wide economic impact of commercial rafting alone was estimated at $145 million dollars with the Colorado River representing 23% of the combined market share, much of which occurs in Glenwood Canyon (Jumey, 2014).

The proposed whitewater parks on the Colorado River provide a unique opportunity to host a significant whitewater event around the July 4th weekend, when other venues lack the power and features necessary for a comparable event. The timing of whitewater boating events and festivals throughout the State of Colorado is dependent on available flows, competing events, availability of professional athletes, and climate. There are many locations which hope to host these competitive events but relatively few weekends during run-off when flows are sufficient to create features necessary for the events. The proposed window for the event flow will offer a reasonable amount of time for the City of Glenwood Springs to host such an event.

The FIBARK event in Salida, CO, one of the most prestigious whitewater events in the country, is always held on Father's Day, which typically falls on either the second or third week of June. In 2014, the four-day event lasted from June 12-15th. Prior to this event, the Towns and Cities of Lyons, Golden, Steamboat Springs, Durango, Vail, and Buena Vista will host their own events. Some locations, like Durango in 2014, are required to pick a weekend that conflicts with other events in order be assured of sufficient flows. The timing of the Glenwood Springs RICD claimed event flow, around the July 4th weekend, will allow the community to host a significant event after all other events in the state have taken place. This will maximize the potential of Glenwood Springs to host a significant event that will draw from the greatest number of available athletes and spectators. The dates and flows chosen will provide for a relatively big-water event on a holiday weekend at a time when other event venues in the State typically will not have the flows required to host a comparable event.

Whitewater rodeos are commonplace in Colorado's rivers during annual spring runoff. Six events sanctioned by USA Freestyle Kayaking were held in 2014 (USA Freestyle Kayaking, 2014) along with numerous other river festivals that included freestyle rodeo events. These events represent a significant benefit to local economies. The largest of these events includes the GoPro Mountain Games, which generated an estimated $4 million dollar economic impact on the local economy in 2014 (Wong, 2014). Furthermore, nonevent use over the freestyle whitewater season also contributes significantly to local economies. Studies have shown that the economic impacts of similar whitewater parks, such as the Golden Whitewater Park, the Steamboat Springs Whitewater Park, the Buena Vista and Salida Whitewater Parks and the Durango Whitewater Park have economic impacts of as much as several million dollars per year.

b. Stream Size and Characteristics

For the preliminary design of the three Glenwood Springs whitewater parks, the weir equation was used to demonstrate the proposed RICD structures' capability of capturing and controlling the flow of the river and to scale the structures to the existing river channel geometry. Thorough topographic and bathymetric surveys of the proposed sites were conducted prior to the development of preliminary designs in order to develop RICD control structure geometries appropriate for the sites.

The design of any whitewater structure must consider the existing river channel geometry, which is a function of its unique hydrology. A structure that, for example, is designed and built for a relatively small channel with lesser flows such as the St. Vrain River in Lyons, CO will be narrower with a smaller low flow width than one created for the Colorado River. The idea of narrowing the flow notches in the RICD control structures to create the same desired flow depth at a lesser flow rate is not feasible when river function and flood risk are considered. This belies the fact that these are real structures in a real river with real average and real flood flows. The designer must design a whitewater park to the expected flows in the reach and in a geometry that is expected to a) not impact the regulatory 100 year Base Flood Elevations, b) allow for continued usage of the existing river user groups, by, in this case, providing water and space for a safe boater bypass, c) not constrict and funnel the water at the whitewater park in a way that creates either unsafe conditions at higher flows or that causes undue erosion, and (d) not impact the sediment transport capacity or fish passage within the reach. Given these restrictions, it can be seen that the width of flow over drop structures cannot be arbitrarily narrowed such that, for example, a drop structure in the Colorado River had a flow width as wide as a drop structure in the St. Vrain River.

The understanding that the river channel cannot be excessively narrowed without creating adverse effects on the regulatory floodplain, as described previously, is a critical point to this discussion. Simply narrowing the control structures in the channel also decreases the flood conveyance of the channel. In doing so, in addition to a number of other issues, the structures would be expected to cause a rise in the

calculated Base Flood Elevations, which is not allowed without re-delineation of the regulatory floodplain. The rule which governs this relationship is the Continuity Equation shown as Equation 5 below:

$$Q = VA \qquad (5)$$

This Equation shows that the flow rate (Q) is equal to the cross sectional area (*A*) times the velocity of flow (*V*). Any decrease in the width of the channel decreases the cross-sectional area (A) of the channel. This results in a decreased capacity to pass flow (Q) and "choking" of the flow. The river adjusts for this impact with raised water surface elevations (increasing the area by making flows deeper) and increased velocities. The resulting impacts affect flood elevations and the safety of the proposed whitewater park.

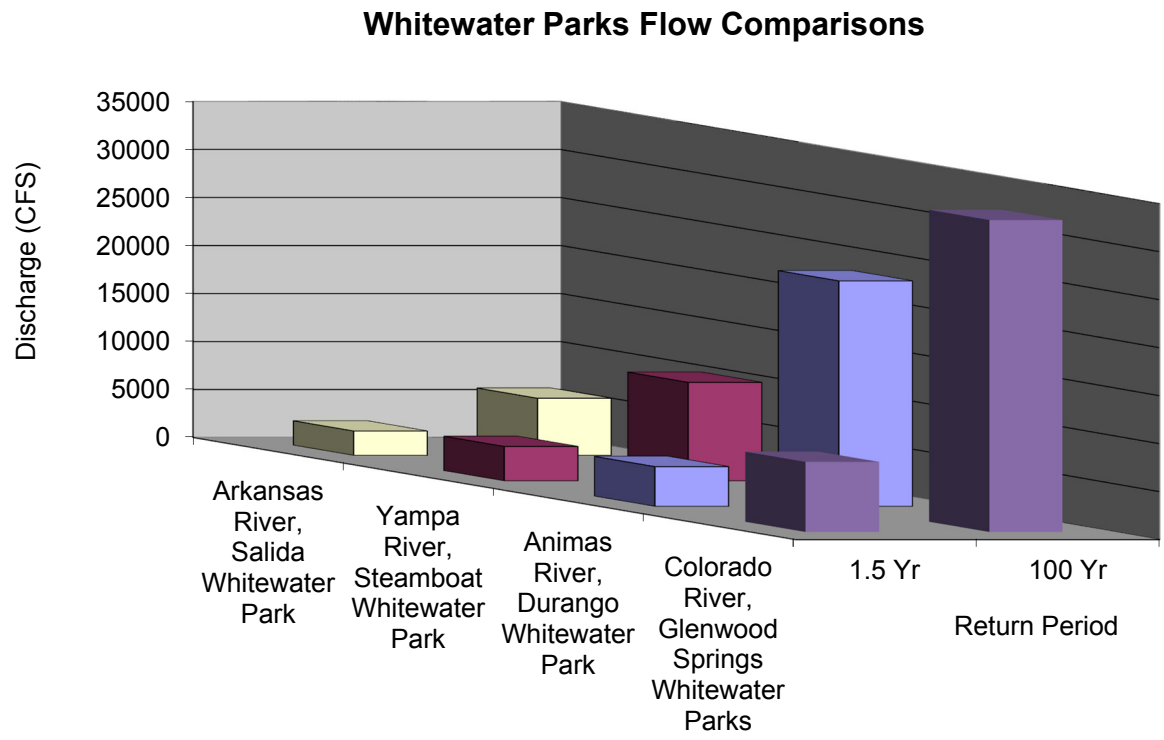

Figure 6: The 1.5 and 100 year return flows of the Arkansas River at Salida, the Yampa at Steamboat Springs, the Animas at Durango, and the Colorado at the Glenwood Springs Whitewater Parks.

Figure 6 shows that both the 1.5 year and 100 year return periods are greater for the proposed Glenwood Springs whitewater parks than at the Salida, Steamboat, or Durango Whitewater Parks. From this comparison, it can be concluded that the channel size and subsequent conveyance capacity of the Colorado River channel are also greater than these other river channels and, if this were the only indicator considered, the ability to constrict the existing channel down to minimal dimensions would be limited by the channel's need to pass flood events without impacting the regulatory floodplain. From this information it can be seen that an appropriately sized RICD control structure for the Colorado River

should be wider and require more flow as compared to other whitewater parks constructed in smaller river channels.

The geometries for the Glenwood Springs RICD control structures were derived from an analytical process using existing aspect ratios and expected flows among other factors as outlined in the Preliminary Report. However, when these independently derived cross sections are compared to cross sections at the Steamboat, Salida, and Durango Whitewater Parks it can be seen that the typical structure geometries are similar as compared to these other parks. These similarities in turn relate recreational experiences achieved at different locations allowing the designer to know with a high degree of confidence the types of features that will be generated. Preliminary one-dimensional modeling of the sites further demonstrates the recreational experiences to occur at the proposed Glenwood Springs whitewater parks. Multidimensional or physical scale modeling could also be performed, but this level of design has not been undertaken for any other RICD water rights cases in the State of Colorado. Figure 7 shows the cross sectional comparisons of these drop structures[4].

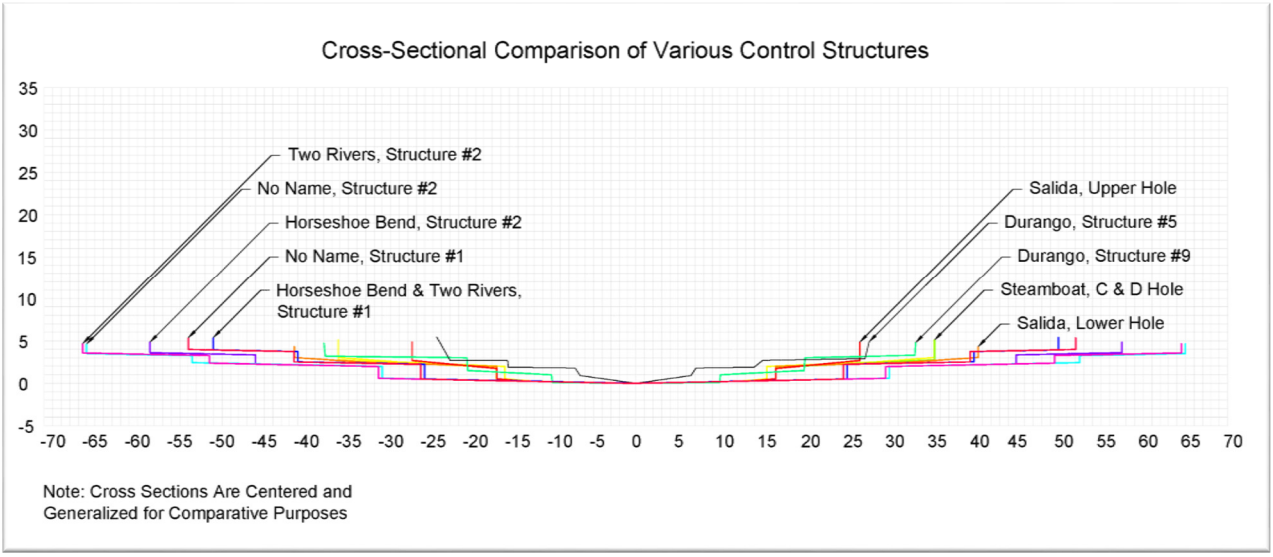

Figure 7: A cross-sectional comparison of various RICD control structures.

Figure 7 shows that the proposed drop structures are typical of those seen in other whitewater parks and share a similar design to those shown to already provide a recreational beneficial use. A key feature of the control structures in the Steamboat, Salida, and Durango Whitewater parks is that they are designed to be roughly "at grade" meaning that their invert elevation closely matches that of the existing riverbed. The low, and high flow channels of these structures are roughly equivalent in depth as well.

[4] Note that all of the drop structures are shown generally with average depths and with the low flow cross sections centered on the high flow cross sections for purposes of ease of comparison.

5. Appropriateness of Stream Reach

The stream reaches of the Colorado River identified in the RICD water rights application for this case are appropriate reaches of the river for the City's intended recreational experiences sought. The RICD control structures planned for the proposed No Name, Horseshoe Bend, and Two Rivers sites are designed as U-structures with bypass channels that are easily recognizable, navigable, and of a class II nature (Figure 8). Furthermore the hydraulics created at these structures will provide for the recreational experiences desired but will also allow for easy recovery of boats and equipment downstream of the structures. Preliminary modeling shows that the hydraulic jumps created by the RICD control structures can be designed to submerge at higher flows up to the 100 year at which time they drown out altogether.

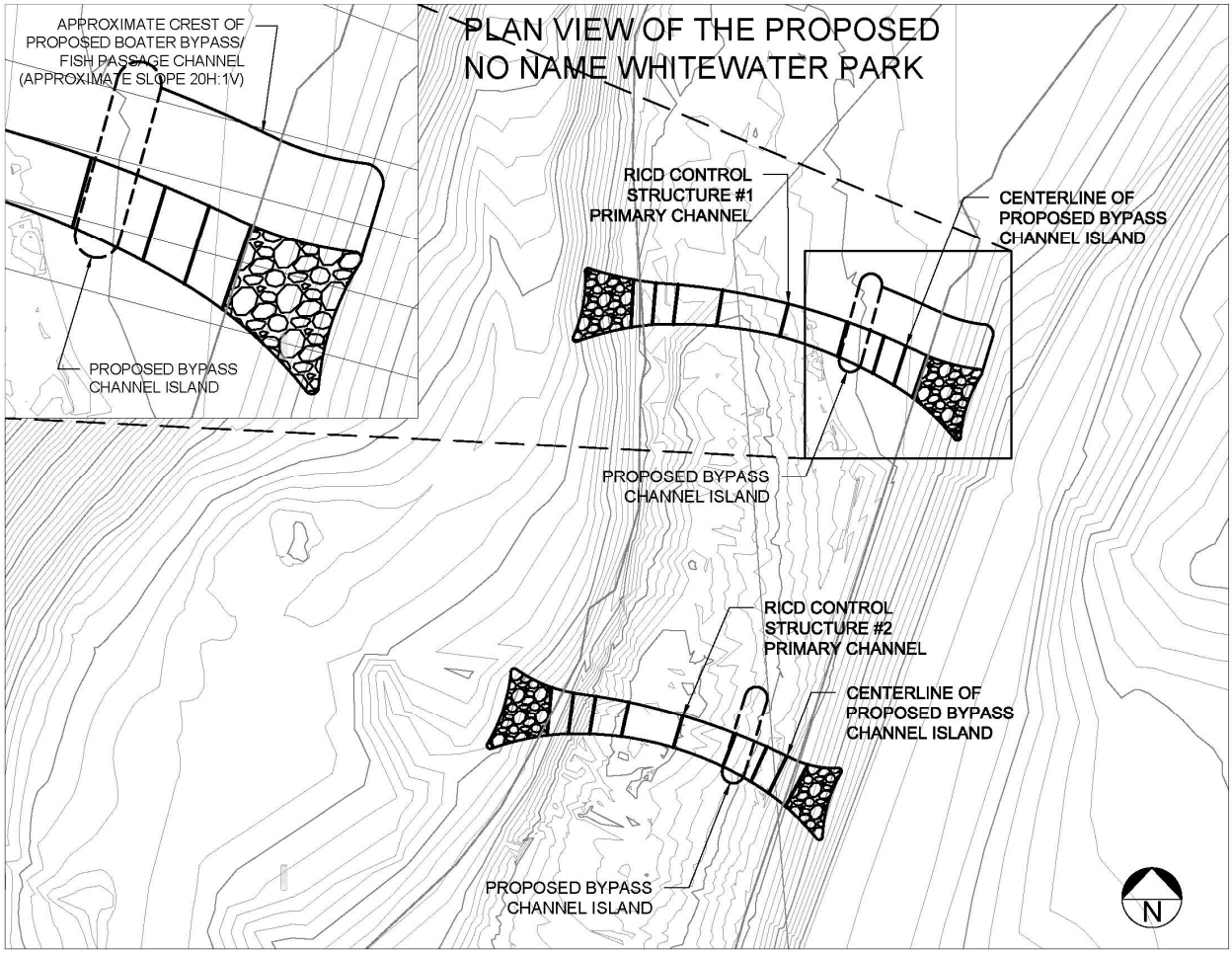

Figure 8: Figure showing the proposed bypass channels at the No Name Whitewater Park

The preliminary designs of the RICD control structures have been developed to provide for existing downriver uses of the Grizzly Creek reach including kayaking, canoeing, rafting, fishing, tubing, and novice usage. Many existing whitewater parks in the State of Colorado draw competitive events yet

remain reaches of the river that are utilized by both beginner and advanced users alike before, during, and after these events. The most prestigious of these include Vail, Steamboat Springs, Salida and Buena Vista. None of these venues feature additional bypass channels such as those proposed in the Glenwood Springs RICD structure designs nor signage to aid in navigation as an added safety feature (also suggested for these sites). These existing venues demonstrate that a class IV difficulty rating is not required to host a premier competitive freestyle whitewater event. Furthermore, the range of ratings for the existing RICD reach is consistent with that of other whitewater parks hosting competitive events.

Whitewater parks in Golden, Salida, Pueblo, and Reno, NV; among many others have been created near their respective Town or City on a reach of whitewater that is easy to navigate and of a similar class to the proposed locations for the Glenwood Springs whitewater parks. Similar to these other locations, the objective of the Glenwood Springs whitewater parks is to create dynamic and fun-to-paddle whitewater near the City in reaches of the Colorado River that are otherwise less attractive to specific types to boating. Most whitewater parks reside in river reaches that saw, and continue to see, significant beginner and intermediate use. Examples have been noted above but should specifically include the Steamboat Springs Whitewater Park which sees thousands of commercial inner-tubers each year. Similarly, the Golden and Boulder whitewater parks also see significant usage by beginner tubers and other novice river craft.

a. River Function

i. Scour

The calculation of scour is dependent on highly variable hydraulic parameters and site specific river conditions. Although final calculations predicting the total potential scour depth have not yet been completed, preliminary analysis suggests a maximum uncontrolled scour depth of 8 to 10 feet for the Glenwood Springs Whitewater Parks. The following equation was used to predict jet scour below a drop structure (Julien, 2002):

$$\Delta z = \left\{1.8\left(\frac{sin\emptyset}{sin(\theta_j+\emptyset)}\right)^{0.8}\frac{q^{0.6}\,V_1\,sin\theta_j}{[(G-1)g]^{0.8}\,{d_s}^{0.4}}\right\} - Dp \qquad (6)$$

Where (Δz) is the scour depth below the drop structure, (D_p) is the drop height of the drop structure, (q) is the unit discharge, (V_1) is the approach velocity, (d_s) is the median particle size, (g) is the gravitational acceleration, (G) is the specific gravity of the bed material, (ϕ) is the angle of repose of the bed material, and (θ_j) is the jet angle measured from the horizontal. Figure 9 shows the schematic of a drop structure, uncontrolled scour pool, and the associated equation variables.

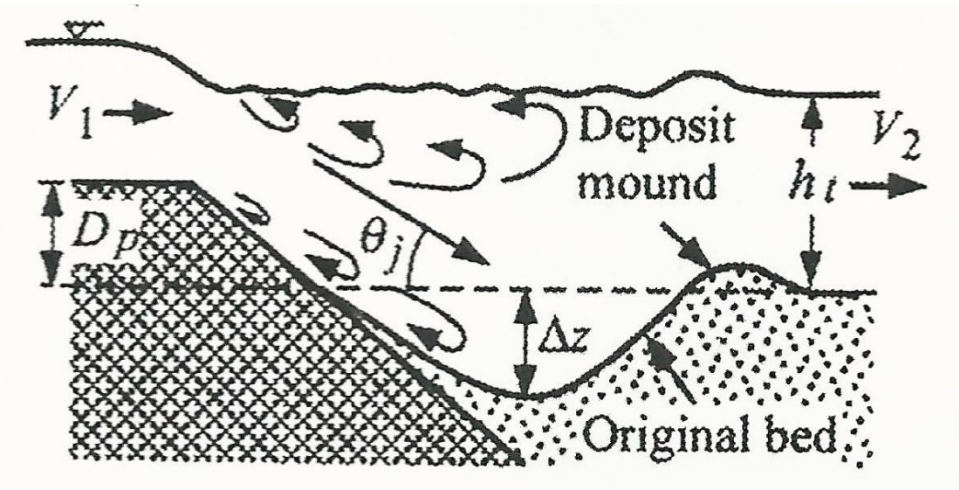

Figure 9 Schematic of Jet Scour

For a RICD control structure, the maximum scour depth may also represent the minimum depth to which the downstream cutoff wall can be constructed. To further protect the structure from scour and to maintain a desired pool depth downstream, a scour apron will also be designed and constructed. This apron will act as a riprap revetment composed of appropriately sized boulder riprap and will be installed along the toe of the RICD control structure so as to prevent uncontrolled bed scour. The depth, extent, and size of the riprap will be calculated using hydraulic parameters obtained from modeling of the final design and generally accepted engineering practices.

Design of the cutoff wall must also consider piping among other factors and be constructed to a sufficient depth for their prevention. For the Two Rivers Whitewater Park, the depth to bedrock is in excess of 50 ft, as described in Wright Water Engineers Supplementary Report (Kelly, 2014). Typical cutoff wall depths, designed by S2o, range between 10 and 15 ft with a maximum depth of less than 18 ft for similar whitewater structures.

ii. Hyporheic Zone

The proposed RICD control structures are designed at or near grade and will be constructed as drop structures on the river bed. Subsurface water surface elevations within the hyporheic zone will not be significantly affected by their construction. The water elevations within the saturated interstitial spaces of the river bed and adjoining river banks are controlled by the water surface elevation in the flowing channel and from the surrounding topography. No change to the surrounding topography and associated aquifers feeding the river channel are proposed and only small localized adjustments in the water surface profile will be required to generate the desired recreational experiences with no net change in the overall energy slope of each whitewater park reach. Obtaining standard permits for construction of these facilities, including floodplain development permits and the US Army Corps of

Engineers Section 404 Permit, will ensure that any effects from these changes do not impact adjoining landowners or water users.

iii. Sediment Continuity

Sediment transport capacity within a typical river channel, often varies from high to low flows. The proposed RICD control structures will function no differently than natural step/pool or pool/riffle features in which the greatest bed shear stresses transition from the step or riffle during low flows to the pool during high flows. This effect results from a disproportionate increase in the hydraulic radius, often approximated by the depth, relative to the energy slope, often approximated by the water surface slope. This seasonal reversal, often observed in river channels in Colorado, allows for step/pool and pool/riffle bed sequences as well as RICD control structures to be self-maintaining throughout each high water cycle. The geometry of the RICD control structures also prevents them from impounding sediments upstream. By setting the invert of the RICD control structures very near the existing grade the structures can mimic existing sediment transport rates within the reach and convey background sediment loads through the park. Furthermore, the wings of the RICD structures are designed to generate strong eddy currents within the scour pools to minimize deposition outside of the main current. Riprap armoring of the river bed will also be performed to prevent uncontrolled scour. Furthermore boulder bank stabilization will also be performed to prevent bank erosion, one of the most common sources of river sediments. The structures will naturally pass background sediment loads and prevent localized erosion within the whitewater parks to maintain the existing river function within the reach.

iv. Protection of Aquatic Habitats

The RICD control structure designs proposed for the Glenwood Springs whitewater parks will accommodate for fish passage as well as overall river function. Fish passage is provided for through two mechanisms at the RICD control structures. First, the step-terraces of the U-structures, described in figures 11-16 of S2o's Preliminary Report, are designed to be hydraulically rough, with staggered boulder and recessed grout, sufficient to reduce near bed velocities and create micro-eddies for fish holding and passage. This technique has been shown to be effective at the Durango Whitewater Park. A secondary bypass channel will also provide for additional fish passage. This side channel will be located in parallel to the whitewater channel and separated by a longitudinal island. The bypass channel bed will also be hydraulically roughened and may include step/pool bed features or even boulder baffles. The length of the bypass channel ramp will be also significantly longer than the whitewater channel ramp. This will result in greatly reduced bed slopes and associated channel velocities.

The City will work with CPW to determine appropriate velocities to allow for fish passage of desired species as well as other input they may have in relation to overall aquatic habitat at the sites. Hydraulic

models will be used to iterate the final design of the RICD control structures to predict in-channel velocities and other important hydraulic effects of the whitewater parks. These data will then be cross referenced against published data on known fish species within the surrounding reaches of the Colorado River to ensure their protection.

S2o has met several times with CPW staff to discuss recent research into fish passage at whitewater parks as well as to collaborate on future design enhancements that can provide for fish passage and improve the quality of the aquatic habitat for fish in and around whitewater parks. This ongoing dialog with CPW will inform the design of the RICD control structures to maximize aquatic habitat within the proposed whitewater parks. The City of Glenwood Springs is committed to working with CPW to ensure that the best science is applied to the final design of the whitewater parks.

6. Conclusion:

In summary, it is S2o's opinion that the RICD control structures for the Glenwood Springs whitewater parks are an appropriate design to capture, control, divert, and place to beneficial use the flows of the Colorado River. It is the intent of the City of Glenwood Springs to create whitewater parks that will produce a surfing and boating attraction for all types of visitors while protecting the existing floating and rafting experiences through this reach. The RICD control structures have been designed to generate a range of freestyle whitewater recreational experiences for beginner, intermediate, and advanced users while also providing for existing float-through use with the inclusion of a safe bypass/fish passage channel at each structure. Based on an analysis of potential flood impacts and a comparison of available power at similar whitewater sites of known recreational experiences, the flows claimed are the minimum necessary to provide for the City's objectives including a flow of 1250 cfs for beginner experiences, 2500 cfs for intermediate experiences, and an event flow of 4000 cfs for advanced experiences.

The RICD control structure designs are stable and have proven to be robust and enduring in river environments and are further designed to maintain river function. Similar whitewater parks throughout the nation, have shown significant economic benefits to their respective communities. Existing private and commercial use and demand for additional recreational experiences at the proposed whitewater parks is substantiated by the numerous letters received by the City of Glenwood Springs supporting the project. Upon completion of final design, all required regulatory approvals and permits will be obtained prior to construction. This regulatory process will ensure that the projects are in compliance with all local, state, and federal requirements and will not impact adjoining landowners or existing water users.

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Appendix A: Support for Post-Labor Day Use of the Colorado River in and Around Glenwood Springs

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From: Peter Benedict <pbenedict@crms.org>
Date: November 15, 2014 at 11:38:26 AM MST
Subject: Re: Colorado River use
To: Douglas Pratte <landstudio2@comcast.net>

Dear Mr Pratte,

I am writing in support of the development of the proposed whitewater parks along Colorado River in Glenwood Canyon and preserving current flows in the Colorado. The Colorado Rocky Mountain School has used three stretches of the Colorado River in Glenwood Canyon extensively since the early 1960's. CRMS normally has between 30 and 50 students involved in the river program during 1st quarter (September, October) and 4th quarter (April, May). Glenwood Canyon is unique within Colorado to have good flows and good rapids during these shoulder seasons. The Glenwood wave is a huge asset to the community in May, June, and part of July. This spring Glenwood Whitewater and CRMS are co-hosting the US freestyle team trials again. Intermediate and advanced paddlers come from around the world to paddle the wave at high water.

However, from August to May, the Glenwood Wave does not provide very much for advanced students to progress their skills, beginner students to practice, or families to play. What I would love to see is a whitewater park that is geared toward the other 8 months of the year. This would include several features for different abilities or styles that would provide not just an exciting ride for advanced paddlers. Other longer parks around the state are great places to learn, and for families to play in the river, as well working on the latest freestyle moves.

Below is a table showing the number of CRMS student user days over the last three fall seasons. This is mainly to demonstrate our current use on the Colorado River. This represents about halfp of our river user days in the fall. If there was a park built with multiple features that could be worked by a variety of skill levels, I could see much more of our use transferring from the Roaring Fork in the fall to the Colorado. On a related note, there were more kayakers in the Glenwood Canyon this fall than I have seen in years. The flows were a bit higher and the weather was great but there were lines at all the play spots. You do not see this even in the summer.

	9/7/12 - 10/24/12	9/4/13 - 10/23/13	9/4/14 - 10/25/14
Shoshone	26 students 6 faculty	44 students 11 faculty	107 students 23 faculty
Grizzly	0	0	6 students 2 faculty
No Name	37 students 9 faculty	32 students 6 faculty	16 students 3 faculty
Wave	32 students 8 faculty	84 students 18 faculty	19 students 4 faculty

Thanks for your time and consideration on this project. On a personal note, I have been paddling Shoshone year round since 1997. Fall is one of my favorite times to enjoy Shoshone. I love sharing this gem with students and feel that it is an asset to Glenwood and the greater Colorado boating community.

Sincerely,

Peter Benedict
River Program Coordinator
Colorado Rocky Mountain School

From: Kayo Ogilby <kogilby@crms.org>
Date: November 16, 2014 at 11:47:06 AM MST
Subject: Re: Colorado River use
To: Douglas Pratte <landstudio2@comcast.net>

The Gift of the Colorado

We sit on one of the true whitewater kayaking gifts: A river that maintains flows beyond the scope of the normal whitewater season. This gem that we sit on began its journey towards realizing its full potential with the development of the Glenwood Whitewater park and has the possibility of a giant step forward with the addition of a whitewater park above the confluence.

I am a passionate life-long kayaker who uses this feature as a critical training ground before and after the high-water season. The only reason I don't use it more is that the quality of the features at the current park are limited during the low flow season. I know and understand the challenge of designing such features and fully appreciate the efforts at reconstruction that went on recently. THANK YOU to all involved. The possibility of an additional park above the confluence, and thus the possibility of dialing in and creating new and additional features that would make the park a world class site at lower flows (and of course hopefully at high flows too), and thus a draw to paddlers from around the region and world in the low season, would not only increase my use, but sets us up to be a unique regional, national, and international draw. The potential is AMAZING. What kayaker wouldn't want to come train on the Colorado in October or March, and go soak in the Glenwood Hot Springs between sessions?!

I also want to add, that as a coach of the CRMS kayak team, the Glenwood Whitewater Park has been a total game changer for our program. The bulk of our team training time happens before the run off in April and May and after the summer flows in September and October. The taste of possibility that the park has given us, and our subsequent craving for even more features, has led us to pray for and engage in ritualistic ceremonies that involve dancing around old 1980's Perception Dancer kayaks in hopes that the phase two park above the confluence will come to fruition.

Finally, as a biology teacher at the same school, and a flyfisherman and ecologist, we must also be thinking beyond our own interests and be fighting tooth and nail for well being of the biota in our Western Rivers. This project gives us one more tool to maintain minimum stream flows and keep water in our rives.

With gratitude, and great hopes for the next phase of making the Colorado, as it runs through Glenwood Springs, a world class kayak destination,

Kayo Ogilby
Carbondale Colorado

Kayo Ogilby
Science Department Chair
Telemark Team Director
Colorado Rocky Mountain School
1493 County Road 106
Carbondale, CO 81623
cell - 970.366.0555
fax - 970.963.9865
Portillo Big Mountain Telemark Camp
www.bigmtntelemark.com

From: Clark Anderson <CAnderson@sonoraninstitute.org>
To: 'Doug Pratte' <landstudio2@comcast.net>
Cc: "tommytsunami@hotmail.com" <tommytsunami@hotmail.com>, 'Scott Dillard' <scottdillardrealtor@gmail.com>, 'Kayo Ogilby' <kogilby@crms.org>, 'Peter Benedict' <pbenedict@crms.org>
Subject: Colorado River use
Date: November 14, 2014 at 10:24:59 PM MST

Hi Doug,

I kayak the Colorado River, typically between downtown Glenwood and Shoshone, fairly often in the fall. At that time of the year, it is one of the only places around to paddle (most other places are too low). I would kayak even more if there were a whitewater park – as is being explored – upstream of the confluence with the Roaring Fork.

I've cc'ed some friends who also use the river in that section and might be willing to chime in on their usage as well.

Feel free to contact me with any questions you might have.

Clark

Clark Anderson
Rockies Director
office: 970.384-4364
direct: 970.928.3410
cell 970.390.7191
817 Colorado Ave, Suite 201
Glenwood Springs, Colorado 81601
email canderson@sonoraninstitute.org

City of Glenwood Springs
Attn: Jeff Hecksel, City Manager
101 West 8th Street
Glenwood Springs, CO 81601

Dear Mr. Hecksel,

We would like to express our support for the effort to secure water rights for river recreation in Glenwood Canyon.

The recreation economy is the cornerstone of our community in Glenwood Springs and the Roaring Fork Valley. Continued support for recreation opportunity is surely the most long-term and sustainable approach to ensuring economic vitality, while also encouraging healthy development that strengthens a certain environmental appreciation and stewardship from locals and tourists alike.

As the local boating advocacy group, we feel that securing a Recreation In-Channel Diversion (RICD), is vital for both conservation and future recreation opportunities. Many local businesses hinge their success upon consistent flows throughout the season. This past season, in particular, was such a wonderful year, that most rafting companies were able to run trips through September.

Both whitewater sports, and angling are increasing in popularity and we can expect to continue to see a rise in visitors and river use. A RICD along with new whitewater features on the Colorado River will be pivotal in making Glenwood Springs one of the most highly sought after boating destinations in the state.

Thank you for your continued effort.

Sincerely,

The Upper Colorado Private Boaters Association

From: Benjamin Petri <bpetri@mymail.mines.edu>
Sent: Saturday, November 22, 2014 12:10 AM
To: Jeff Hecksel
Subject: Paddling in Glenwood Canyon

Hello Jeff

I would like to express my support for continued protection of fall flows within Glenwood Canyon. September weekend flows are particularly import to me because I help organize trips for the Colorado School of Mines Kayak club, and we often get new members at the beginning of the semester, which is right at the end of August. We typically do at least 1-2 trips to Glenwood each fall because it is the best river that time of year for new paddlers to learn on. These groups will often be up to 10 people. Most front range creeks are too low at that point to paddle, and the ones that still do have water are either too difficult for beginners, or offer a generally mediocre boating experience akin to an irrigation ditch. What I like about Glenwood Canyon is that it offers a nice mix of whitewater difficulty levels, good scenery, relatively fast drive from Golden, and usually a stop at the hot springs to boot. I've run Glenwood Canyon in every month of the year, including new years day. Please support the RICD for Glenwood Springs.

Cheers

Ben Petri

From: Abby Burk <kabbyburk@gmail.com>
Sent: Friday, November 21, 2014 2:21 PM
To: Jeff Hecksel
Subject: Glenwood Canyon RICD and Colorado River Recreation

Dear Mr. Hecksel,

Recently, I have heard that front range water developers have been challenging Glenwood Canyon's water rights for recreational paddling uses. I would like you to know that I am a front range resident and avid whitewater kayaker. Often, myself and three to five of my friends (also front range residents) come to Glenwood Springs to paddle.

We regularly paddle the Colorado River through Glenwood Canyon and Glenwood Springs from spring thaw until the weather turns, often in late October. We travel to Glenwood Springs because it's the only place left in Colorado that has adequate water to kayak and raft. We do not just paddle in Glenwood and leave. We also stay in local hotels, eat at the local restaurants, and purchase goods from local stores. Per visit, our group's time in Glenwood can result in over $1,000 of local income.

The bottom line of why my friends and I travel to Glenwood Springs (often in the late paddling season Sep-Oct) is because the water is there. Please do what you can to ensure that the Colorado River in Glenwood Canyon stays adequately flowing. This is not only a benefit for the recreational and tourism economy, but for the health of the River too.

Thank you,
Abby Burk
Golden, CO

--
~ K. Abby Burk

"We must begin thinking like a river if we are to leave a legacy of beauty and life for future generations." David Brower

From: Jocelyn Ritti <JRitti@tosv.com>
Sent: Friday, November 21, 2014 12:21 PM
To: Jeff Hecksel
Subject: Concerning Shortening the Colorado Boating Season in September

Dear Mr. Hecksel,

I am writing to you to let that my boating friends and I paddle the Colorado River at least 3 times a week during the month of September, either from Shoshone or Grizzly to Two Rivers Park. We usually paddle in a group of 3 to 4 people. We choose the Colorado River in September because of the beauty of the river and knowing that it will have consistent flows. September is a great time to paddle the Colorado as it is not too hot or too cold and not too crowded. We always see at least 10 other people we know and rafters as well. We love to paddle the Colorado River in September and plan to do it next year as well, by the way we have paddled the Colorado every September for the last 6 years. Thank you for your attention to this matter.

Sincerely,
Jocelyn Ritti
jritti@hotmail.com

Jocelyn Ritti, Recreation Center Manager
Town of Snowmass Village
PO Box 5010, 2835 Brush Creek Road
Snowmass Village, CO 81615
p.970-922-2246
f. 970-922-2230
jritti@tosv.com

From: Scott Sandblom <siltblom81652@gmail.com>
Sent: Friday, November 21, 2014 8:20 AM
To: Jeff Hecksel
Subject: Colorado river flows

City of Glenwood Springs,

It is incredibly important that you know that I and many of my rafting friends float the colorado after Labor Day. In fact we do so during this time more than in the summer. The weather is beautiful and we don't have to fight as many commercial rafting companies. I live in Silt for this reason. Restricting the flows after Labor Day would have a huge impact on the boating community. Please fight any proposed restrictions to flows after Labor Day!

Sincerely,
Scott Sandblom
Silt, Colorado

Sent from my iPad

From: Mollie Podmore <moepod@gmail.com>
Sent: Thursday, November 20, 2014 10:00 PM
To: Jeff Hecksel
Subject: Support for the RICD in Glenwood Canyon

Dear Mr. Hecksel,

I support the Recreational In-Channel Diversion Rights for water in Glenwood Canyon. I am an avid kayaker, and Shoshone has long been my run of choice in the Glenwood area. During high school, I paddled daily with the Colorado Rocky Mountain School, and Shoshone was our most frequently visited stretch of river. In the low water season of the fall, Glenwood Canyon's flows are adequate, while other areas lack sufficient water. I consistently saw other river enthusiasts, including fisherman and other paddlers. Glenwood Canyon has played a huge role in my learning to kayak, and I hope to always return to enjoy its flows year round. Glenwood Canyon was a wonderful place to learn to kayak, and it remains a local favorite and a draw for paddlers from across the state.

Please continue supporting the RICD initiative.

Thank you,
Mollie Podmore

From: Zak Podmore <zpodmore@gmail.com>
Sent: Thursday, November 20, 2014 9:35 PM
To: Jeff Hecksel
Subject: Comments on September flows in Glenwood Canyon

Dear Mr. Hecksel,

I'm writing to ask the city of Glenwood Springs to secure an Recreational In-Channel Diversion right on the Colorado River in Glenwood Canyon to support September paddling.

I grew up in Glenwood Springs and learned to kayak on the Colorado between the Shoshone power plant and Two Rivers Park. In high school, I kayaked in Glenwood Canyon an average of 4 days per week each Sept. and Oct. In college, I guided rafts in the canyon with companies that run trips well into the fall.

The Shoshone rapids remain among the best places to paddle in the fall in the Colorado watershed and are a wonderful part of Glenwood's outdoor playground. Even in Sept., the river remains busy with rafters, fishermen, stand up paddler boarders, and kayakers of all skill levels. What's more, the water levels that make Glenwood a river recreation destination ensure a healthy riparian habitat is maintained as well.

Please stand up to the Front Range's ever-growing demand for water and file a RICD to protect our September boating on the Colorado River. Doing so will only help Glenwood's economy and support our great quality of life.

Thank you,

Zak Podmore
0780 127 Road
Glenwood Springs, CO

(970) 319-8229

From: Michael Freeman <mfreeman81601@gmail.com>
Sent: Thursday, November 20, 2014 6:59 PM
To: Jeff Hecksel
Subject: flows from Shoshone to Two Rivers Park (and beyond)

Dear Mr. Hecksel,

I've recently become aware that there is discussion at the State and local level regarding the possibility of reducing the flow of the Colorado River thru Glenwood Canyon starting in the month of September. I have lived in Glenwood Springs for 23 years and one of the reasons that I initially moved here was the extended whitewater boating season that the Shoshone section of the Colorado River provides. I moved to Glenwood Springs from Salida, CO where the Arkansas River was typically unboatable after 8/15 because water managers reduced the flows. Now by Labor Day the Arkansas is typically to low to boat for the same reasons. That is when many boaters in Colorado (and beyond) flock to Glenwood Springs to paddle. You can witness this at the Whitewater Park in West Glenwood during the fall. The whitewater park is busy. This obviously brings in tourist money and ultimately benefits the citizens of Glenwood Springs. Additionally, it is part of what makes Glenwood Springs such fun and wonderful place to live. One of the highlights of the fall season is a boating trip through Shoshone when the shrub oak has changed and the water is clear. I am in Glenwood Canyon kayaking at least three times a day in the fall and I have retired friends who are there daily.

Therefore, I would strongly oppose any reduction of the Colorado River water, particularly during the fall. I would strongly support Glenwood Springs in a pursuit of recreational water rights to maintain flows through Glenwood Springs.

Mike Freeman

mfreeman81601@gmail.com

970-390-7558

From: Eileen Wysocki <ewysocki@holycross.com>
Sent: Thursday, November 20, 2014 3:30 PM
To: Jeff Hecksel
Subject: Please don't shorten our floating season!

Dear Mr. Hecksel,

The Colorado River through Glenwood Canyon to New Castle is extremely important to the citizens of our valley and beyond. As a rafter and kayaker, the river offers some of the best whitewater in the state, and also provides anglers with incredible opportunities for fishing nearly year-round. As you know, it is a huge factor in our local economy. Rafting companies, boating supply shops, outdoor retail gear stores, fishing supply shops and local restaurants and hotels benefit greatly from the Colorado with its consistent flows. Please do not allow water to be taken from our area for Front Range interests to the point that flows will need to be decreased in September and/or April.

As a New Castle resident, I often paddle or row in the "off season" months. In fact, I have boated the Colorado in Glenwood Springs in every month but January. This September, as in most Septembers, my friends and I typically paddle or row every weekend and every other Friday, and even a few nights after work if the weather permits. I can say the same for April. When we go, we typically travel in fairly large groups, with 3 or 4 rafts and several kayakers. We'll usually have at least 10-20 people in our group. Most of these people are local, but some come from Avon, Grand Junction, Boulder, and occasionally out of state. It's great to run into other friends in the boating community while we're on the river, and I would have to say some of the months when there are fewer commercial boaters out there are the most enjoyable. There's a bit less traffic at the boat ramps and you know the people who are out there generally are very skilled and know what they're doing. The fall colors are amazing along the river in September. This year having more water in the river than usual in the fall meant that we could float more miles in the same amount of time, and it was easier to do a quick after work float. I will continue to boat in the "off season" as much as weather and flows allow.

I also believe that keeping enough water in the river is critical for wildlife and fish. Lower flows will also reduce the numbers of anglers taking trips, which could severely impact that industry and tourism in general. Glenwood is often one of the few areas in the state with enough water to support good fishing and floating almost year-round. I sincerely hope you will protest any efforts to reduce flows in off-season months, because the river should be a year-round amenity and economic driver. The river is one of the most important aspects of our area that impacted my decision to live, work and play here.

Thank you for your time and consideration.

Sincerely,

Eileen Wysocki
Energy Auditor
Holy Cross Energy
970-947-5508 (work)
970-984-9705 (home)
ewysocki@holycross.com

"Holy Cross Energy is committed to providing its members with the best possible services at a reasonable and competitive cost consistent with sound business and environmental practices."

From: Lynne Uhl <lynne.uhl@hypermall.net>
Sent: Thursday, November 20, 2014 1:35 PM
To: Jeff Hecksel
Subject: Water through September

Please insure that there are recreational water flows on the Colorado River through Glenwood Springs from April - September. I have enjoyed whitewater kayaker in Colorado for over 20 years. In September the Colorado is about the only river with enough water to kayak.

Many times we run the Colorado and then pop into Glenwood for dinner. The options for boating in September are already so slim. Please insure that we can count on flows in Glenwood Springs for recreation!

Thanks,

Lynne Uhl
Email: lynne.uhl@hypermall.net
Cell & text at 720-556-8255
Home: 303-691-2077

From: Ellen Casey <elleninvail@aol.com>
Sent: Thursday, November 20, 2014 10:12 AM
To: Jeff Hecksel
Subject: Colorado River Flows through Glenwood Canyon and Whitewater Park.

Dear Mr. Hecksel,

I intended to write you a real letter, but I am recovering from multiple surgeries, so an email will have to suffice. I apologize for the informality which does not reflect how seriously I consider the subject matter.

It has come to my attention that flows through Glenwood Canyon, and most importantly to me, the section we refer to as "Shoshone" from the Shoshone power plant to Grizzly Creek, may be limited after Labor Day weekend.

I feel that this would be a great disservice to your community. I kayak that section almost daily from Labor Day until winter temperatures make it too inhospitable. I have friends who continue to kayak and raft through the winter even. During runoff we have our choice of the Arkansas, the Eagle, Gore Creek, the Roaring Fork, the Frying Pan, and on and on. By August, all that is left to us for whitewater is Shoshone. For many paddlers Labor Day through October IS Shoshone Season.

It is also a time when professional River guides can finally enjoy the river because they aren't working everyday providing a service for others. And we spend money. Several of us bought off season pool passes at the Glenwood Hot Springs pool for one reason only: to have a dip to warm up after our chilly fall evening runs. We go for dinner and we buy beers, we purchase gasoline. It is significant. Although I work as a nurse at Valley View Hospital, I live in Vail, as do about 20+ other boaters I know that travel to Shoshone each late summer and fall to enjoy the only whitewater left in the state.

It would be a shame to lose this water to the eastern slope. Please do not let this happen.

Thank you for your time and consideration.

Sincerely,

Ellen M. Casey

Sent from my iPad

Don Edmonds

0196 Sunlight Drive

Carbondale, CO 81623

To:

City of Glenwood springs

Attention Jeff Hecksel, City Manager

I am writing in support of recreational In-channel Diversion rights in Glenwood Canyon on the Colorado river.

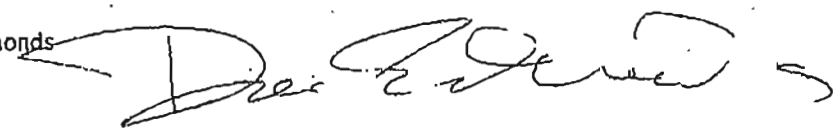
I have paddled (kayaking) in Glenwood Canyon approximately 14 times in September this last year. I expect to kayak in Glenwood canyon in coming years as well. In September I typically see several other groups of kayakers as well as rafts using that section of the Colorado River.

Typically, I have one to four companions when kayaking in Glenwood Canyon.

September is special because other rivers have inadequate flows for kayaking in September.

The weather is very pleasant and vehicular traffic on I70 is decreased.

Don Edmonds



Dear Mr. Hecksel,

I live in Buena Vista, but regularly come to Glenwood Springs to kayak and SUP surf.

I do come down in September. I'm there in October too.... I usually come with at least 2 others and there are always others in the river with us.

The two rivers park and Shoshone are an important late season boating destination for myself and my friends. Please do what you can to keep the flows up through September (into December would be even better).

Thank you for your time,

Ken Cook

From: John Cantamessa <johnny@raftingcolorado.com>
Sent: Thursday, November 20, 2014 9:17 AM
To: Jeff Hecksel
Subject: Letter regarding the Glenwood RICD

Dear Jeff Hecksel:

My name is John Cantamessa, one of the owners and V.P. of operations for Rock Gardens Rafting Inc., a permitted rafting outfitter with the USFS on the Colorado River through Glenwood Canyon. Rock Garden's has been operating on the Colorado River for over 40 years.

It has come to my attention that there are some questions about the rafting business in Glenwood Canyon on the Colorado River. Our typical rafting season goes from Mid March till Late October. The shoulder rafting season is critical to the financial stability of our company as well as our ability to keep staff employed for as long as we can. The Colorado River through Shoshone is the most popular section of river to raft in the shoulder seasons (April, May-September, October). Primarily because of its water levels and mild temperatures it is the best place in Colorado to raft during those months. As documented by our USFS post use reports, our company on average services over 1000 guest a year during this time period. This section is the most popular section of river in the state for not only commercial boaters but kayakers and other private boaters as well. Needless to say consistent flows adequate for boating during shoulder seasons is vital to the health of the Colorado River and the recreation it provides to the community.

I hope this information helpful. If you need any additional information you can contact me at (970-)390-0566 or via this email address.

Sincerely yours
John Cantamessa

COLORADO
ADVENTURE CENTER

Home of:
Highside Adventure Tours
Good Times Rafting
Rock Gardens Rafting
Glenwood Canyon Zipline
800.997.3448
johnny@raftingcolorado.com

From: Trevor LaLonde <lalondetrevor@gmail.com>
Sent: Thursday, November 20, 2014 7:47 AM
To: Jeff Hecksel
Subject: fall flows glenwood canyon

Mr. Hecksel,
My name is Trevor LaLonde and I live in El Jebel. I am writing to ask your help in protecting fall flows through Glenwood Canyon. As you know, this is one of the true gems of the state in terms of scenery, river recreation, and accessibility. I am an avid kayaker, and living in colorado, where the boating season is so short compared to other parts of the country, I frequently utilize this stretch of river to extend my boating season. The shoshone run is one of the only runs in the state that can be run at a decent fun level essentially all year round. This year in particular I enjoyed running shoshone as well as barrel springs (when the plant was not diverting water) into October.
Myself and numerous others can often be seen throughout the fall and into winter on sunny (and occasionally not so sunny) afternoons paddling shoshone. I could call almost 10 friends right now who would be interesting in running shoshone today. I am writing to ask you to plead, or diplomatically explain, on our, and others behalf that this section of river is most definitely utilized by locals and other boaters from around the state during September and beyond into the fall and winter. If "they" take away fall flows to this part of the river, it would be a huge blow to the recreation opportunities in Glenwood Canyon. I would go so far as to say a few local businesses would loose a dollar or two due to absent "tourists" coming from the front range and other parts of the state to get some quality late season boating in.
Besides, If we couldn't paddle here in the fall and winter, what would we do? Go skiing or something? What a shame! Seriously though, we all love to ski but its a great change of pace to get on the river during a lull in snowstorms when your legs are tired and all the powder is gone.
Thank you for your time and your help, and I'd love to see you on the river in the late months of future. Please feel free to call or email me with any other assistance I can provide.

Trevor LaLonde
Parks Manager
Town of Basalt
987-4365

From: Frank Arenella <kayakweirdo@hotmail.com>
Sent: Wednesday, November 19, 2014 4:56 PM
To: Jeff Hecksel
Subject: CO River

Please do NOT allow the front range to take any more of our precious water. We are kind enough to give them as much as we are, when will it stop. The CO doesn't even make it to the ocean anymore.

Please allow paddles to keep their water where it belongs, on the western slope.

Its the only flowing water that western CO has in the fall months.

Thank you

From: ccarren@comcast.net
Sent: Wednesday, November 19, 2014 3:20 PM
To: Jeff Hecksel
Subject: September river flows through Glenwood Canyon

I'm writing in support of the city of Glenwood Springs keeping water flows through and including September adequate for whitewater rafting and kayaking. I have been an avid kayaker for 30+ years, and have lived in Fort Collins and copper mountain during that time. Every September, when our local river, the Poudre, and those near Summit County no longer have boatable flows, my husband and I love to spend time kayaking Shoshone.
We see many other kayakers and rafters on the river during that time, too. Please do what you can to keep water in the river during September, and we will continue to come to Glenwood Springs to enjoy both the river and all of the amenities the town has to offer.

Sincerely,
Claire Carren
9702325749

Sent from XFINITY Connect Mobile App

Don Edmonds

0196 Sunlight Drive

Carbondale, CO 81623

To:

City of Glenwood springs

Attention Jeff Hecksel, City Manager

I am writing in support of recreational in-channel Diversion rights in Glenwood Canyon on the Colorado river.

I have paddled (kayaking) in Glenwood Canyon approximately 14 times in September this last year. I expect to kayak in Glenwood canyon in coming years as well. In September I typically see several other groups of kayakers as well as rafts using that section of the Colorado River.

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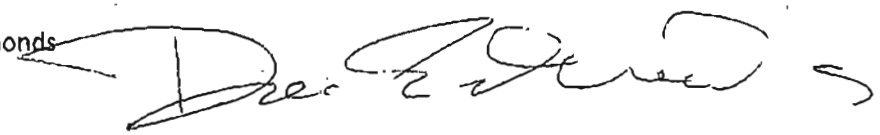
Don Edmonds



Dear Jeff Haskel,

I am writing this letter in regards to lowering the Colorado river's water supply in September. I am an avid kayaker & paddle the Shoshone section of the river year around. In September I boat probably 3 to 4 per week & usually with 2 to 4 of my friend. I also see many other kayakers still taking advantage of the river flows during this time. I plan on continuing to paddle throughout September (as well as later months) and urge you not to sell out our water rights to the front range.

Sincerely,

Damian Gallegos

Dear Mr. Hecksel,

My name is Kimbrell Larouche and I am a senior at Colorado Rocky Mountain School. I recently heard that the Glenwood Canyon Whitewater recreation was at risk and I would like to say how much my friends and I use that section of the river. With Colorado Rocky Mountain School, I paddle kayak 4 times per week at least, mostly 5 times per week during September. I choose this section over others due to its unique features that are not found anywhere else in the valley. I always paddle with at least 5 others and I know they feel the same as I do. Also, I constantly see others enjoying kayak as well. In the future, I plan to paddle this section of the river many times per week and also in future Septembers.

Sincerely,
Kimbrell Larouche

Esteemed Mr. Heckel,

My name is Tashi Brundige, and I am a student at the Colorado Rocky Mountain School in Carbondale. I am on the kayak team and I enjoy the amazing Glenwood Canyon 5 days a week during the spring and fall. This September I was able to run either Shoshone, No Name, or go to the Wave every weekday. The Glenwood Canyon is an incredible river formation and I am fortunate to have access to it. I choose the Canyon because it is close, varying, and offers many different boating opportunities to different kinds of boaters.

Our team consists of about 10 students and three coaches. We were fortunate enough to be joined by a few professional kayakers that our coach had met along their careers. Coming off of Shoshone, I often see rafts or other boaters. Many raft companies take guided trips down to Two Rivers Park throughout the fall, and I have enjoyed a few of them to celebrate birthdays or float with my family. At the wave, we are joined by at least one other boater or surfer daily. Locals come through after work or on the weekend. I know how much this section of river means to so many that enjoy its waters year round. September is the start of kayaking season for my school, and I see many others taking advantage of the flows before winter starts. I plan to continue paddling this section of river as long as I can, and I hope that you can recognize its importance to the community and the boaters in surrounding areas.

Thank you for your consideration,

Sincerely,

Tashi Brundige

From: alex garhart <agarhart@yahoo.com>
Sent: Tuesday, November 18, 2014 3:30 PM
To: Jeff Hecksel
Subject: Please do not shorten the paddling season in Glenwood Springs

Mr. Hecksel,

My friends and I paddle mostly on the weekends but I do drive up a few days a week to come up and paddle in September. Usually 3-4 days a week. This is the closest location to Grand Junction to be able to paddle class 3 (shoshone) and surf. There area usually any where from 3 to 6 of us paddling when we do come up. We also see lots of other people enjoying the late season flows. I am hoping that if flow continues I can keep coming up the Glenwood to paddle in september. Also an additional wave feature would be amazing!!

Thanks,

Alexander Garhart

From: halagear@gmail.com on behalf of Peter Hall, Hala Gear <peter@halagear.com>
Sent: Tuesday, November 18, 2014 3:22 PM
To: Jeff Hecksel
Subject: Keep the flow!

Hi Jeff,

Indian summer is the best time to be out on the river! Please keep the flows! I hit the Colorado River a TON in the fall, and turning it off is not good! It would hurt my business like closing a ski area early hurts businesses in mountain towns.

Thanks for your consideration!

Peter

--
Peter Hall - Founder

Hala Gear
Design. Adventure. Better.
Steamboat Springs, CO
970-367-7885
halagear.com
facebook.com/halagear

From: Dawn Waldrop <Dawn.Waldrop@vvh.org>
Sent: Tuesday, November 18, 2014 2:20 PM
To: Jeff Hecksel
Subject: Please DON'T shorten the boating season

Dear Jeff Hecksel,

I paddle the Glenwood Canyon in September, and will continue to do so in the future.
September is still a great time to run Shoshone after work and on the weekends. We have plenty of daylight and temps are still good.
For those who live in the valley, the Glenwood Canyon is in our back yard. I definitely prefer to paddle the Colorado River than to travel out to another river to run class III rapids.
I paddle with a regular group of people, typically, at least 3 of us in the evenings and 6-12 people on weekends.
We almost always see others paddlers running Shoshone in September.
We live here, we have the ability and we have the gear to run Shoshone year round! Please DON'T shorten the boating season.

Thanks,
Dawn Waldrop
Youth Recovery Center
384-7470

From: Ian Foley <ianfoleyiii@hotmail.com>
Sent: Tuesday, November 18, 2014 12:57 PM
To: Jeff Hecksel
Subject: Paddling in Glenwood Canyon

Hi Jeff,

I'm writing in support of the RICD for the Colorado river in Glenwood Canyon. After runoff fades in august the Colorado River is one of the few locations in the state that has boat able flows. It has a variety of difficulty ranges which attracts a diverse group of boaters.

I paddle in the canyon from sept into early winter. Every year paddlers stage a New Year's Day run down Shoshone. This late season option is a huge resource for paddlers and we want to let folks know that we do paddle the canyon in September and beyond.

Note that I live in Denver a routinely make the day trip trek out there in the shoulder seasons.

Thanks,
Ian Foley

Sent from my iPhone

From: Jennifer Vyhlidal <jv4vyhlidal@gmail.com>
Sent: Tuesday, November 18, 2014 11:17 AM
To: Jeff Hecksel
Subject: September paddler

As a mom of two small children I raft locally for convenience. After school has started it's really our only option to raft in Glenwood. Don't take that experience away from them. I also see many people out and usually travel with one to two more groups. I can even vouch for rafting into October as I have done many birthday floats.
Sent from my iPhone

From: Brian magee <bpmagee20@hotmail.com>
Sent: Tuesday, November 18, 2014 10:15 AM
To: Jeff Hecksel
Subject: glenwood canyon_RICD

Hi Jeff-

It has come to my attention that the City of Glenwood is pursuing an RICD to protect flows on the Colorado River through Glenwood Canyon. First, Thank you! Protecting adequate recreational instream flows is paramount to ensuring a healthy river system and a sustainable economy.

I live in Durango, CO. My family and I (2 boys and my wife) take several trips to the Glenwood Area every year specifically to participate in river based recreation in Glenwood Canyon, on the Roaring Fork, and Crystal Rivers. We typically try and catch the high flows in the late spring and early summer and then return in the fall september/early october to kayak and raft on the Colorado River. Unlike the spring there are not too many opportunities in the State of Colorado to raft and kayak in the fall. We typically like to run a few laps on the white water section of Shoshone, then float the canyon out.

The fishing can be outstanding below the Shoshone section, and we enjoy float fishing the river in this section. Brown trout spawn in the fall (September-October), and we come to the Colorado River to fish for spawning brown trout from our raft, because it is one of the only places with adequate fall rafting flows that allow us to target these fish. I have been making this annual fall trip to Glenwood Canyon for the past 15 years and with my family for the past 6 years. We love seeing others enjoying the fall boating opportunity as well and often bring other families to share the experience with.

When we come, we like to stay at the Glenwood Springs Hotel, because the kids think it has the best water slide "in the world". While I agree its fast, it could be longer. But I digress.

At any rate, we would like to continue this annual fall pilgrimage to the Colorado River, but only if there are adequate, boatable flows to make it worth the trip.

Please ensure that this opportunity remains in the future as you work on your RICD.

If you would like to discuss any of my comments feel free to contact me.

Thanks,

Brian Magee

From: Bill Hilty <bhilty66@gmail.com>
Sent: Tuesday, November 18, 2014 8:53 AM
To: Jeff Hecksel
Subject: Colorado River Flows in the fall

Jeff,
I am a boater from Grand Junction, and visited Glenwood three times this fall for kayaking and rafting—once in September, and twice in October. All 3 times my group stayed over and enjoyed a dinner meal before returning home. Once we purchased lunch and another time we visited the Grocery store. We encountered a number of other boaters—most from the front range, and a few from Vail and the Roaring fork valley.

Paddlers from around the State enjoy late summer flows from Shoshone to Two Rivers Park,
Please prevent the Front Range from taking away an entire month of our paddling season!

Bill Hilty
396 High Ridge Drive
Grand Junction, CO 81507
970 640-2360 cell

From: Katie Martin Langenhuizen <katie.langenhuizen@gmail.com>
Sent: Monday, November 17, 2014 11:39 PM
To: Jeff Hecksel
Subject: CO River Recreational Water Rights

Dear Mr. Hecksel,

My name is Katie Langenhuizen and I am a Glenwood Springs resident. I use the Colorado River well into October!! My husband, friends, and hopefully someday our kids love to float down the river in early fall. The river is a busy place where we see many people using it. The companies in our area use it well into September as well. Blue Sky Adventures, White Water Rafting, LLC, and Rock Gardens are all Glenwood based companies that I hope you are consulting about water rights for river recreation as these local folks depend on it for their livelihoods and take many people down the river in September. I know us locals use it every weekend for fun. We love to take any of our friends from out of town too. Please protect our recreational use here in Glenwood on the Colorado. It is a vital part of our community and our lifestyle depends on it. I moved to Glenwood as a raft guide years ago and this river, and the fun of running it at all different times of years, is one of the reasons I moved to Glenwood. Please let us raise our family as boaters for as much of the season as possible as well!

Thank you for your time.

Sincerely,
Katie Martin Langenhuizen

From: John Van Eden <j.vaneden@comcast.net>
Sent: Monday, November 17, 2014 7:35 PM
To: Jeff Hecksel
Subject: River Flows

Dear Jeff,
I am writing you to encourage your efforts to secure in-channel flows in the Colorado River through Glenwood Springs. I have paddled from Shoshone to Two Rivers park several times in September. Late Summer is a great time to visit Glenwood and the river is the primary draw for me and my family. Having paddled there in different years, the experience is far better with healthy flows. While paddling I have noticed many rafters and other sportsman enjoying the river. I appreciate your efforts to date and ask that you continue your efforts to secure the in-channel diversions for future years.
Thank you,

John Van Eden
Fort Collins, CO

From: Paul Siskind <paulsiskind@gmail.com>
Sent: Monday, November 17, 2014 7:32 PM
To: Jeff Hecksel
Subject: September Flows in Glenwood Canyon

Jeff Hecksel,

I am writing to tell you that I am a boater who paddles the Glenwood Canyon a couple time a week throughout September. It is a great attraction, while the rest of the state is dry all my friends from the front range travel to Gwood to surf and play in the canyon. Paddled with a couple dozen front rangers this September not to mention countless roaring fork paddlers. I will continue to paddle Glenwood Canyon throughout the winter.

Thanks,
Paul D. Siskind
2203 Blake Ave
Glenwood Springs, CO
81601

From: Rusty Jones <rustyjones.co@gmail.com>
Sent: Monday, November 17, 2014 6:39 PM
To: Jeff Hecksel
Subject: Late summer boating--Colorado River

Mr. Hecksel,

I'm writing this letter in support of the City Glenwood Springs's effort to retain water rights on the Colorado River. It's my understanding that the Front Range is attempting to divert water away from the Western Slope after Labor Day, citing that nobody uses the river for recreation in the late season. I have been a valley resident since 1981 and was once a raft guide with Rock Gardens in the early 80's. We normally boat 35-50 days a summer and generally is every weekend as well as maybe a weekday afternoon or evening. Our season typically starts in later March or April and goes not only through September but into October as well. We have boated the Colorado River as late as mid November some years. Typically there is 3-4 of us that make up our normal paddling group. We see other private rafters, kayakers, fisherman as well as some commercial outfitters using this valuable resource.

I support you to do all that is possible to maintain these flows through whatever legal action is required against these Front Range entities attempting to steal this water. It not only allows us to recreate but I'm sure helps the valley economy with a couple of extra months of tourists using the river as well.

I thank you in advance for your efforts!

Thanks

Rusty Jones

—
Rusty Jones
Carbondale, CO
rustyjones.co@gmail.com

AUTHENTIC ADVENTURES

GRAVITY PLAY SPORTS

November 17, 2014

To Whom It May Concern:

We are writing this letter in support of maintaining the City of Glenwood Springs, CO current water rights on the Colorado River for September recreational uses.

Every September Gravity Play Sports produces our annual Glenwood Springs Adventure Xstream Adventure Race. The Shoshone – Two Rivers Park kayaking stretch is an integral part of our annual multi-sport race and we will be unable to produce our event without adequate river flows in September.

Our annual event draws hundreds of paddlers and multi-sport enthusiasts to Glenwood Springs in mid-September. This is one of the ONLY stretches of river that can be paddled in Colorado in the fall. Eliminating this recreational opportunity will have a significant impact on our business and on the local economy as well. As you are aware the recreational tourism industry is one of the region's largest tax generators and numerous businesses would be impacted by a shortened boating season in Glenwood Canyon.

Please let us know if you need any additional information at this time.

Sincerely,

Will & Jenny Newcomer

Will & Jenny Newcomer

Gravity Play Sports

970.259.7771

From: Kevin Cripps <kevin.cripps@gmail.com>
Sent: Monday, November 17, 2014 5:52 PM
To: Jeff Hecksel
Subject: Colorado River Glenwood Canyon RICD

Dear Jeff Hecksel:

I recently became alerted by American Whitewater to discussions surrounding recreational water releases through Glenwood Canyon on the Colorado River. I wanted to express that as a whitewater kayaker, this is a value recreational resource to me, especially in the fall and even into winter. Even though I live in Boulder, at least once a year in the fall/winter I pass through the area and kayak this section of river. It is a unique stretch of whitewater in Colorado because of its access, fun whitewater, and especially its long (essentially year round season). Practically speaking, this is the only reasonable section of whitewater in the state with good year round flows.

Thank you for your consideration.

Kevin Cripps

From: Glenn Wysocki <gwysocki@holycross.com>
Sent: Monday, November 17, 2014 4:21 PM
To: Jeff Hecksel
Subject: Fall Flows in the Colorado River

Jeff,
I am writing in support of the City of Glenwood Springs plans to build a whitewater park and to secure water rights for recreation. As an avid rafter and whitewater enthusiast I recreate on the Colorado nearly every month of the year but especially enjoy being on the water after the summer tourist season ends. I meet many people on the river and the slower pace and the cool, clear water in the Fall amidst the changing leaves brings a noticeably different group to the river. More diversions to the Front Range would greatly impact the river and the people who come to float, fish, and kayak. It is important the City of Glenwood does everything possible to not allow the quality of recreation to be diminished by Front Range diversions.

Sincerely,
Glenn Wysocki
New Castle, CO
970-984-9705

From: Sam <hope5446@gmail.com>
Sent: Monday, November 17, 2014 4:17 PM
To: Jeff Hecksel
Subject: Colorado River

Mr. Jeff Hecksel:
I am writing you to contribute to the effort of maintaining paddle-able flows on the Colorado River through September and later dates. I, and many others that I know personally, paddle the Colorado River though Glenwood Canyon, specifically from Shoshone to Two Rivers Park, multiple times per year and will continue to do so on a FREQUENT basis in the future.
Sometimes this is one of the only runs in the state that still has adequate flows in the late season. Some of us crazy kayakers even boat the Shoshone section on New Years Day! This section of river is a year-round gem to paddlers from all over the state. Please do not let the late season flows diminish for the water "needs" of the Front Range. Please help paddlers across Colorado keep the RICD rights in place, and we will continue to visit your beautiful town and spend money there on our frequent paddling trips :)

Thank you,
Samantha Hope
Steamboat Springs, CO 80487

From: Betty Delaney <piranha@rof.net>
Sent: Monday, November 17, 2014 3:06 PM
To: Jeff Hecksel
Subject: Water in the Colorado River in September

Dear Mr. Hecksel, Yes, I do boat on the Colorado River in September, a bunch. And, I know many other people, kayakers, rafters, duckiers, that consider "after Labor Day" a beautiful, serene time to be on the Colorado River through the Glenwood Canyon and on down. I worked as a river guide for all of the Glenwood companies over the years and, though the season slows down after Labor Day, it is not over. Now, as a private boater, I hope to continue floating the Colorado River into the Autumn months, with many, many other friends from this area and from all over the state. This is a prime, fun stretch of river for boating—after Labor Day. Please do all that you can to protect the fall water flows. Many people will be happy. Thank You, Betty Delaney

From: Marcus Thackston <marcusthackston@gmail.com>
Sent: Monday, November 17, 2014 2:19 PM
To: Jeff Hecksel
Subject: Glenwood Canyon September Rafting

City of Glenwood Springs
Attn: Jeff Hecksel, City Manager
101 West 8th Street
Glenwood Springs, CO 81601
970-384-6401

Dear Jeff,
I am writing to voice my opinion about rafting the Colorado River through Glenwood Canyon in September.

I have for many years (10+) enjoyed late season rafting in Glenwood Canyon. It's my favorite river in all of Colorado, with one of the biggest reasons being that that season is so long and that you can always depend on it.

I have rafted the Shoshone stretch many times in September, most recently three times this past September. I always run it with a boat full of people (6+) and usually drive from a fair distance away to run it, because no other rivers are running at this time of year. I currently live in Frisco, and have made it to Glenwood about 50 times this year. It is a fabulous stretch to run late season (and all summer!) because the days are still beautiful and it's not quite ski season.

I always get quite a crew together for the late season runs and this year we had three rafts and 2 kayaks for a day together in mid September among the other days we spent on it.

Please do anything you can to keep this river running and accessible. The water shouldn't go to Denver, it should stay in the river, supporting the recreational enthusiasts who are the lifeblood of Glenwood Springs and the Roaring Fork Valley.

Sincerely,
Marcus Thackston
970-819-1762

--

Marcus Thackston
Founder And C.E.O, The Gifted Goat
m:970-819-1762 | e:marcusthackston@gmail.com| a: 822 Hunters Circle, Frisco, Colorado, 80443

Please consider the environment before printing this e-mai

From: Joel Wenblad <joeljames131@gmail.com>
Sent: Monday, November 17, 2014 1:37 PM
To: Jeff Hecksel
Subject: Colorado River

Hello Mr. Hecksel, my name is Joel, and I live in Winter Park. Paddling is the reason I moved to Colorado, and the outdoors opportunities here continue to impress me. My concern is that the rising population on the front range is threatening these opportunities. I can't tell you how many folks I know (including at least 4 business owners) who are currently researching other places to live for this same reason. I can tell you first hand that continuing to diminish the state for the sake of 200 square miles is going to plague many local economies around Colorado. I paddle the river in your neck of the woods weekly in september and october. My bank statement has over $600 in gas and restaurant stops alone in Glenwood Springs from this calender year. I'd hate to stop visiting, as much as I love the town, but if the flows change, so do my plans. I think that this state needs leaders who will show Colorado how we can improve usage and be more efficient. Those leaders will be the ones still standing when the consequences of dewatering rivers come to light.

From: Evan Stafford <evan@reelmotioninc.com>
Sent: Monday, November 17, 2014 1:26 PM
To: Jeff Hecksel
Subject: Attn: Jeff Hecksel, City Manager

Dear Jeff,

I am writing in support of the City of Glenwood Springs Whitewater improvements to the Colorado River and the RICD that accompanies them. I frequently travel from Fort Collins all the way to Glenwood to visit friends, stay at the Hotel Colorado where my wife and I were married, soak in the hot springs AND paddle the Colorado River. We do this throughout the entire year including well into late summer and the fall (Sept/October/November) and late winter/early spring (Feb-May).

We often see other paddlers playing at the Glenwood Wave and running the various stretches in the canyon, even when it's pretty cold outside. Part of this is probably because it is one of the very few options left for whitewater recreation across the entire state during these times of year. There is even a group of paddlers who meet to paddle in the canyon every New Years Day, which we've participated in a number of times. With even more play features we expect to visit the area even more than our current 3-4 trips a year.

Thank you for listening to our comments!

Sincerely,
The Stafford Family

--
--
Evan Stafford
Owner/Creative Director
Reel Motion Media
970.420.5377
evan@reelmotioninc.com
www.reelmotioninc.com

From: Craig D. Irwin <streamsflow@gmail.com>
Sent: Monday, November 17, 2014 12:42 PM
To: Jeff Hecksel
Subject: late summer flows of the Colorado River in Glenwood Canyon

I'm writing you regarding the Recreational In-Channel Diversion rights for the Colorado River through Glenwood Canyon.
I've paddled the Colorado River for over 15 years and I really enjoy the Glenwood Canyon sections.
My group of friends and I regularly kayak the Shoshone and other sections in September. We usually choose these sections because of their unique geology and the great rapids. We enjoy camping in the area, and enjoy all the benefits of the towns nearby.
We run into other groups of kayakers in September and enjoy using this run for instruction, training and just good regular paddling.
I plan on paddling these sections in the future and will continue paddling in September in the years to come.
Please keep the water in the Colorado river and not allow diversion to the front range.
Thanks for your consideration.

Craig D. Irwin

From: John Blackshire <John.Blackshire@transwestern.com>
Sent: Monday, November 17, 2014 11:26 AM
To: Jeff Hecksel
Subject: Paddling Glenwood Canyon in September
Attachments: GlenwoodSpringsCrew.jpg

Jeff,

I paddle in Glenwood about one day a week in September. I live in Denver, so it is quite a trip, but well worth it.

I paddle with anywhere from 2 to 10 people, sometimes in groups as large as 20.

September is a great time of year to paddle the river, the fall colors are in and it is gorgeous, take a look at the attached photo

I plan to continue paddling in the future in September.

John Blackshire

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Denver, Colorado 80237
Phone 303.952.5603 | Cell 303.257.5164

john.blackshire@transwestern.com
www.transwestern.com
Denver Multifamily Team Website

From: Nathan Sullivan <sullivanconstructionco@gmail.com>
Sent: Monday, November 17, 2014 11:07 AM
To: Jeff Hecksel
Subject: River Use

Hi Jeff,

I wanted to let your office know how often I personally and friends use the Colorado river from Hanging Lake down. We raft, kayak, paddleboard fish and frolic in the river all summer long as well as September and October. Sept is one of my favorite months as the commercial crowds have died down.
My family of 4 raft grizzly down often and go with other large groups of private boaters, It would be a shame to loose water during what may conceived as off months.
I have been in the valley for over 20 years now and will continue to use the Colorado river through Glenwood Canyon as often I as can.

Thanks for your concern
Nathan Sullivan

--
Sullivan Construction Co.
99 Arapahoe Rd.
Carbondale, Co.
81623
970 987 9697

From: Elizabeth Austen <eausten@live.com>
Sent: Monday, November 17, 2014 10:53 AM
To: Jeff Hecksel
Subject: Don't shut down Shoshone!

Hi Jeff.
I'm a kayaker and VP of Colorado Whitewater Association. I understand that the recreational usage of the Colorado River in September are being questioned and I'd like to add my 2 cents.

Our club hosts our annual Colorado River Weekend event in September and there are always a number of groups of at least 8-12 kayakers who paddle Shoshone and Grizzly during that weekend.

Additionally, I personally paddle Shoshone with a group of anywhere from 6 to 12 friends at least one day in September every year. At that point in the season there isn't much else that's still running. I know there are quite a few CW members who also enjoy organizing their own trips to run laps on Shoshone in September.

Please add my voice to those who don't want to see the September flows reduced.

Thanks very much.

Elizabeth Austen
303 929 2908

From: Jeff Coburn <jaffy27@gmail.com>
Sent: Monday, November 17, 2014 10:46 AM
To: Jeff Hecksel
Subject: RICD vote?

Hi Jeff,

I have heard there is an upcoming vote on protecting water in the Colorado river from being diverted. I am definitely in favor of keeping as much water in the river as we can. From late summer through to the spring, Glenwood canyon is one of the few places with enough water that we can still kayak it. Every year we make a few trips out to the play park in Glenwood after the water is gone in the rest of the state. We also like to do what we call our "Surf & Turf" weekends, where we go skiing one day and then head down to Glenwood and kayak or raft the next. Please do whatever you can to keep water in the river so we can continue to enjoy it year round.

Thanks,
Jeff Coburn

From: Samuel W Dorsi <Samuel.Dorsi@Colorado.EDU>
Sent: Monday, November 17, 2014 10:46 AM
To: Jeff Hecksel
Subject: Colorado River flows during fall months

Mr. Heckel–

My wife and I have a September tradition of floating the Shoshone and Grizzly Creek stretches of the Colorado, then soaking at the hot springs and enjoying town. We really love visiting your area in the fall--from riding the bike path and appreciating the healthy Colorado River views, to stopping for a burger at Vicco's drive-in burger joint. But among all of these attractions, our ability to float the Colorado is paramount.

I've heard that there is some discussion of reducing river discharge after Labor Day, and I wanted to encourage you to maintain floatable flows through Glenwood Canyon through the fall. The long float season is such an asset to Glenwood Springs--there are many great destinations for spring and summer floating, but only a few spots that offer good September flows. Having good fall whitewater allows Glenwood to win over tourists that might otherwise choose mountain biking and whitewater in Moab, Vernal, or Green River, UT.

Thank you,

Sam

From: Kyle Clark <clarkkyle05@gmail.com>
Sent: Monday, November 17, 2014 6:55 AM
To: Jeff Hecksel
Subject: Colorado River

Jeff,
Good morning. I just want to tell you how much I enjoy kayaking in the Colorado river through Glenwood. My wife and I recently moved here from the south east and have spent at may days from May to October paddling in Glenwood. I choose to come to the Colorado river during Sept. because we can count on the flows to be good when may other rivers in the state no longer have good levels. I have traveled over with Colorado Mesa students a few times to paddle and they have been able to improve their river running skills on the Colorado river. The Sepember flows are so wonderful for all the paddlers in this area and give those wanting to learn a longer season to do so on the Colorado through Glenwood. I plan on leaving in Grand Junction for many more years and will continue to paddle this section of river in September and also share my experiences with many others in this area. Please do what you can to keep good flows through September.
All the Best,

Kyle Clark 970-201-5781

From: Frank Lilly <copyfrank@comcast.net>
Sent: Sunday, November 16, 2014 8:14 PM
To: Jeff Hecksel
Subject: Glenwood Canyon

Dear Jeff: Please be assured that I have paddled Glenwood Canyon, as well as the Glenwood Whitewater Park many times in September, and sometimes even into October. I plans to do so many times in the future, at least two or three times per year. I usually paddle with at least one other person, sometimes two or three. I like paddling in the Glenwood area that time of year because it is one of the few class III runs that is still flowing that time of year. It also, because of its relatively low elevation, tends to have warm whether in September and October.

I am not alone. I often see many other people on the Colorado river in September and October, both private boaters and commercial rafters.

If you have any questions, please do not hesitate to contact me.

Frank Lilly
334Hillside Dr.
Silverthorne, CO 80498
970-468-9013

From: Trent McCrerey <chaosman88@gmail.com>
Sent: Sunday, November 16, 2014 8:11 PM
To: Jeff Hecksel
Subject: Colorado River Releases

Dear Jeff Hecksel,
I am a frequent paddler of the Colorado River, in particular Glenwood Canyon, and I plan on doing so quite frequently in the future. The majority of the time I paddle Glenwood Canyon is september through october when most other rivers and creeks are dried up. Please continue to do late season water releases as it is one of the few places that can be paddled late into the year.
Thank you,
Trent McCrerey

From: earl@coloradokayak.com
Sent: Sunday, November 16, 2014 3:06 PM
To: Jeff Hecksel
Subject: Glenwood

Hello Jeff

This letter is to inform you and your colleges about the popularity of paddling on the Colorado River in and around the Glenwood Springs area. As a 20 year veteran of the paddle sports industry, we have seen a huge increase in recreation on the sections both upstream and downstream of the city of Glenwood. I paddle there several times a month. Especially in the fall month's of September - November. This is because there is still enough water during the fall to paddle here and the weather is still really nice and these sections of river offer so much variety. We all look forward to spending time in the Glenwood Valley paddling every fall. As long as there is ample water.

Thanks
Earl Richmond
CKS
719-221-1461
coloradokayak.com

From: andrew hodge <hodgephoto@me.com>
Sent: Sunday, November 16, 2014 11:20 AM
To: Jeff Hecksel
Subject: September Water On Colorado River

Please don't sent water to the Front Range in September or any time. I travel to Glenwood Springs every weekend of September to paddle with 5-10 friends. I plan to continue this tradition well into the future if flows continue. Shoshone to two rivers is the longest paddle I can do closest to home when there is very few and far. My next closest destination would be Boise, ID in September that would have any water worth paddling.

Thanks for your consideration,

Andrew K Hodge
801-652-4822
hodgephoto@me.com

From: kent.vertrees@gmail.com on behalf of Kent Vertrees <kent@steamboatpowdercats.com>
Sent: Sunday, November 16, 2014 8:48 AM
To: Jeff Hecksel; Kime, Bruce; Saunders, John; Jost, Matthew
Subject: In support of late season recreational water rights on the Colorado River near Glenwood Springs

Hello Jeff,

I am writing to give the City of Glenwood Springs a 2 thumbs up in your efforts to provide late season recreational water rights thru Glenwood Canyon, Shoshone and Two Rivers Park.

Since the early 2000's, I have taught River Orientation courses at the Alpine Campus of Colorado Mountain College in Steamboat Springs. CMC holds permits on a variety of rivers and teaches this class Spring, Summer and Fall semesters. Classes have from 8-12 students and 2 instructors. We spend 5 days on the river and teach not only an overnight component but a day trip, paddle boat component. The Alpine Campus alone teaches 2 of these courses a semester.

During the Fall, I have been leading these River Orientation courses on the Upper Colorado River, specifically on Shoshone as this is one of the only rivers in Colorado that still has adequate water for us to teach these whitewater rafting, paddle guide courses in September.

Without late season, September flows, thru Shoshone, we would either be forced to go elsewhere or not teach this class in Colorado at all and have to consider completely other options out of the State of Colorado. If you look at flow patterns on rivers in the State, there are not many options beyond the Upper Colorado, including Shoshone near Glenwood Springs.

Shoshone in the fall offers CMC the best opportunity to teach advanced river rafting, paddle boat techniques as the rapids and flow of the river provide the dynamic that is needed for us to reasonably teach this course.

We plan on utilizing our river permit on Shoshone as long as there is water flowing in this stretch.

It is not uncommon for us to see a hundred other river users on the river during the September courses. Other river guides, private rafters, kayakers and paddle boarders are utilizing this river and travelling from afar to engage in river recreation thru Shoshone.

Thank you, thank you, thank you for working hard at keeping water in the Colorado River near Glenwood Springs. Recreational water rights are one of the greatest ways our Colorado communities can maintain their local river based economies, especially in the Fall. Please keep your efforts moving forward to protect late season flows on the Upper Colorado River.

Thank you again.

Cheers,

Kent Vertrees

Master of Chaos
Steamboat Powdercats

970-879-5188 o
970-846-7933 c

From: John Melrose <johnmelrose1@yahoo.com>
Sent: Sunday, November 16, 2014 12:38 AM
To: Jeff Hecksel
Subject: Glenwood canyon, colorado river, September recreation

Dear Jeff Hecksel and whom it may concern, I have enjoyed paddling the Colorado river though Glenwood Springs, CO many times. Including upstream and downstream stretches, from class I to Class V and the play park. Many times this has been in 'off-peak' times of the year. The Colorado Rivers' long season for recreation is the reason for many of my visits to the area. September especially is a time when runoff has ceased in other watersheds, but the weather is still pleasurable for paddling in the Glenwood area. I will continue to visit (and spend money) when visiting the Glenwood area if the river continues to flow at a desirable level during September, spending money at campsites, hotels, restaurants, gas stations, etc.
thanks for your time-John Melrose

From: Julie Houston <jhouston76@gmail.com>
Sent: Saturday, November 15, 2014 4:18 PM
To: Jeff Hecksel
Subject: CO River

I recently read an article stating that the eastern slope is trying to take water from the CO River that would jeopardize the river from Glenwood Canyon down. I would like to express my support for the City of Glenwood and American Whitewater in keeping our water where nature intended. I am a frequent surfer and paddler on the CO River, and I absolutely support securing water rights for river recreation through at least September. I typically begin surfing in Glenwood in May, as soon as the water level is just high enough for it. I'm a teacher in the Roaring Fork School District, but as soon as summer break begins, I surf the river all day, every day, as long as I can, until the water level gets too low. Almost all of my friends are other surfers I met in Glenwood Springs. On any day when the surf is up, I can go to Glenwood by myself and guarantee my friends will be there. There is probably a group of about 15-20 of us who are regulars and know each other, and that's not including all the kayakers. When the water level drops too low to surf anymore, I begin stand up paddle boarding on the river, and usually continue into the fall. I have paddled down the river on a weekly basis as late as mid-November, and have gone as late as early December. I always paddle with at least one other person, but typically there are 3-4 of us, and occasionally a bigger group, sometimes up to 10 of us. As much as I would love to be able to travel and just surf all year, I do have to return to work in August, at which time my river trips go from almost daily to weekly. I do enjoy my winters in Snowmass, but since I began river surfing, I typically spend the entire winter just waiting for next surf season to begin, and hoping for lots of snow so the surf season will be good. I would actually prefer that all of the water in the river stay in the river, but you have my full support in keeping however much of it we can here, where it belongs.

Julie Houston
Snowmass, CO

From: Steve Telgener <steve@telgener.com>
Sent: Saturday, November 15, 2014 2:15 PM
To: Jeff Hecksel
Subject: I paddle and I spend in your city

Please be aware that my family has paddled the Glenwood section of the Colorado River at least once after the labor-day weekend for the last three years and plan to continue this tradition as long as the fall recreational releases continue. We have always had at least one meal in Glenwood and on two occasions have spent the night at the hot springs and paddled or rafters both day of the weekend. Please support American White Water's effort to continue the fall recreational releases.

Steve
303-526-0497

From: William Sardinsky (S) <William.Sardinsky@ColoradoCollege.edu>
Sent: Saturday, November 15, 2014 1:30 PM
To: Jeff Hecksel
Subject: Glenwood Canyon Water

Dear Mr. Hecksel,

My name is Will Sardinsky andI am writing to you today to let you know that I have paddled Glenwood Canyon in September and boy is it fun. It is something that I will continue to do, and hopefully we will have the water flow to make this possible. I grew up in Carbondale, attended Basalt High School and Colorado Rocky Mountain School where I fell in love with kayaking. Since learning to kayak, I have fallen in love with rivers in general. This past summer I was a raft guide on the Colorado. Sometimes it's hard to remember that while we are having fun on the water, some people also depend on rivers to make their living. I use the Colorado river in September for the end of rafting season and to kayak on. This section of river is runnable over such a wide range of river flows and it is always changing which makes it even more fun than other sections of river. I spend my breaks from school at Colorado College on rafting trips with friends and we always try and stop by to paddle it on the way back to Colorado Springs. I usually paddle with about 5 other friends, but the amount of friends I have gained from kayaking here is astonishing to think back upon. There is something about being on the river in this magical place with others that brings community. I plan on paddling the Colorado River in Glenwood Canyon for many Septembers to come and I hope you can understand how important this section of river is to me, along with the rest of the community that uses this section of river. Thank you for your time.

Cheers,

Will Sardinsky

From: Nicholas John Martin <nmartin@mymail.mines.edu>
Sent: Saturday, November 15, 2014 1:16 PM
To: Jeff Hecksel
Subject: Protecting Fall Flows in the CO River

Hello Mr. Hecksel,

I have been informed that American Whitewater is working with the City of Glenwood Springs in an effort to protect flows in the Colorado River. I frequently paddle the stretch of the Colorado River that flows through Glenwood Canyon during September and October, and believe that it is important to secure water rights in this area during the fall months. Typically, during the months of September and October the Colorado River is one of the only options for kayakers and rafters in the state of Colorado.

I travel from Golden to paddle in Glenwood Canyon and usually come with a group of 10-15 members of the CSM Kayak Club. During the fall months, Glenwood Canyon is one of our only options for club trips because this stretch of river is a moderate difficulty that is appropriate for our trips. I was actually out there this year on November 8th with a group of 11 kayakers from the CSM Kayak Club, and we had the pleasure of seeing at least 10 other kayakers out enjoying the river on that day. If flows in the Colorado were threatened, that would leave us with very few options for kayaking during the fall months. Thank you for taking your time to hear my opinion on the matter.

Sincerely,

Nicholas Martin

From: Paul Heller <pih1@otter.com>
Sent: Saturday, November 15, 2014 12:32 PM
To: Jeff Hecksel
Subject: Spring and Fall paddling near Glenwood

My understanding is that City of Glenwood is trying to protect water rights in Colorado river. There's been some contention that the river isn't used by recreational boaters much in the off-season. From my direct experience and experience of a dozen kayaking friends this is incorrect. Especially for intermediate paddlers and kids.

Gore canyon is too difficult for all but experts. The Arkansas quits running in August and doesn't start in until May. So for a good part of the year the Colorado near Glenwood is only place to find decent water flow. From a recreational standpoint the state needs more water in that stretch not less. Thanks, Paul Heller 1321 Cedar Ave, Boulder CO 80304.

From: Miranda Townsend <matownse@gmail.com>
Sent: Saturday, November 15, 2014 12:11 PM
To: Jeff Hecksel
Subject: Save our water!

Hi Jeff - extending my voice to express how much our water means to us in the RFV for many purposes, including boating. More exclusively, the Colorado River is extremely important to my significant other and I, and many, many people come to boat from all over in the Spring, Summer and Fall. Please save our water!!!!!!!!!

Thank you for your time!
Miranda Townsend

From: Katy Joy Knapp <glenwoodk8@gmail.com>
Sent: Saturday, November 15, 2014 11:53 AM
To: Jeff Hecksel
Subject: Water Rights for River Recreation

Dear Jeff,

I'm writing you today because I'm concerned with the low water flows on the Colorado River between Shoshone and Two Rivers Park during September and into the fall. I paddle this stretch a great deal during this time of year and would love to continue paddling it this time of year in the next years to come.

What little water that is left in the river should not be pumped to East Slope Cities in the future.

Thanks for your time and consideration.
Sincerely,
Katy Joy Knapp

From: Peter Benedict <pbenedict@crms.org>
Sent: Saturday, November 15, 2014 11:43 AM
To: Jeff Hecksel
Subject: Colorado River River Park - RICD

Dear Jeff,

Your work on this matter is very important to me and the Colorado Rocky Mountain School. Shoulder season flows on the Colorado River are crucial to our program and then development of CRMS students over the last 50 years.

Letter of support

--
Peter Benedict
River Program Coordinator
Math Faculty

From: Taylor Parsons <tparsons@mymail.mines.edu>
Sent: Saturday, November 15, 2014 11:06 AM
To: Jeff Hecksel
Subject: Glenwood Canyon Flows

Hello, it has come to my attention that you are investigating the issue of flows in glenwood canyon after Labor Day, and that it has been argued that private boaters such as myself do not use the river in September, October, and beyond.

I wanted to assure you that the colorado river through glenwood canyon is a gathering place for kayakers in the late season when most other rivers in the state are not flowing. I live in Golden, several hours away, and I have personally taken groups of 5-15 people across the divide for the whitewater recreation at Shoshone 4 times since Labor Day this year. As the president of the kayak club at colorado school of mines, glenwood canyon provides me and my club members with a perfect setting to take somewhat new members out and test their abilities in a safe and exciting environment. We have never been alone on the boat ramp. After Labor Day, I might go as far as to say that traffic may pick up slightly because rivers elsewhere begin to wane. The pervading opinion in the paddling community is that, as long as you own good cold-weather gear and Shoshone does not have ice bridges, it's good to go! I and a large group (around 30-50 every year) even participate in a new-years day float of the river. It would be a shame to remove this wonderful opportunity for the paddling community, and this clear attraction for glenwood. Each time I have boated shoshone this season I have stopped in town and purchased gas, food, even a couple gear items we have forgotten. The influence of the paddling community in glenwood is clear, and I think it would be a mistake to assume that this boater traffic is over so early in the season.

Thank you for your time,
-Taylor Parsons

From: Kayla Fratt (S) <Kayla.Fratt@ColoradoCollege.edu>
Sent: Saturday, November 15, 2014 9:49 AM
To: Jeff Hecksel
Subject: Glenwood Canyon

Mr. Hecksel,
My name is Kayla Fratt, and I'm a student at Colorado College in Colorado Springs. It was brought to my attention that the September season of whitewater paddling is in danger. I would like to say that I paddled in Glenwood Canyon twice this September in a group of 6 total, all students at CC. We were not the only group on the river. We routinely visit Glenwood because of the difficulty of the river, which is well-suited to advanced beginners like our group.

Please consider keeping our September season intact.

Kayla Fratt
Colorado College Class of 2016
kayla.fratt@coloradocollege.edu
401.209.8816

From: Mike Swankhouse <swank1975@gmail.com>
Sent: Saturday, November 15, 2014 8:32 AM
To: Jeff Hecksel
Subject: Use of the Colorado River through the fall and into Winter

Jeff,

As a user of the Colorado river from pumphouse to westwater including Glenwood Canyon and the Glenwood playpark the news of these efforts to limit flow in the river upsets me. By taking this late season water they will impact my ability to use this section of river for a portion of the year. The loss of September would be unacceptable. We love going to Glenwood and running shoshone for the river, hot springs, and local bars and restaurants. We have paddled with groups as large as 20 in this section. I expect to continue running this section of river.

Thanks for protecting this recreational water right.

--
Mike Swankhouse
Centennial, Colorado

From: Lori Russell <snowplow81655@yahoo.com>
Sent: Saturday, November 15, 2014 7:36 AM
To: Jeff Hecksel
Subject: Water in the Colorado

Jeff & the City of Glenwood Springs.
Count me with thousands or tens of thousands who enjoy recreational use on the Colorado River in Glenwood Canyon. I even made my choice to live in Eagle where I can be close to a year-round river. I have boated Shoshone probably a thousand times over the last 30 years, maybe a few dozen times a year on average. And I always love a trip to the West Glenwood Wave, especially during high water season. That was one of the best investments made by your city. My trips to Glenwood, (sometimes several a week), always include a stop in town for snacks or shopping.
Lori Russell
Box 4237, Eagle, CO 81631

From: Kristin Taylor <lilyleigh@hotmail.com>
Sent: Friday, November 14, 2014 10:30 PM
To: Jeff Hecksel
Subject: Glenwood paddling

Hello there,
I just wanted to take a minute and let you know that I am a kayaker from Fort Collins who heads to Glenwood Canyon to boat in September and the rest of the fall / winter months. It is the only place to paddle when the rivers around here become un-runnable after summer. I have a passion for kayaking that brings me to any river in the area if the flow is runnable, regardless of weather or month of the year. In September, as the flows on the other rivers diminish, I am faced with the fact that our season is drawing to a close, and the only comfort I have is that I can still go to Glenwood. In fact, quite a few of us even do a New Years Day paddle in Glenwood. I normally paddle with at least two other people, and there are always other boaters on the run as well. They come from all over Colorado, not just the front range like me. I plan to continue boating in Glenwood for as long as the flows continue.

Thank you,
Kristin Taylor

From: David Wallace <davidk1@q.com>
Sent: Friday, November 14, 2014 10:09 PM
To: Jeff Hecksel
Cc: davidk1@q.com
Subject: Support for Glenwood Canyon flows in September

City of Glenwood Springs
Attn: Jeff Hecksel, City Manager

Dear Mr. Hecksel,

I would like to voice my support for keeping recreational water flows in the Colorado River through Glenwood Canyon in September and the Fall, and I am not in favor of any extra Front Range water diversions from the Colorado River. My son and I kayaked the Shoshone section this past September along with a big group of Stand Up Paddle (SUP) boarders, and commercial rafters. We live in Steamboat Springs and the Shoshone section offers the best boatable Class 3 whitewater in September and October in Western Colorado. It is also fairly warm in Glenwood Canyon in September, so still warm weather boating. This is a great whitewater resource for Colorado once the rest of the rivers drop too low by August.

On November 8, we drove through Glenwood Canyon on our way to Aspen. We stopped at the I-70 rest area that is the take out for Shoshone and went down to look at the river. Coming down the river was a large group of kayakers--probably 10--from the Colorado School of Mines kayak club. The air temp was cool, but the college kids were all having a great time and were headed up to do it again. they commented this was the only boatable river around for early November.

September and Fall flows in Glenwood Canyon are great for still getting out on the river, and good for novice paddlers since flows are much lower than in Spring thru Summer. Please support recreational river flows in the Fall for Glenwood Canyon.

Thank you--

David Wallace
1330 Saratoga Ave
Steamboat Springs, CO 80487

From: Philip Coebergh <pjcoebergh@gmail.com>
Sent: Friday, November 14, 2014 8:21 PM
To: Jeff Hecksel
Subject: September boating in Shoshone area

I want to address the issue of boating in the Shoshone power plant area in September. Over the last 10 years I have kayaked Shoshone well over 100 times in September - also in October and even a few times in November. Even though I am from Grand Junction, I consider Shoshone to be my "home" boating run. And of course there are always lots of boaters in September, as it has the best water in the state in that month. The commercial rafters also continue to have banner business in September, but I trust they will express that themselves. Please do whatever you can to maintain the flows in the Colorado River and to keep the east slope big money people from grabbing more water. Thank you, Philip Coebergh

Philip Coebergh
2504 Mount Sopris Drive
Grand Junction CO 81507
970 596-0265

From: Juliann Poma <jpoma24@gmail.com>
Sent: Friday, November 14, 2014 8:17 PM
To: Jeff Hecksel
Subject: Paddle on!

Greetings Mr. Hecksel!

I am writing to you today about a place dear to my heart, Glenwood Canyon. The scenery and constant flows make this run a joy to paddle any time of year. Because of its close proximity, my friends and I try to make it down to Glenwood at least a few (if not more) times a year but I particularly enjoy our late season trips; the chill in the air, the colors, the peace and quiet. A different breed of recreationalist comes out in the shoulder season, one that doesn't mind the cold, one that has not grown bored paddling all summer, one that can simply appreciate the place in it's varied seasonal coats. These are the same people that I enjoy meeting over beers post-paddle to discuss the state of the world or whatever else you talk about over beers.

Mostly I am writing you this email to ask you to maintain the flows in Glenwood canyon and **not** divert the water to Denver to be used to water lawns and flush inefficient toilets.

Thanks for your time,
Jules

--
Juliann Poma
Outdoor Educator, Colorado Mountain College
Media Specialist, Rig to Flip
(313) 300-5343

From: Mathew McCabe <mattextremesportscamp@gmail.com>
Sent: Friday, November 14, 2014 6:30 PM
To: Jeff Hecksel
Subject: Colorado River Useage

Greetings.

American Whitewater has brought to my attention that late season flows on the Colorado are possibly in jeopardy. I wanted to ensure you , and all interested parties , that the use of the Colorado river, after Labor day, is an ESSENTIAL part to why I choose to live in the roaring fork valley. I have 30 days on the river AFTER Labor day this year! it was the greatest thing!! MANY of my friends are out with me every day, all though, they are kayakers and I cant guarantee they will write in... I can guarantee its important to them, and a big part of why they live here. Please help us do everything in our power to continute to provide late season flows down the Colorado river for all to enjoy!!! Please!!!! Thank you!

--
Mathew McCabe
Adaptive Sports Instructor
Recreation Therapist
Spectrum Unlimited Colorado
309-267-2911

From: april lewandowski <aprilboater@hotmail.com>
Sent: Friday, November 14, 2014 5:54 PM
To: Jeff Hecksel
Subject: Support for September flows on Shoshone

Dear Mr. Hecksel,

I'm writing my email to let you know I paddle Shoshone throughout the month of September.

For several years now, my husband and I have come to the Western slope in the month of September just to paddle the Shoshone section of the Colorado. Fall is one of our favorite times to be on the river: the crowds are gone, the weather is still moderate, and the changing leaves paint the gorge in a special beauty.

Typically, we bring both our rafts and our kayaks and try to bring others with us, too, and take them down the river. Throughout the weekend, we do "laps" on Shoshone, getting in several runs each day. We see others getting in runs on Shoshone or Grizzly Creek all the way to Two Rivers park. About two seasons ago, we ran the rapids with a gang of crazy racers swimming down the river!

As a member of American Whitewater and Colorado Whitewater and as an active member of the boating community in Colorado, please know that paddlers like us want September flows in Glenwood.

As a former resident of the southeast, where most rivers are runnable year round, it's important to me to have the longest paddling season possible here in Colorado. Eventually, snow and cold will make me exchange my kayak for skis. I hope that the siphoning of water to the Front Range won't be the reason I have to put my kayak up a month early.

Thank you for your work on this topic.

Sincerely,

April Lewandowski
996 Rudi Lane
Golden, CO 80403

From: Cody Perry <cody.perry@gmail.com>
Sent: Friday, November 14, 2014 5:03 PM
To: Jeff Hecksel
Subject: Recreating on the Colorado

Hello There Jeff,

My name is Cody M. Perry and I live in Steamboat Springs. I wanted to let you know that enjoy coming down to your community in Glenwood and getting on the Colorado River. I make a point every year to start as early as possible and take my boating season all the way past Halloween. But during the later months of summer, September for instance, Glenwood Canyon is a fabulous place to be on the water. We try to and travel down from Steamboat with a group, dozen or so, to boat every weekend in September. Even though there's a fair amount of people thinking the same, its good to see other enjoying the water and too good to miss.

No doubt, you understand how important this resource, the river, is to your community. As a citizen of Colorado and a neighbor to your community I urge you and the City of Glenwood Springs to secure Recreational in Channel Diversion Rights on the Colorado River.

I sincerely hope you feel the same way, and see you next year on the River!

--
Cody M Perry
Outdoor Educator Colorado Mountain College
Project Director Rig To Flip
9708191610
Rig to Flip.org
water education awareness

From: Mark Krasnow <markkrasnow@gmail.com>
Sent: Friday, November 14, 2014 4:56 PM
To: Jeff Hecksel
Subject: kayaking on the CO in Glenwood Canyon

Hello Jeff,

I wanted to let you know that I love to paddle the Colorado River through Glenwood Canyon. I have been paddling that stretch, Shoshone to South Canyon, regularly since 1999. I love it! I especially love it in September and October when it is far less crowded. I have paddled that stretch in September at least 50 times. I like it because it is super easy to access and that stretch is fun. I often take boaters there who are learning to paddle because the bike path is a great way to scout rapids and learn how to navigate them safely. The surf wave in South Canyon is good year round. I often see other paddlers enjoying this section of river in September, lots of other paddlers. I look forward to paddling this section in September for many years and sharing the fun with old and new friends.

Thanks,
Mark Krasnow
Buena Vista, CO

From: Pete Bellande <pete@nostalgichomes.com>
Sent: Friday, November 14, 2014 4:50 PM
To: Jeff Hecksel
Subject: Glenwood Canyon in September

Hi Jeff,

As you are weighing the value of flows in the river after Labor Day, please consider the fact that I quite often come out to Glenwood to visit family and paddle Shoshone in September. With weather still warm and trees changing color, it is one of my favorite times to paddle one of the few rivers in the state that has water that time of year.

Please take this into consideration as you evaluate the need for water in the river this time of year.

Thank you,

Pete Bellande
Broker Associate
Nostalgic Homes
303.999.8822

pete@nostalgichomes.com

www.nostalgichomes.com

From: Neil McNutt <neil.mcnutt@western.edu>
Sent: Friday, November 14, 2014 4:38 PM
To: Jeff Hecksel
Subject: Recreational In-Channel Diversion (RICD)

Mr. Hecksel,

I am writing to express my support for securing Recreational In-Channel Diversion (RICD) rights on the western slope.

I'm an avid whitewater kayaker and rafter who frequently recreates on Glenwood Canyon of the Colorado River. As you know, Glenwood Canyon is one of the most important recreation areas in the state. Commercial whitewater rafting is a significant economic driver for communities like Glenwood Springs, and should be protected.

Tourists and residents alike are able to enjoy the recreational opportunities later in the year because the Colorado is one of the few rivers with sufficient flows to support recreation in the late season. Typically, I spend eight to ten days kayaking and rafting near Glenwood in the month of September. I look forward to a lifetime of recreating on the Colorado River. I trust that local government and policy makers on the Western Slope continue to work to protect in-stream flows.

Kindly,

Neil D. McNutt

Gunnison, CO

From: Peter Holcombe <peter@holcombephotography.com>
Sent: Friday, November 14, 2014 4:27 PM
To: Jeff Hecksel
Subject: I paddle Glenwood Canyon in September.

Attn:
City of Glenwood Springs
Attn: Jeff Hecksel, City Manager
101 West 8th Street
Glenwood Springs, CO 81601
970-384-6401
jeff.hecksel@cogs.us

Hello Jeff,

I hope you are having a great day. I wanted to quickly share with you how lowering the flows on the Colorado River through Glenwood Canyon will personally effect me.

I am a passionate river lover and kayaker. I live in Boulder, Co and in late summer river choices with boatable water levels become a challenge. The Colorado River becomes the only real option by the time we reach late august and september. My whole family (daughter 10 years old, and wife) make frequent trips to Glenwood Springs to kayak all through the later summer and into the winter. Often in September we will make 4-5 trips just to paddle from Shoshone to the Glenwood Wave Whitewater Park. Most of the time we have group of 6-10 other families who share this love of time on the river with there children and friends. In fact paddling in September is the perfect time to teach kids to kayak. The water is at a very comfortable level and comfortable temperature for children to excel. As most of the year it runs too swift and cold for youth. We friquently meet other families and individuals enjoying the fall color while running the river.

If river levels drop any more in September we won't have this opportunity. It will essentially end my families paddling season a month early. Paddling already has a short window in Colorado compared to many other parts of the country. I feel we visit Glenwood Springs at a time when most people aren't supporting the areas economy at a key time as school has started keeping people home and the ski season hasn't. We always visit our favorite eateries and purchase all the other essentials of a traveling family. Essentially it's the main time of year we come to Glenwood Springs as in the peak of summer we have great paddling options on the Poudre River two hours closer to our home. Please preserve this key time of year for the Colorado River in Glenwood Canyon to offer a truly unique experience that can't be found in any other part of the state in September.

All the best,
Peter Holcombe

www.HolcombePhotography.com

Peter@HolcombePhotography.com
Office-303.514.0834

Cell-303.665.5878

From: Brendon Langenhuizen <brendon.langenhuizen@gmail.com>
Sent: Friday, November 14, 2014 4:10 PM
To: Jeff Hecksel
Subject: Letter of Support for the Glenwood Springs RICD extending through September

Hello Jeff,

I am writing in support of the City's RICD water right application. I am a kayaker and rafter and have enjoyed running the Glenwood Canyon many times since I've moved to Glenwood in 2006. I understand that the City's application is under threat to limit the days of implication to before Labor Day. I have paddled and rafted the river numerous times past Labor day and want to support the City's application to maintain the RICD application through the end of September. I average approximately 10 days on the river through Glenwood Canyon in September mainly on weekends and after-work. When I raft there is on average 2 others on the trip with me and usually there are many other boaters on the river as well. I believe that a RICD water right through the end of September can easily be support and justified as September is a prime season for river recreation in the Glenwood Canyon.

Thank you,

Brendon Langenhuizen

Glenwood Springs Resident

From: Chris Whaling <chris@chriswhaling.com>
Sent: Friday, November 14, 2014 4:02 PM
To: Jeff Hecksel
Subject: September Colorado river paddling

Hey Jeff, just wanted to let the city know to please keep pursuing the RCID for the Colorado River in September – all boating season long for that matter. I come down from Carbondale and paddle at least once a week with several friends, either the Shoshone run or to the play wave.

Thanks, Chris

Chris Whaling

Roaring Fork Realty

Chris@ChrisWhaling.com
www.RoaringForkRealty.com
970-729-3143 mobile

From: Andrew Knapp <knapp.andrew@gmail.com>
Sent: Friday, November 14, 2014 3:54 PM
To: Jeff Hecksel
Subject: Colorado River RICD

Hi Jeff,

I was passed along a message asking to send you a note regarding the use of the Colorado River beyond Labor Day.

I am a local GWS resident and a river user. Paddling the canyon in September is a great time. The weather is great and the tourist traffic is decreased. There may not be bumper to bumper rafts floating down the river but there is significant use by recreational and commercial users. I float the Shoshone stretch roughly once per week in September.

This fall I was working in the canyon on a daily basis repairing the bike path adjacent to the Shoshone stretch and saw river users every day the weather was decent. This included commercial and non commercial trips. We had to delay some elements of riprap replacement later in to mid October as to not interfere with the commercial and non commercial river traffic using the Shoshone river access.

I plan to continue to utilize this wonderful stretch of river every September about once a week until i move away or the water does (hopefully never).

The water belongs in the riverbed for the use of local residents, flora and fauna instead of watering another lawn or golf course on the Front Rage.

Yours Truly,
Andrew Knapp

--
High Five!

From: Walker, Timothy <tgwalker@coloradomtn.edu>
Sent: Friday, November 14, 2014 3:48 PM
To: Jeff Hecksel
Subject: RICD

Dear Jeff,

I just wanted to write you in support of American Whitewater's effort to inform interested parties about river usage in Glenwood Canyon. Shoshone is a great whitewater resource for the communities nearby. I am a Glenwood Springs local, now, but didn't use to be. I paddle Shoshone and other sections of the Colorado river on a regular basis in September, if I had to quantify it, I'd say on average 5 to 7 times. Before moving to Glenwood Springs, often times we would stop at the whitewater park or paddle Shoshone on the way to Gore Canyon or Westwater Canyon, it is a good way to break up a road trip. Before moving to Glenwood Springs three years ago, my paddling club from Colorado Springs would bring kayaks and bikes along on the autumn pilgrimage to Moab. It was not uncommon to have a group of 20+, paddling Shoshone, hitting the hot springs in Glenwood, then continuing on to Westwater Canyon and then ending up in Moab for mountain biking. Although September slows down for the bulk of tourist season, Shoshone is great paddling in September. Most other rivers in the state are low by then and it is not uncommon to go do multiple laps on Shoshone. Please don't let the Front Range suck up more western water. They need to work on their demand side of the issue!!

Thanks!!

Tim Walker

From: Kevin Schneider <KevinS@glenwoodcanyonresort.com>
Sent: Monday, November 24, 2014 9:43 AM
To: Jeff Hecksel
Subject: Keep the water in the Colorado River!!!!

Dear Jeff Hecksel,

I am writing to let you know about it has come to my attention there are some questions about the Colorado River and its importance to our community. I am hoping this will help you to better understand the river industry and the effect it has on the Glenwood Springs area.

As owner of Glenwood Canyon Rafting and Rock Gardens Rafting, both licensed rafting outfitters with the USFS on the Colorado through Glenwood Canyon. GCR and RGR have been operating on the Colorado River for many years.
The typical rafting season goes from March till October. The rafting industry is crucial to the financial stability of our company and the community of Glenwood Springs. It is also vital to the workforce of Glenwood Springs and the surrounding areas. The Colorado River through Shoshone is the most popular section of river to raft in the shoulder seasons (April, May-September, October). Primarily because of its water levels and mild temperatures it is the best place in Colorado to raft those months. Our company services many guest each year in the shoulder seasons. The extended season on the Colorado River has great benefits not only for our guests, but our staff as well. The longer season enable us to keep valuable personal employed longer.
This section of the Colorado River is the most popular shoulder season section of river in the state for not only commercial boaters, but Kayakers and private boaters alike. Needless to say, consistent water flows in the shoulder seasons is vital to the health of the Colorado River and the recreation it provides to our community.

I hope this information helpful. if you need any additional information you can contact me at (970)-945-6737.

Sincerely yours,

Kevin Schneider

Kevin B. Schneider
President/Managing Partner
Glenwood Canyon Resort
Office: 1-970-945-6737
Cell: 1-970-948-4881
Fax: 1-970-945-2413

Glenwood Canyon Resort
on the Colorado River

Matthew R. Solomon

P.O. Box 5246, Eagle, Colorado 81631
970.376.2146 | matt@devious.tv

November 22, 2014

City of Glenwood Springs
Attn: Jeff Hecksel, City Manager
101 West 8th Street
Glenwood Springs, CO 81601
970-384-6401
jeff.hecksel@cogs.us

Re: Colorado River Flows

Mr. Hecksel:

I am writing to you today in regards to information I was given that the Recreation In-Channel Diversion rights (RICD) may be amended to shorten our season on the river.

I have kayaked, rafted, paddle-boarded, and fished for nearly twenty years on the Colorado River and its tributaries – for personal enjoyment, for employment, and as a sponsored athlete. I assisted in the coordination and running of the US National Team Trials and with the SUP Championships. My resume and contribution to the whitewater community go further, but I think this is a broad enough stroke to begin the painting.

The Colorado River is our only year-round source of liquid satisfaction, if you will. It is a recreational channel and a direct contributor to our local economy. I have witnessed the High County go from a one-season attraction to a two-season attraction to year-round use and visitation - driven by enhancements to river-based recreation in our communities. Personally, I rely on the river to give me my much needed connection and mental recharge during the fall months before we are hit with winter and I know many others that do, as well. I utilize the river year-round, I take friends on the river year-round.

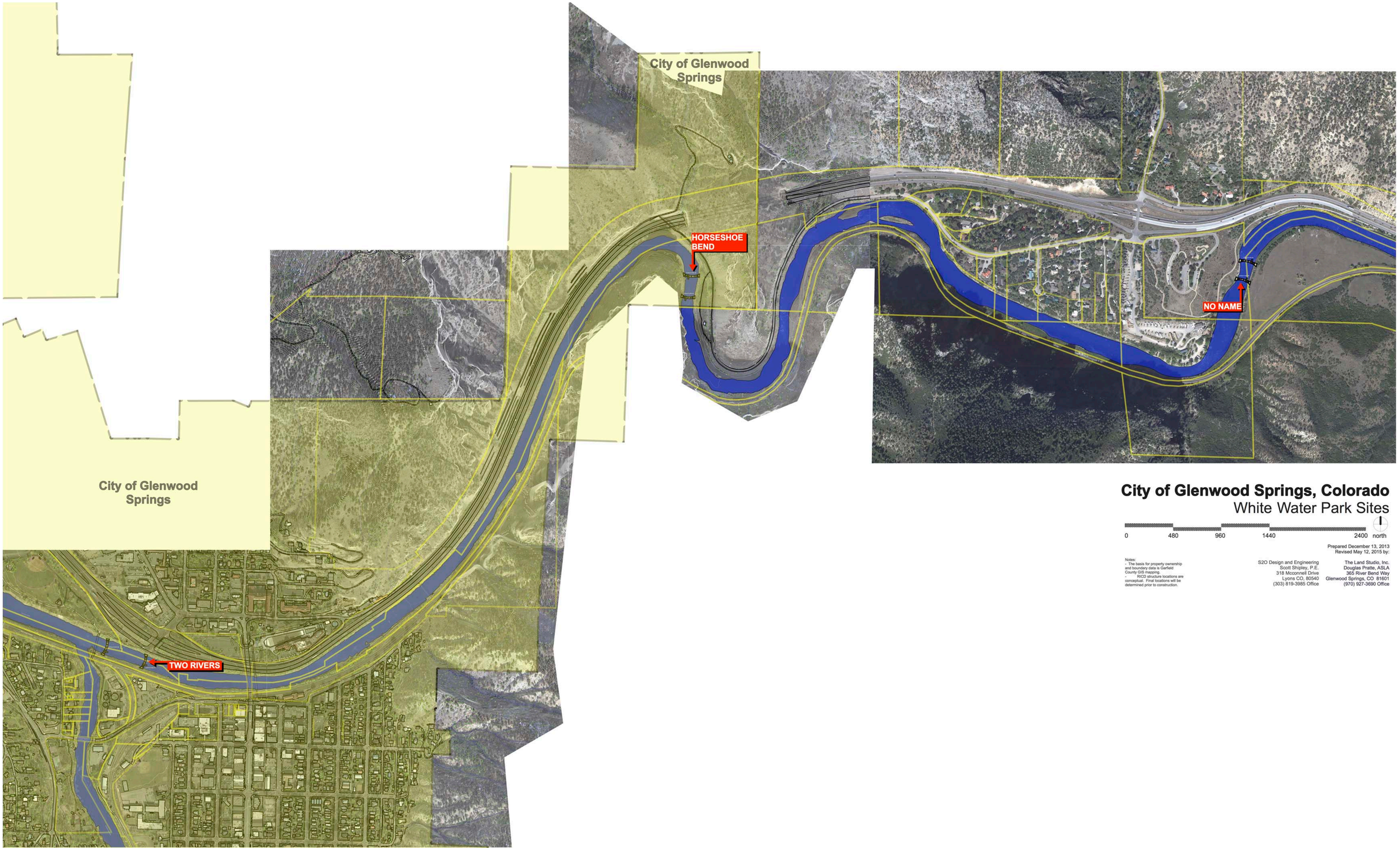
Speaking specifically about the request to cut short the RICD to not include the month of September, I point out the following: the Town just spent millions of dollars on whitewater enhancements and we should not voluntarily shorten the statutory RICD season when existing flow protections are already insufficient for the town. The Colorado River is so vital to our communities on the Western Slope, and we must exercise all available, though limited, means to protect it. Negotiating away the few protections we can secure now, is not the right path forward - particularly since RICDS are junior and liable to statutory changes in the future.

I would like to assist you in your efforts to keep our flows where there are, if not expanding them for longer periods of time.

Thank you for taking the time to read and share my thoughts. If you have any further questions or comments, please feel free to contact me at any time.

Sincerely,

Matt Solomon



City of Glenwood Springs, Colorado

White Water Park Sites

0 480 960 1440 2400 north

Prepared December 13, 2013
Revised May 12, 2015 by:

Notes:
- The basis for property ownership and boundary data is Garfield County GIS mapping.
- RICD structure locations are conceptual. Final locations will be determined prior to construction.

S2O Design and Engineering
Scott Shipley, P.E.
318 Mcconnell Drive
Lyons CO, 80540
(303) 819-3985 Office

The Land Studio, Inc.
Douglas Pratte, ASLA
365 River Bend Way
Glenwood Springs, CO 81601
(970) 927-3690 Office

No Name White Water Park Preliminary Drawing

City of Glenwood Springs, Colorado

0 90 180 270 450 north

Prepared December 13, 2013
Revised May 12, 2015 by:

The Land Studio, Inc.
Douglas Pratte, ASLA
365 River Bend Way
Glenwood Springs, CO 81601
(970) 927-3690 Office

S2O Design and Engineering
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Notes:
- The basis for property ownership and boundary data is Garfield County GIS mapping.
- RICD structure locations are conceptual. Final locations will be determined prior to construction.

Interstate 70 to Glenwood Springs

Interstate 70 to Denver

To No Name

To I-70

Rest Area Exit

State of Colorado Department of Transportation ROW

To Hanging Lake

NO NAME WHITE WATER PARK

To No Name

CDOT NO NAME REST AREA

STRUCTURE #1

STRUCTURE #2

State of Colorado Department of Tranportation

GLENWOOD CANYON RESORT

Colorado River

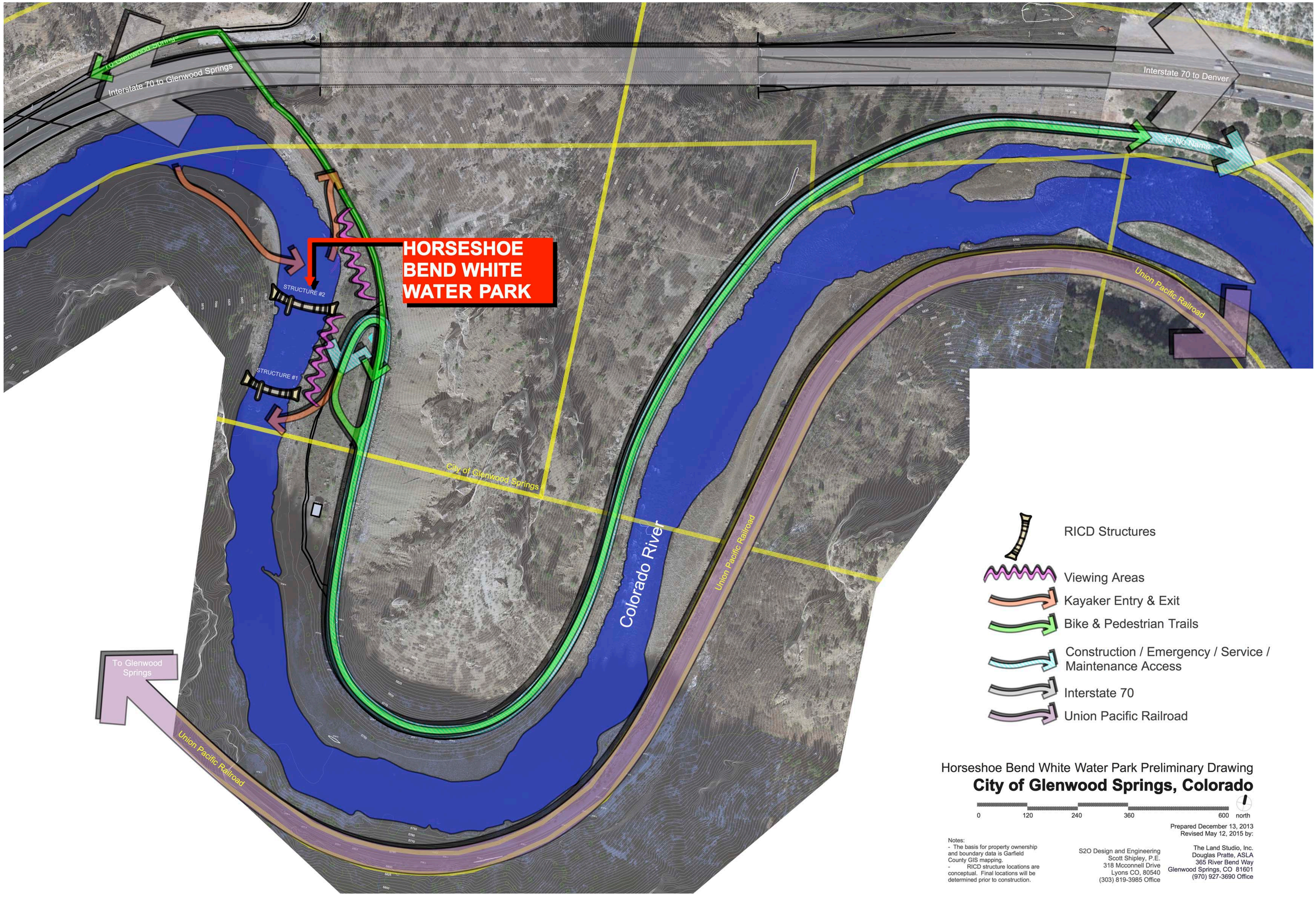
McKeel, Joseph Wayne

Union Pacific Railroad

Union Pacific Railroad

McKeel, Joseph Wayne

- RICD Structures
- Rest Area Parking and Restroom
- Kayaker Parking & Restrooms
- Park and Picnic Facilities
- Off-Site Amenities
- Fishing Access
- Viewing Areas
- Kayaker Entry & Exit
- Bike & Pedestrian Trails
- Vehicular Access
- Interstate 70
- Union Pacific Railroad



RICD Structures

Viewing Areas

Kayaker Entry & Exit

Bike & Pedestrian Trails

Construction / Emergency / Service / Maintenance Access

Interstate 70

Union Pacific Railroad

Horseshoe Bend White Water Park Preliminary Drawing

City of Glenwood Springs, Colorado

0 120 240 360 600 north

Prepared December 13, 2013
Revised May 12, 2015 by:

Notes:
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Glenwood Springs, CO 81601
(970) 927-3690 Office

To Two Rivers Park

TWO RIVERS PARK

City of Glenwood Springs

Interstate 70 to Grand Junction

EXIT 116

6TH ST

DOWNTOWN GLENWOOD SPRINGS

To Hotel Colorado

STRUCTURE #2

State of Colorado Dept. of Transportation ROW

Union Pacific Railroad

Union Pacific Railroad ROW

STRUCTURE #1

TWO RIVERS WHITE WATER PARK

Interstate 70 to Denver

Colorado River

Grand Avenue Bridge

Roaring Fork River

UNION PACIFIC RAILROAD

7TH ST

To Train Station

DOWNTOWN GLENWOOD SPRINGS

Grand Avenue

8TH ST

To 8th Street

W 7TH

RICD Structures

Primary Parking, Rest Rooms, & Amenities

Potential Park and Picnic Facilities

Fishing Access

Viewing Areas

Buffer Zones

Kayaker Entry & Exit

Bike & Pedestrian Trails

Vehicular Access

Grand Avenue

Interstate 70

Union Pacific Railroad

Two Rivers White Water Park Preliminary Drawing

City of Glenwood Springs, Colorado

0 90 180 270 450 north

Prepared December 13, 2013
Revised May 12, 2015 by:

Notes:
- The basis for property ownership and boundary data is Garfield County GIS mapping.
- RICD structure locations are conceptual. Final locations will be determined prior to construction.

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Lyons CO, 80540
(303) 819-3985 Office

The Land Studio, Inc.
Douglas Pratte, ASLA
365 River Bend Way
Glenwood Springs, CO 81601
(970) 927-3690 Office

Figure A: Time Periods of RICD Flow Claims

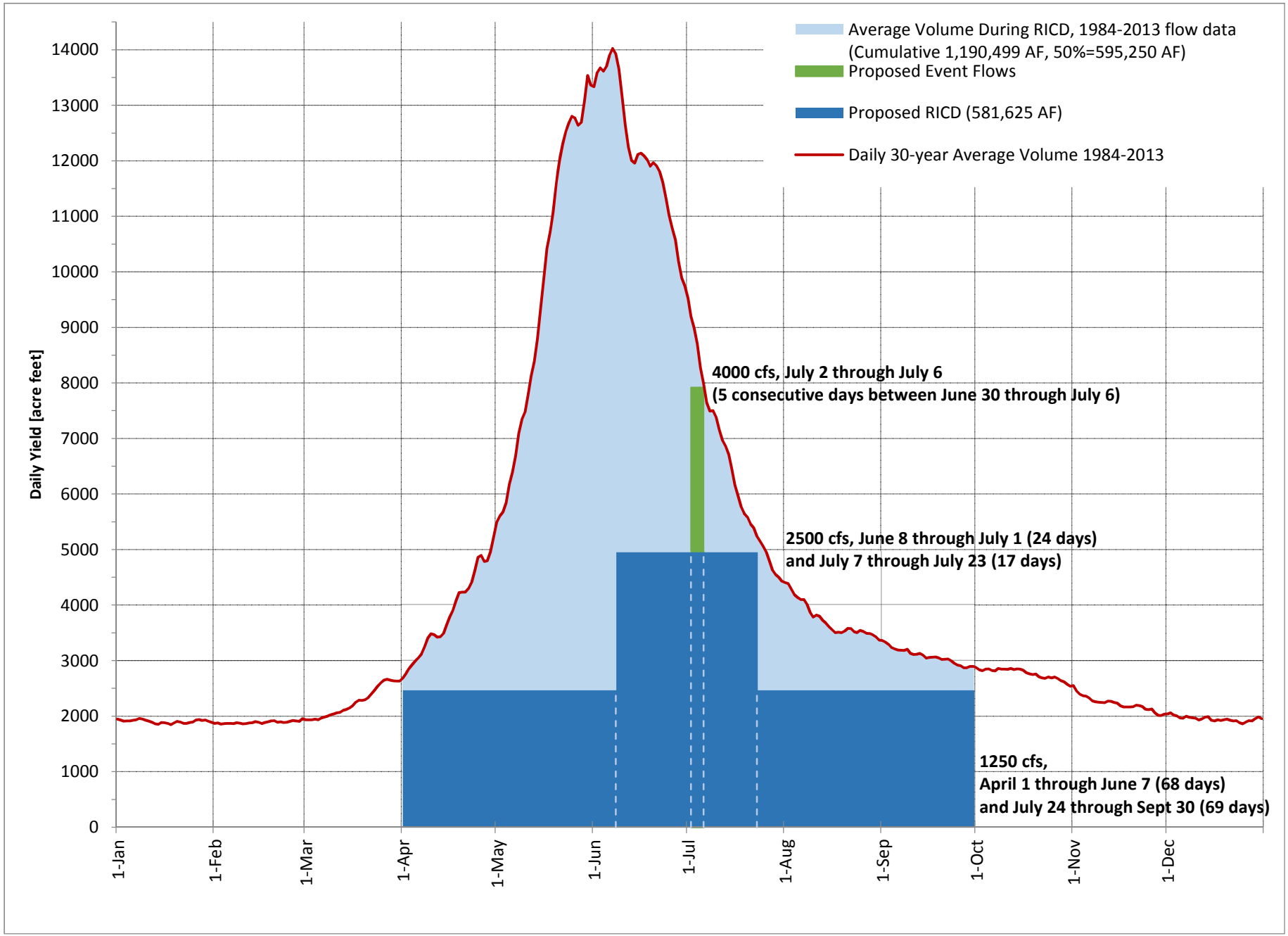


Figure B
Glenwood Springs RICD
Base Flow Claim (1250 cfs)

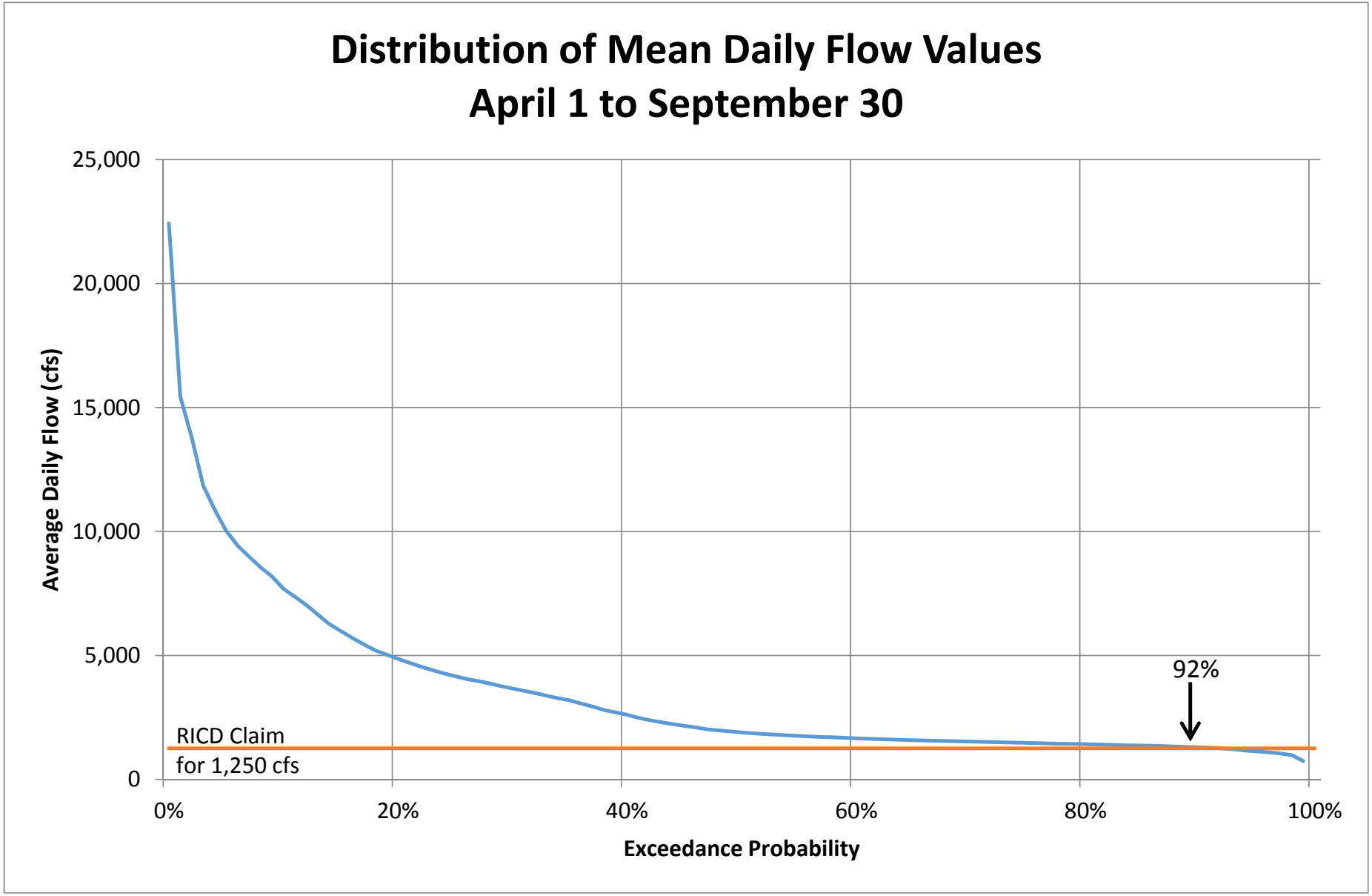
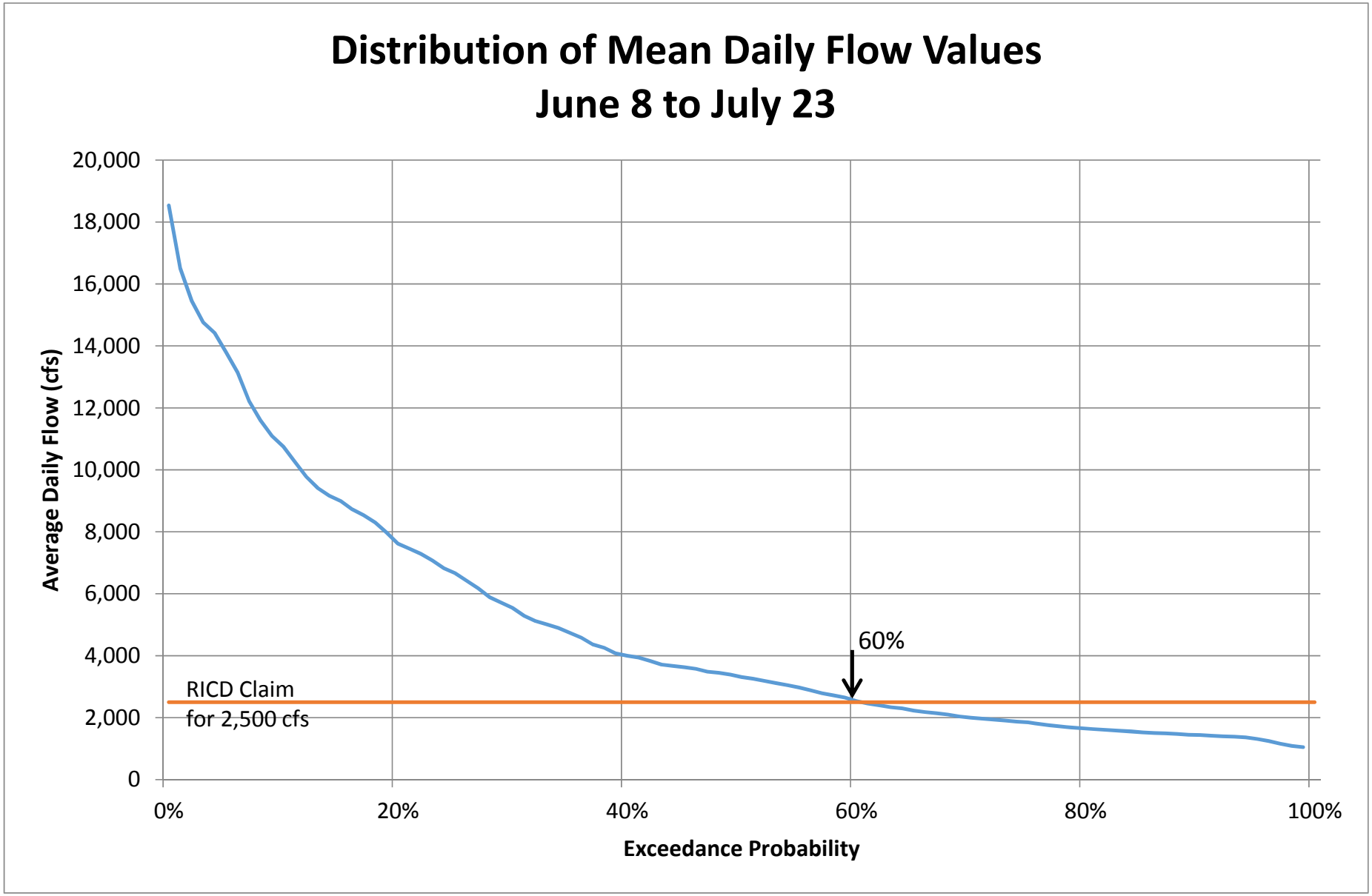


Figure C
Glenwood Springs RICD
Intermediate Flow Claim (2500 cfs)

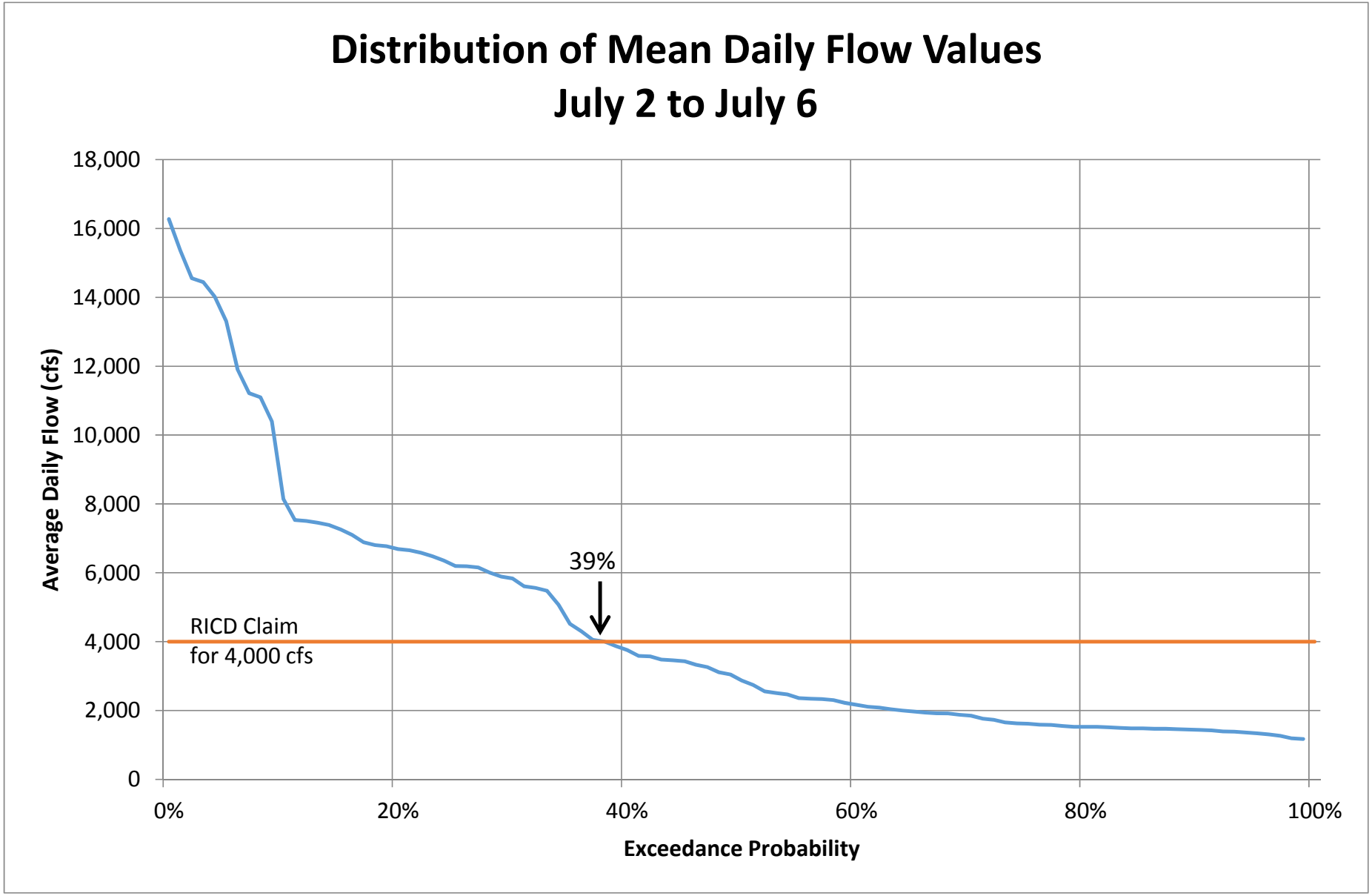


Z:\WWE\131-036\000\Engr\USGS Flow Stations\
Exceedance Analysis March 2015

Wright Water Engineers, Inc.
May 21, 2015

Calc By: CBB
Chkd By: JMK

Figure D
Glenwood Springs RICD
Event Flow Claim (4000 cfs)



WWE

MEMORANDUM

To: Suzanne Sellers
Colorado Water Conservation Board
Via Email: suzanne.sellers@state.co.us

From: Wright Water Engineers, Inc.
Jonathan Kelly, P.E.

Date: June 15, 2015

Re: Supplemental Information for Consideration in Case No. 13CW3109

Wright Water Engineers, Inc. (WWE) has prepared this memorandum as a follow up to our meeting on June 11, 2015. The City of Glenwood Springs has a pending water court application in Case No. 13CW3109 for Recreational In-Channel Diversion (RICD) water rights on the Colorado River associated with three proposed whitewater parks from No Name to above the confluence with the Roaring Fork River. For the purposes of this memorandum, there are no practical distinctions among the sites so the use of the term proposed RICD will apply to all three locations.

NEED FOR PERIOD LESS THAN 14 DAYS

Section 37-92-103 states that "[i]ndividual time periods shall not be shorter than fourteen days unless the applicant can demonstrate a need for a shorter time period." The proposed ruling in Case No. 13CW3109 claims event flows for a 5-day period between June 30 and July 6. This 5-day period is centered on Independence Day and is intended to provide higher flows for a special event. The flow claim period of five days is the minimum needed to achieve the desired recreational experience and is therefore consistent with the statutory requirements for maximum utilization by the efficient use of the available flows to meet the need.

It is assumed that part of the rationale for the minimum 14-day period is to avoid creating an undue burden on those tasked with administration of the river. Since the 5-day period of the RICD is for a special event, the planning will begin months prior to such an event. Therefore, the Division Engineer and his water commissioners will know about the exact timing of the flow claims well in advance of having to administer the water rights. This advance notice would also facilitate the opportunity for coordinated reservoir operations that could help satisfy the non-consumptive RICD since upstream reservoir releases en route to users downstream of Glenwood Springs will count against the RICD water right pursuant to the terms of the Glenwood's proposed decree in this matter.

FUTURE DEVELOPMENT POTENTIAL

When considering the effect of the RICD on future development potential, there are a couple of key aspects. The first is the volume of the RICD relative to the volume of the historically available flow. The second is the timing of the RICD relative to the historically available flow.

Whether future development of additional water demands occurs upstream or downstream of the proposed RICD, storage will be required in order to augment with respect to the existing calling rights (i.e., Shoshone and Cameo). These junior storage rights will rely on free river conditions to fill during the rising limb of the hydrograph. The timing of the RICD flow claims to meet the desired recreational experiences is centered on the falling limb of the hydrograph, which protects the early season free river conditions.

In addition, the upstream development potential is largely in the headwater tributaries of the Fraser, Blue, and Eagle Rivers. As shown in Wilson Water Group's Figure 2 of their June 4, 2015 report (attached), future development in these headwater tributaries is already encumbered by existing RICDs.

With regard to future development potential downstream of the RICD, there are numerous conditional water rights already decreed for oil shale development. Western Resource Advocates (WRA) published a report in 2009 entitled "Water on the Rocks: Oil Shale Water Rights in Colorado" (attached with this email) that documented the number and magnitude of the water rights associated with oil shale at the time. WRA's key findings included:

1. Energy companies and water supply districts have established conditional water rights associated with more than 200 separate structures (e.g., reservoirs and pipelines) in the Colorado River and White River Basins that potentially could be developed to support oil shale production. Most of these conditional rights were established in the 1950s and 1960s.

2. Collectively, with these rights, energy companies have the right to divert annually more than 10,000 cubic feet per second (cfs) — or 7.24 million acre-feet (af) — of water and store more than 1.7 million af, enough storage to meet the annual needs of 8-10 million Colorado residents.

The location of the oil shale development is within the Piceance geologic basin, and extends between the White and Colorado Rivers beginning at Meeker and Rifle, respectively. Therefore, all of the potential oil shale projects will be located either downstream of the proposed RICD or on tributaries not affected by the proposed RICD.

MAGNITUDE OF FLOW CLAIMS

While Glenwood's proposed flows exceed those of existing decreed RICDs, the flows are consistent, if not conservative, with the channel geometry and the historically available flow. As shown in Wilson Water Group's Figure 3 of their June 4, 2015 report (attached), while Glenwood's flow volume claim is higher than existing RICDs, the Colorado River is the largest in the state, and the proportion of the historically available flow claimed is therefore among the lowest.

The closest upstream RICD that is on the mainstem of the Colorado River is Grand County's Gore Canyon Whitewater Park. Grand County's decreed flow rates are 860 cfs for April 5 through April 28 and July 23 through October 15, and 1,500 cfs for April 29 through July 22. The historically available flow to Grand County's RICD during the claimed time periods is 543,178 acre feet, which is only 45.6 percent of volume available at Glenwood's proposed RICD.

The Gore Canyon RICD has a higher decree flow rate (1,500 cfs) from April 28 through June 7 than the Glenwood's proposed RICD flow rate (1,250 cfs) during that same 41-day period. As such, Grand County's approved RICD is at a location with less than half of the historically available flow and with higher flow rates during the rising limb of the hydrograph when storage is typically accomplished.

The Gore Canyon RICD has a peak rate of 1,500 cfs for a duration of 85 days; whereas, the proposed RICD has a rate of 2,500 cfs for a duration of 46 days (with the potential for events flows of 4,000 cfs for 5 of those days). Therefore, the Gore Canyon RICD has a flow rate that is 60 percent of Glenwood's proposed RICD despite the fact that historical flows in Gore Canyon are less than 50 percent of historical flows in Glenwood. In addition, the duration of the higher flow rates at the Gore Canyon RICD is 39 days longer than Glenwood's proposed RICD.

POTENTIAL FOR REDUCED FREE RIVER CONDITIONS

WWE is still in the process of evaluating the claim by Wilson Water Group that the proposed RICD has the potential to reduce the free river conditions by up to two months in certain years. However, it appears unlikely given that the flow claims only exceed Shoshone calls for a total of 46 days. It should also be noted that other decreed water rights that are senior to Glenwood's claimed RICD water rights, including the Grand County RICD, already have the potential to place a call during these 46 days.

WWE has also taken an initial look at the volume of water that could be associated with the increase in potential calls due to the proposed RICD. While WWE's initial analysis showed maximum volumes near the 250,000 acre feet that you mentioned to us during our meeting on Thursday, June 11, I discovered that we were accounting for the entire volume of the flow claim rather than the actual streamflow. While we are still putting together a more comprehensive analysis, in one example year (1987), this revision reduced the volume associated with a potential RICD call from about 170,000 acre feet down to approximately 102,000 acre feet. To put this volume in perspective, 102,000 acre feet represents less than one-tenth of the average historical flow volume during the RICD claim period of 1,190,499 acre feet. As noted above, this calculation also does not

account for the potential calls by other existing water rights such as the Grand County RICD, which would further reduce the impact of a call by Glenwood. But, even without considering the Grand County RICD, in 1987 the Glenwood RICD might only add 30 days of additional potential call, rather than the two months cited by Wilson Water Group. And, again, this period is largely on the receding limb of the hygrograph, when upstream reservoir storage has typically already been accomplished.

While WWE intends to finalize its analyses of the flow volume associated with potential RICD calls during otherwise free river conditions in an upcoming rebuttal report, at this point it is our opinion that any change in call regimes due to the Glenwood RICD will be consistent with the maximizing utilization standard, since the volume associated with such calls would only be a small part of the basin's yield, and since the use is non-consumptive and there are downstream consumptive uses that can "reuse" most if not all of the water delivered to the RICD during call periods before it leaves the state.

Attachments

cc: Mark Hamilton, Holland & Hart

Z:\WWE\131-036\000\Docs\Memo to Suzanne Sellers.docx

FIGURE 2

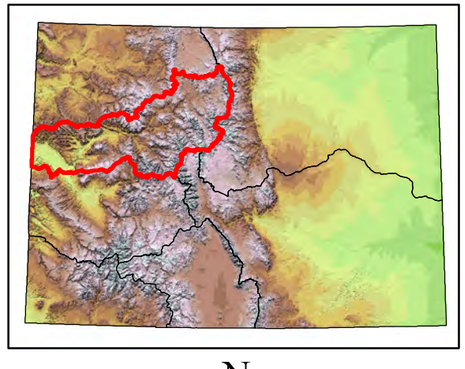
Vicinity Map of Watershed Areas Affected by Colorado Water Conservation Board (CWCB) Decreed and Pending Recreational In-Channel Diversions (RICD)

wilsonwater group

Date: 2 June 2015
Filename: Glenwood_RICD_mainstem.pdf
Created by: W.R.

Watershed Contributing Areas

- Pending RICD
- Decreed RICD
- Cities
- Counties
- Water Division 5
- Rivers
- Glenwood Springs Area
- Blue River Area
- Breckenridge Area
- Avon Area
- Vail Area
- Pitkin County Area
- Carbondale Area
- Aspen Area
- Gore Canyon Area
- Hot Sulphur Springs Area



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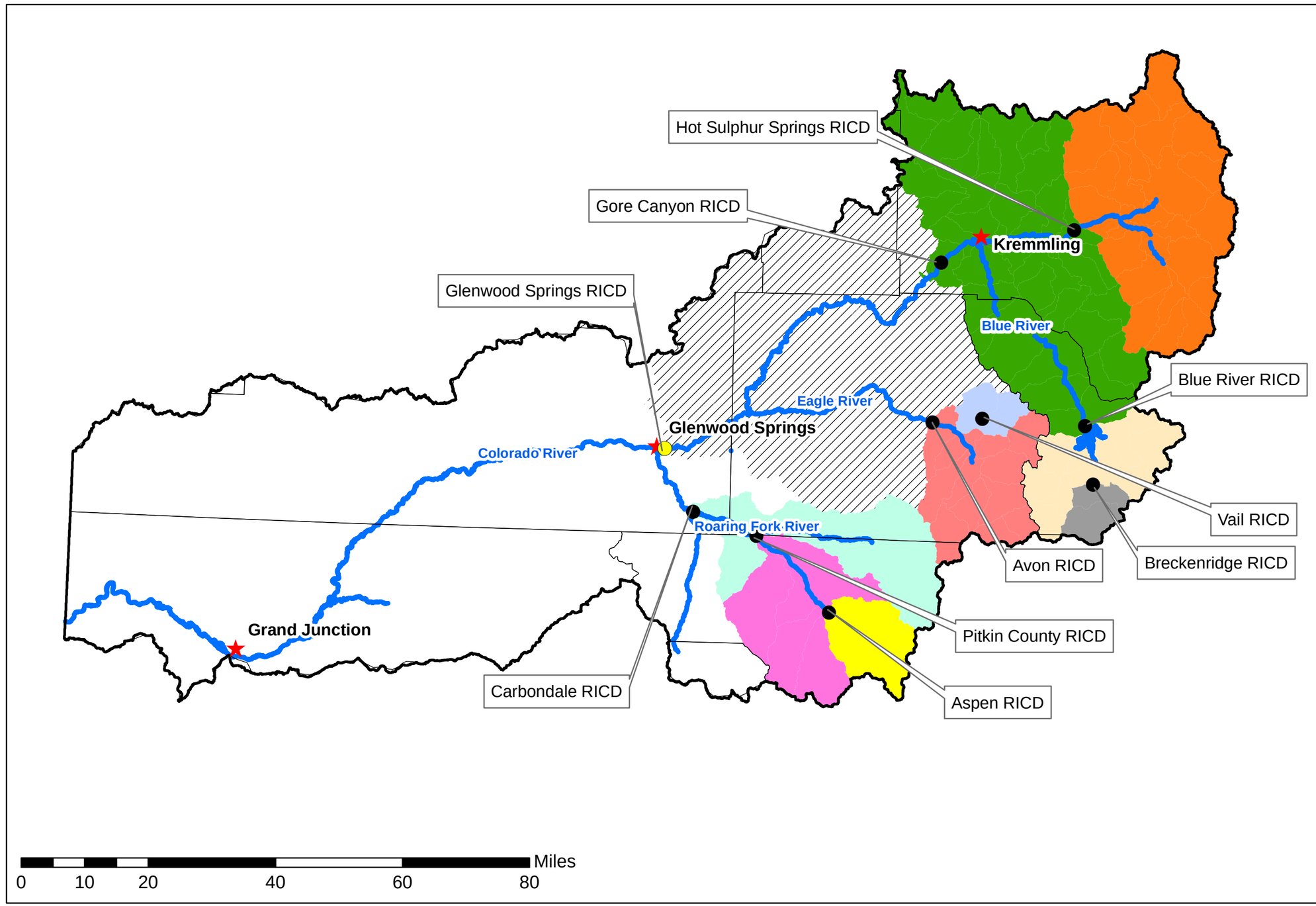
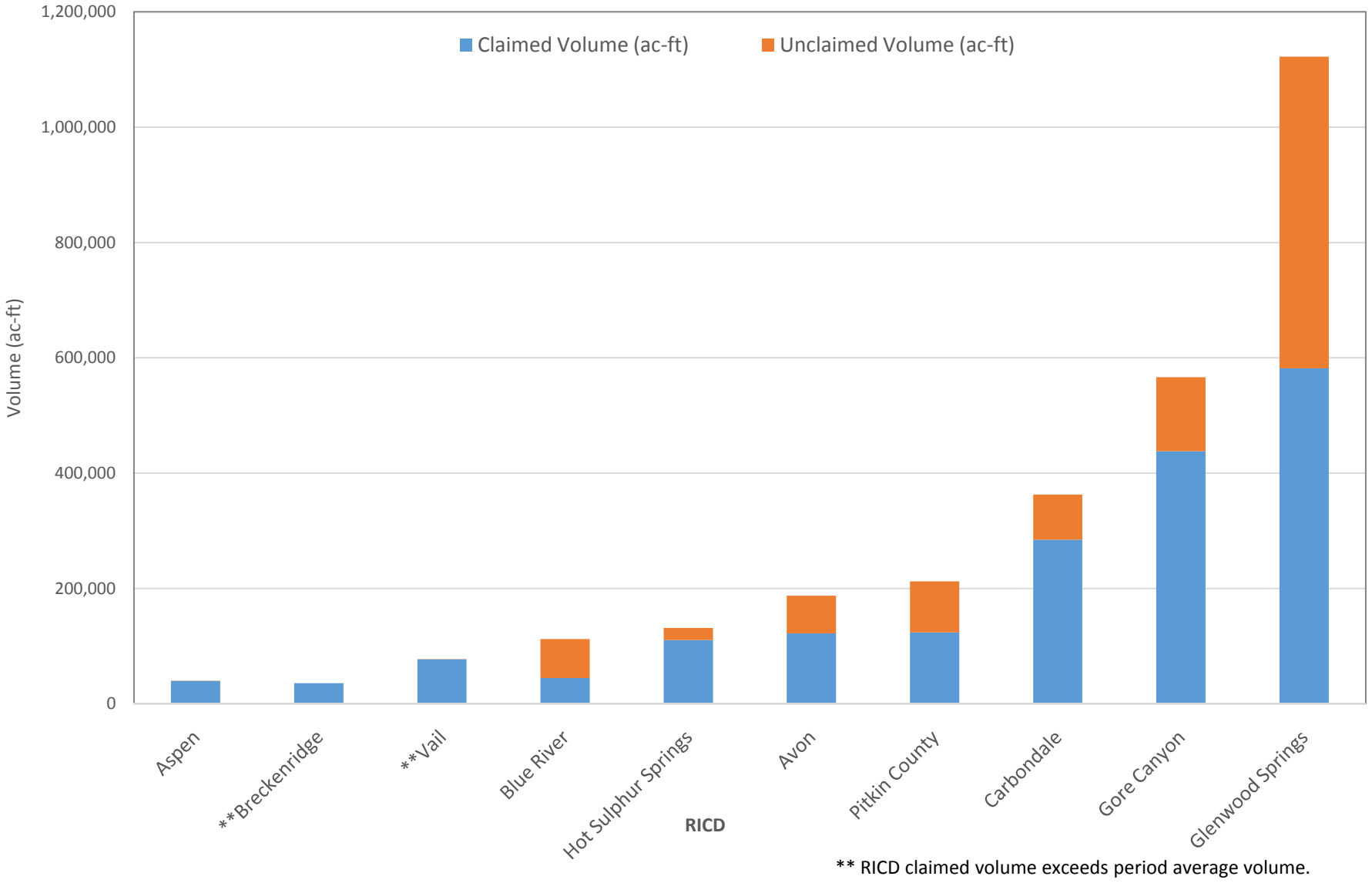


FIGURE 3
Overview of RICD Water Rights
Total Flow Volume Claimed

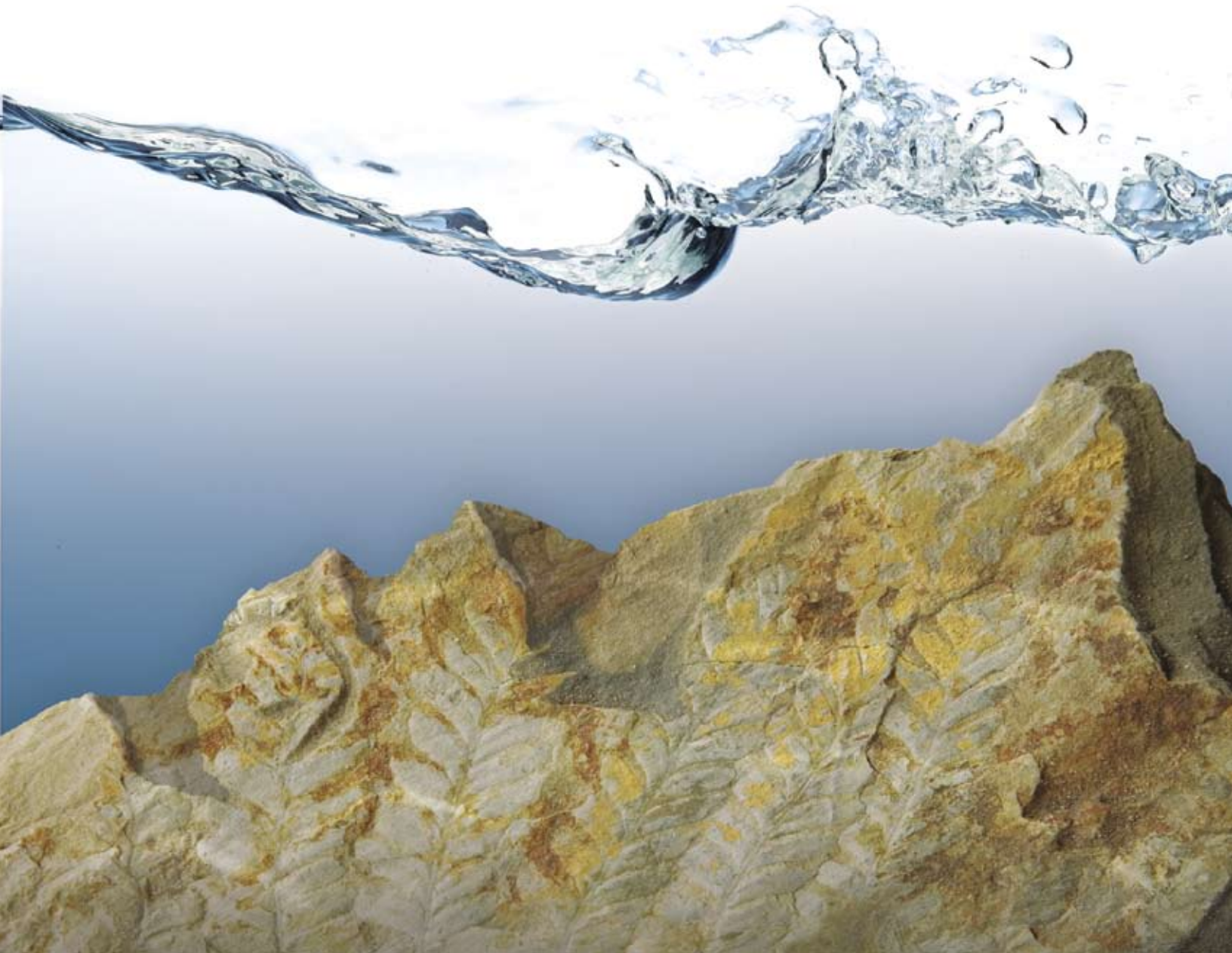


** RICD claimed volume exceeds period average volume.

WATER ON THE ROCKS

Oil Shale Water Rights in Colorado

WESTERN RESOURCE ADVOCATES



This report was written by Lawrence J. MacDonnell with invaluable assistance from David M. Abelson. The introduction was written by Karin P. Sheldon. The project was funded by grants from the William and Flora Hewlett Foundation and the Aspen Skiing Company Environment Foundation.

Dan Luecke contributed the sections on the Upper Colorado River Endangered Fishes Recovery Program and the Colorado River Compact. Robert Harris researched the decrees for the conditional water rights. Steve Styler generated the many tables. Geneva Mixon developed the maps. The report also benefited from the expert review of Chase Huntley, Amy Mall, Bart Miller, Peter Roessmann, Anita Schwartz, and Barney White.

About Western Resource Advocates
Western Resource Advocates is a nonprofit environmental law and policy organization dedicated to protecting the West's land, air, and water.

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ADVOCATES

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Fax: (303) 786-8054
www.westernresourceadvocates.org
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WATER ON THE ROCKS: *Oil Shale Water Rights in Colorado*

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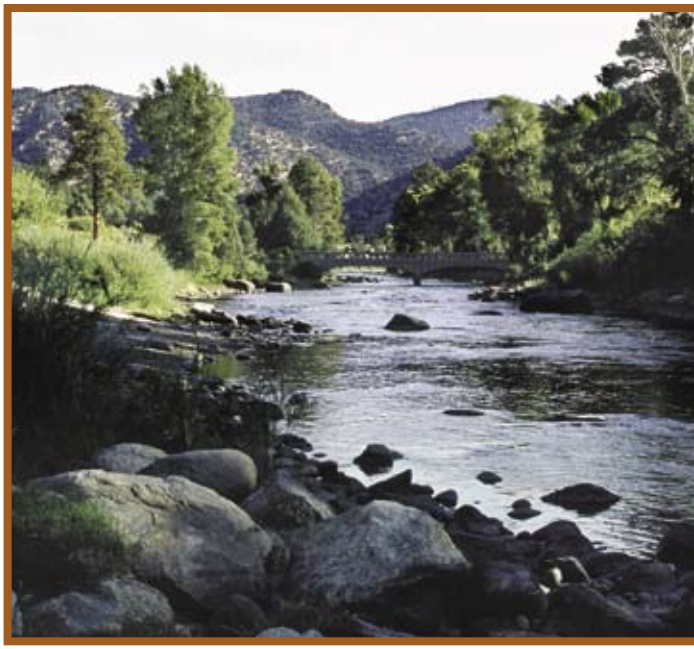
FOREWORD

WHY THIS WATER AND OIL SHALE ANALYSIS MATTERS

KARIN P. SHELDON
Executive Director
Western Resource Advocates

Since the early 1900s, the dream of tapping vast oil shale reserves has drawn energy companies to western Colorado. That dream has proven elusive, for while small quantities of oil have been released after heating shale, commercial production technology remains undeveloped. Past development attempts have failed because of a number of technical, economic, and environmental challenges that have yet to be overcome, despite the billions of dollars invested by both government and industry.

Some members of Congress and a few oil companies suggest the oil shale puzzle may soon be solved. Should this prove to be the case, western Colorado will witness, as Colorado Governor Bill Ritter cautions, "the largest industrial development in the State's history — with enormous implications for all of Northwest Colorado and for the State itself."[1] Oil shale development would bring significant change in western economies, communities, and ways of life. One of the most significant aspects of such change would be in the use of water.



Oil shale development would have tremendous impacts on current and future uses of water — Colorado's most precious natural resource. Water is the lifeblood of the West. It's the foundation of western economies and communities, the basis of political divisions, and often the cause of conflict. Battles over water often pit Front Range cities, such as Denver and Colorado Springs, against West Slope communities, such as Rifle and Grand Junction. Renewed efforts to develop a commercial oil shale industry could once again fan the flames that fuel such battles.

Initial analyses by the RAND Corporation and the U.S. Departments of Energy and the Interior conclude that significant amounts of water will be required to both extract oil from shale and power the extraction processes. Large quantities of water will also be needed to support major infrastructure development and the influx of new workers. It would be folly to discount the crucial link between oil shale development and water resources, ignoring the fact that the arid Rocky Mountain Region is defined by the scarcity of water. Westerners understand this link — and our leaders understand the vital importance of examining potential oil shale development within the context of increasing competition for dwindling water supplies.

It is undisputed that oil shale development will stress limited water resources. The question for elected officials and other community leaders are how, when, where, and to what extent. In a May 2008 letter to Congress, Hamlet J. "Chips" Barry III, manager of the Denver Water Board, stated that "development of oil shale in Colorado could significantly affect the [Front Range Water Users] Council's ability to serve existing customers and the future growth projected for the Front Range of Colorado."[2] That conclusion is significant. What is unclear, however, are the specific impacts on Colorado water and the timing of such impacts.

In order to more fully understand the conflict Barry identifies, Western Resources Advocates (WRA) engaged Larry MacDonnell to investigate the extent of water rights in Colorado held by oil companies, individuals, and water providers that could be used for oil shale development. Entitled "Water on the Rocks: Oil Shale Water Rights in Colorado," this report frames critically important issues vital to the future of Colorado and the West.

BACKGROUND AND KEY FINDINGS

In a 2008 environmental analysis covering oil shale development, the Department of the Interior's Bureau of Land Management (BLM) concluded that oil shale development would likely transform communities in western Colorado from agricultural-based to industrial economies. While noting the likelihood of this fundamental shift, the BLM largely ignored the potentially staggering ramifications.

For northwest Colorado, the fundamental change the BLM forecasts is troubling. Several analyses have already kicked off the public debate. Recently, the Associated Governments of Northwest Colorado teamed with the Colorado Department of Local Affairs to evaluate the socioeconomic impacts of energy development in a four-county region. Their report, which was issued in February 2008, projects a $1.3 billion shortfall in the monies local governments will need to support critical infrastructure upgrades required by oil and natural gas development and oil shale development.

Another study, commissioned by water providers in northwestern Colorado, estimates the growth in water demand needed to support increased extraction and production of energy in four sectors in northwest Colorado, including natural gas, coal, uranium, and oil shale.[3] That report concludes water demands for oil shale could be as much as 378,000 acre-feet per year, an amount that is approximately 25% more than the city of Denver uses annually.[4]

This report fills in another critical piece of the puzzle. It identifies water rights held by energy companies and water providers that could support oil shale development. The report:

- Projects water requirements associated with oil shale development.
- Identifies all major water rights currently owned by energy companies that could be used for oil shale development in Colorado, as well as conditional rights that could be exercised in the future.
- Analyzes legal and hydrological issues of the Colorado River Basin affecting future development of Colorado's allocation under the 1922 Colorado River Compact and subsequent 1948 Upper Basin Compact.
- Explains how the Upper Colorado River Endangered Fish Recovery Program affects and limits additional consumptive uses of water in the mainstem Colorado River.

To illustrate the scope and potential impacts of building new water reservoirs and pipelines, plus shifting existing agricultural rights to oil shale, Geneva Mixon, a Colorado-based cartographer, mapped these rights.

The report's key findings include the following:

1. Energy companies and water supply districts have established conditional water rights associated with more than 200 separate structures (e.g., reservoirs and pipelines) in the Colorado River and White River Basins that potentially could be developed to support oil shale production. Most of these conditional rights were established in the 1950s and 1960s.
2. Collectively, with these rights, energy companies have the right to divert annually more than 10,000 cubic feet per second (cfs) — or 7.24 million acre-feet (af) — of water and store more than 1.7 million af, enough storage to meet the annual needs of 8-10 million Colorado residents.
3. Energy companies have acquired rights in more than 100 existing irrigation ditches in the Colorado River and White River Basins. The flow associated with these rights total 650 cfs. Diverting scarce water for oil shale and other energy development would likely eliminate much of the existing irrigated agriculture in northwest Colorado.
4. The Upper Colorado River Endangered Fish Recovery Program and 1922 Colorado River Compact limit the amount of water Colorado has available for development. As the state edges closer to these limitations, large-scale oil shale and other development projects become mutually exclusive.
5. Large-scale oil shale development would affect existing uses established under more junior water rights, either by curtailment and/or through decreased water availability. Because of potential limits imposed by the 1922 Colorado River Compact, rights junior to 1922 but senior to the oil shale rights could become subject to a call if oil shale resulted in an over-development of Colorado's compact entitlement. A call would potentially limit other planned water development projects, which propose to rely on water from Colorado's West Slope. Those development projects include plans to transfer additional water to Colorado's Front Range cities.

WRA'S CONCLUSIONS FROM THIS REPORT AND OTHER ANALYSES

This report frames a vitally important issue — the nature and extent of water rights that could support oil shale development. By design, however, the report generally does not examine broader issues of the nexus of oil shale and water, and the potential impacts on local economies, the environment, and other water users. Nor does it address the critical issue of climate change and the potential impacts on water availability.

The report's findings are all the more significant when viewed in the larger socioeconomic context of oil shale development. By synthesizing this report and other analyses of potential energy development in Colorado, Utah, and Wyoming, WRA has reached the five conclusions described below on important questions facing the region.

Conclusion #1: ***Commercial oil shale development would transform western Colorado communities.***

> "Water is likely to be transferred from traditional agricultural uses to industrial uses, resulting in the loss of traditional irrigated agriculture. Changes may also result in an increase in dryland agriculture, and depending on scale it may also result in a transition from traditional agriculture based community to a more urbanized lifestyle."[5]
>
> *— Bureau of Land Management, 2008*

> "If commercialization progresses, the oil shale industry has the potential to expand very rapidly – very likely overwhelming the capacity of local governments to deal with growth requirements."[6]
>
> *– Associated Governments of Northwest Colorado, 2008*

First, as this "Water on the Rocks" report makes clear, water for oil shale will partially come at the expense of agricultural use. The vast majority of the agricultural water rights held by oil companies are in Rio Blanco County, an area of the state where the local economy depends heavily on existing agriculture. Many of these water rights, which date back to the late 1800s and early 1900s, are owned by oil companies and are now being leased back to ranches. So, for now, most of the water still remains in irrigation.

However, as this report cautions — and as the BLM notes through its environmental analyses — should commercial oil shale development take off, oil companies would transfer water currently used for agriculture to oil shale production. Thousands of acres historically irrigated would be taken out of agriculture, resulting in a dramatic transformation of land use and associated water uses in the region from an agricultural to an industrial landscape. As witnessed in the Arkansas Basin in Colorado, once a critical mass of farmers (or, in the case of the Piceance Basin, ranchers) sell their lands and associated water rights, it is hard for the agriculture community to sustain itself. The infrastructure that supported the local economy — suppliers, producers, and landowners — shifts to a new economy, and with it the impetus and ability to sustain an agriculture economy. Such changes signal a marked difference in the socioeconomic fabric of agricultural-based communities — the transformation the BLM forecasts.

Anticipated changes in populations necessary to support large-scale industrial development add to the changing uses of water. With rapid industrialization comes the ripple effect of increased populations and related infrastructure needs. The amount of water associated with changing demographics is significant. According to a recent report prepared for the Colorado, Yampa, and White River Basin Roundtables Energy Subcommittee, full-scale oil shale production (which the BLM estimates could occur from 2036-2050) will require an additional 21,100 af of water to accommodate municipal use resulting from the additional 100,000 workers and their families who will move to the area.[7]

Estimated Oil Shale Water Demands

Source of Water Demand	Annual Quantity (af)
Direct demand (1.55 million barrels per day)	112,675
Electric power	244,535
Increased population	21,100
Total	**378,310**

A second impact resulting from oil shale development that requires careful examination is the development of senior conditional water rights. While these rights have not yet been exercised, they have priority dates that are senior to many developed water rights on which Colorado's economy depends today. As MacDonnell discovered through his extensive research of the hundreds of conditional water rights held by energy companies, many of these rights date back to the 1950s. Once oil companies begin using these rights for oil shale development, other users whose rights are junior to oil shale rights could see use of their rights curtailed. This report provides some key examples of development scenarios that show the extent of such displacements.

One example is ski towns in western Colorado. Many of Colorado's premier destination resorts were developed in the 1950s and 1960s, the same period that oil companies were establishing initial water rights for oil shale. Once sleepy towns in the Colorado River Basin, these commu-

nities now sustain substantial year-round populations, recreation, and numerous second homes. As this report notes, much of the water used to serve these communities depends on rights that are junior to oil shale rights. These towns are a core component of a diversified economy that could, along with agriculture, be undermined by oil shale development. Impacts would not be limited to existing uses, as oil shale development would likewise threaten future municipal, recreational, and other development projects on Colorado's West Slope.

Conclusion #2: ***Oil shale development in western Colorado would affect Colorado's Front Range communities and must be thoroughly evaluated and understood.***

> "The prospects of oil shale proceeding to high-level development and the prospects of developing water for Front Range growth are mutually exclusive so there has to be a balancing act."[8]
>
> *— Colorado River Water Conservation District, 2008*

Front Range water providers, such as the Denver Water Board and the Northern Colorado Water Conservancy District, agree with the Colorado River Water Conservation District on one key conclusion — oil shale development will stress and/or compromise future water projects as well as existing projects that are subject to calls from senior in-basin rights and compact curtailment throughout Colorado.

Denver Water and other Front Range water providers divert several hundred thousand acre-feet of water annually out of the Colorado River Basin. Much of this water is senior to conditional water rights established for oil shale development and thus is less likely affected by such development. However, oil shale could trigger a compact call that could lead to curtailment of any post-1922 water uses. Because of increasing needs on Colorado's Front Range, plans are in place to boost water deliveries to Denver and other cities by enlarging existing transbasin diversions and developing new projects. For some of these new projects, water utilities would rely on a combination of both older, pre-oil shale rights and newer junior rights.

For instance, Denver Water's Williams Fork project holds a conditional water right for the Darling Creek Enlargement that is junior to a collection of conditional rights for oil shale. Similarly, the refill right for Williams Fork Reservoir is junior to oil shale conditional rights held by oil companies, as is the proposed Straight Creek Collection System for Roberts Tunnel. Under Colorado water law, senior rights must be fulfilled prior to junior rights. During dry years, junior rights may only be partially met, if at all.

Similarly, the Northern Colorado Water Conservancy District's Windy Gap Reservoir has a 1967 priority date. While this project currently only diverts small amounts of water from the Colorado River Basin, water providers have encountered difficulties in diverting water because their rights are relatively junior. Efforts are underway to "firm" the yield from this project by improving the delivery and reliability of the existing supply with an additional Front Range reservoir. However, substantial development of senior rights for oil shale development would make this task much harder to achieve.

To some outside of the West, these conflicts may appear minor in relation to the need to increase domestic oil production. To those of us in this arid region, how such conflicts are resolved bears directly on Colorado's economic prosperity, future growth, and environmental protection.

Conclusion #3: ***Oil shale will accelerate climate change and will further stress water availability.***

> "Production of unconventional fuels (oil shale, coal to liquids, heavy oil) produces more CO_2 than is produced when using conventional petroleum."[9]
>
> *— U. S. Department of Energy, 2007*

Photo courtesy of The Story Group

Climate change exacerbates and potentially eclipses all other foreseeable stresses on the environment in the region. In February 2007, the Intergovernmental Panel on Climate Change (IPCC) declared: "Warming of the climate system is unequivocal…" and "Most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG [greenhouse gas] concentrations."[10]

Oil shale development poses serious climate threats. Producing oil from shale will likely result in the generation of huge quantities of greenhouse gas emissions. Transportation fuels derived from oil shale will be highly energy-intensive and have a carbon footprint greater than both conventional fuels and cleaner fuel alternatives.

Throughout the western United States, climate change is projected to further reduce water availability. In general, these transformations will result from changes in temperature, precipitation, and evapotranspiration. The challenge facing allocation and use of western water is determining the impacts in future years on water availability as temperatures rise and supplies decrease. While the specific impacts are hard to predict, scientists of all disciplines are sounding the alarm. Here is what we do know:

1. <u>The West is getting hotter.</u>
   In a recent, comprehensive assessment, researchers found that 46 out of 49 global circulation model simulations project a more arid southwestern U.S. in future years, with droughts becoming the norm.[11] Climate models project Colorado's average temperature will warm 1.5 to 3.5°F by 2025, relative to the 1950-1999 baseline, and 2.5 to 5.5°F by 2050.[12]

2. <u>The West is getting drier.</u>
   In the arid and semi-arid West, global warming is already having serious consequences for the region's scarce water supplies. As with much of the West, Colorado has a snowfall-dependent water system, deriving 70% of its water supply from snowmelt. Recent hydrologic studies of the Upper Colorado River Basin project multi-model average decreases in runoff ranging from 6% to 20% by 2050 compared to the 20th century average.[13] Relative to the 1950-2000 baseline, evaporation is projected to exceed precipitation by 1.24 inches in the period 2021-2040.[14] This difference compares to that of the Dust Bowl years.[15]

3. Droughts will increase.
   As global warming continues, the IPCC predicts more intense and longer droughts, as characterized by the severe drought that began in the western United States in 1999 and continues today. Moreover, whereas past droughts have been caused by natural variability in ocean and atmospheric circulation (e.g., La Niña events), climatologists predict future drying will be caused by an overall warming. Normal climatic variability will further stimulate additional, increasingly severe, droughts.

4. Streamflows will change.
   Throughout the 20th century, much of the United States has experienced higher streamflow and precipitation, with a corresponding decrease in the duration and severity of drought. The notable exception is the West and Southwest. With drought comes a trend toward reduced mountain snowpack and earlier spring snowmelt runoff, both of which affect water availability and quantity.[16]

5. Ecosystems will be disrupted and wildlife will be affected.
   The IPCC also concluded that recent warming is already strongly affecting ecosystems and wildlife. Glaciers are melting and forests across the West have suffered as warming has extended the range of some damaging insects, such as the mountain pine beetle. Warming is also disrupting the natural timing of seasons and leading to loss of wildlife, including diminished fishing and hunting opportunities in the West.[17]

Importantly, federal officials project oil shale production would not reach full capacity before 2050, the same time that climatologists believe runoff in the Colorado River Basin will have dropped by 6-20% over 20th century levels. The convergence of events would further stress water availability, compounding the challenges and conflicts MacDonnell identifies, including constraints associated with the Upper Colorado River Endangered Fish Recovery Program and allocations under the 1922 Colorado River Compact.

Conclusion #4: ***Water needs must be quantified and supply sources identified before committing to commercial oil shale leasing.***

> "We need to be thoughtful about our approach, especially in light of the magnitude of such development. In fact, if the Department of the Interior were to authorize a commercial oil shale industry in Colorado, the development would constitute the largest industrial development in the State's history — with enormous implications for all of Northwest Colorado and for the State itself."[18]
>
> *— Colorado Governor Bill Ritter, Jr., 2008*

Future municipal development, power production, instream flows for federally endangered fish, and other types of energy development are expected to rely on water from the Colorado River. However, as a result of anticipated changes in climate, population, and changing land uses both within and outside the Colorado River Basin, the margin of uncertainty regarding water availability is troubling.

Estimates of water needed to directly support oil shale development also vary by 400%. According to the RAND Corporation, 1 to 3 barrels of water would be needed for construction, operation, and production for every barrel of oil produced via in-situ methods;[19] 2.6 to 4 barrels of water would be needed for every barrel of oil produced via retort.[20] When electricity demand is added, these estimates jump to 5 barrels of water for every barrel of oil produced. Water used for refining (called "upgrading") further increases the water demands. These margins are significant, especially when the BLM estimates peg potential oil shale development at 2 million barrels per day.

Bruce Lytle, a hydrologist who has evaluated water needs associated with oil shale development, underscores the significance of this margin of uncertainty. He points out that the BLM's analysis of water needed is deficient, noting the BLM's analysis:

- Does not adequately evaluate site-specific water supplies in river basins where oil development may occur.
- Fails to assess impacts from oil shale development in forcing the retirement of agricultural water rights and the dry-up of agricultural lands.
- Does not sufficiently address water rights issues related to hydraulic interconnection of aquifers, permanent changes to surface and groundwater systems, water quality, and mitigation of impacts related to either surface or groundwater supply development.

These conclusions present important warnings to policy makers, especially when coupled with the "Water on the Rocks" report's findings regarding (a) likely elimination of most of the existing irrigated agriculture in northwestern Colorado, (b) constraints associated with the Upper Colorado River Endangered Fish Recovery Program and obligations under the 1922 Colorado River Compact, and (c) impacts on junior water rights throughout Colorado.

These facts are the reason, we believe, why Denver Water and other water providers warned Congress that oil shale development could significantly affect their "ability to serve existing customers and the future growth projected for the Front Range of Colorado."[21]

As long as there is ample water to appropriate, there is little need or incentive for parties to collaborate. That was the case during the failed oil shale development program of the early 1980s, when water was a secondary concern. Since that time, Colorado has experienced a population explosion, which has increased competition for water and decreased water availability.

As Colorado begins to push up against Colorado River Compact allocations and endangered fish recovery goals and agreements, it is vital that stakeholders collaborate to address competing needs. Planning must be integrated to ensure development is consistent with other projects. As a first step in this process, companies seeking to develop oil shale must quantify their water needs and identify supply sources. Without such information, regional planning cannot be accomplished — and regional planning is increasingly necessary as supplies become further stressed.

Conclusion #5: ***Energy demands must be quantified and sources identified before committing to commercial oil shale leasing.***

> "In addition to the emissions associated with the operations themselves, extraction of oil from shale could consume immense quantities of electricity. This would necessitate the building of new power plants, which could further contribute air emissions."[22]
>
> *— Bureau of Land Management, 2008*

> "We do not know the amount of energy that will be needed to process shale oil, the sources or locations of necessary power plants, the impacts such energy production would have on regional air quality and visibility, or the greenhouse gas implications."[23]
>
> *— Colorado Governor Bill Ritter, Jr., 2008*

The BLM estimates that a 100,000-barrel-per-day (bpd) oil shale operation using in-situ conversion technology would likely require 1,200 megawatts (MW) of electricity. That amount of energy roughly equates to the amount needed to serve a city of 500,000. To produce one million barrels of shale oil per day would require 10 new power plants and 5 new coal mines.

In addition to the water required to extract the resource, water would also be needed to power the extraction process. Because oil shale technologies remain in their infancy, it is difficult to ascertain how much energy development would be required or the source of such energy.[24] Nevertheless, the Colorado River Water Conservation District estimates that the BLM's goal of full-scale oil shale development (2 million barrels per day) could require as much as 244,532,000 af of water to power oil shale development.[25] One of the critical policy issues Congress and federal officials must ask is whether the huge volumes of energy required to produce shale is an appropriate use of such power. A closely linked question is whether the associated water needs are an appropriate use of increasingly limited water supplies.

Water need projections for power generation are based on the BLM's assumptions that oil companies will use coal-fired power plants to power oil shale operations. In addition to the vast water requirements, these plants will be a major source of air pollution, which damages human health and the environment. They likewise will use dwindling water supplies and impact (and, in some cases, curtail) junior water users throughout the state.

Before diverting limited water supplies to support 20th century technologies, federal, state, and local leaders must engage in a robust public dialogue on broader energy policy — and must determine whether to promote old technologies or pursue new ones. WRA supports the latter and thus questions using limited water supplies to generate huge amounts of power for oil shale development.

WRA's final conclusion: Develop the information necessary to make informed decisions.

> "Currently, there is no oil shale industry and the oil shale extractive technology is still in its rudimentary stages; as such, commercial oil shale production does not exist anywhere in the world."[26]
>
> *— Bureau of Land Management, 2008*

> "The lack of a domestic oil shale industry makes it speculative to project the demand for oil shale leases, the technical capability to develop the resource, and the economics of producing shale oil."[27]
>
> *— Bureau of Land Management, 2008*

Oil shale development is fraught with uncertainty. While this report sheds light on the nexus between oil shale development and water, the unknowns are still paramount. The BLM acknowledges a 400% range of uncertainty for the amount of water needed to support oil shale development. Uncertainties regarding water availability and water requirements also include:

- Sequencing of development projects
- Rate of consumption
- Power generation needs
- Competition for shared resources
- Impacts of perfecting conditional water rights on junior users
- Impacts of climate change

Photo courtesy of The Story Group

This report makes clear that the link between oil shale and water is complex. Whether changes faced by communities will be incremental or seismic is difficult to predict. Nevertheless, while the specific impacts are difficult to quantify, the BLM's prediction that western Colorado will transition from an agricultural society to an industrial society is well-grounded.

Before we rush headlong into a commercial leasing program, it is wise to remember Spanish philosopher George Santayana's counsel: "Those who cannot remember the past are condemned to repeat it." In May 1982, as world oil prices plummeted, Exxon Oil pulled out of its oil shale Colony Project in Parachute, Colorado, leaving 2,000 people without work. The promise of energy independence turned bust overnight. Government subsidies were not enough to save this faltering industry as the technological obstacles and many costs proved too powerful a force.

Governmental officials at the local, state, and federal level continue to warn policy makers in Washington, D.C. that the knowledge base is simply not there to make informed decisions. Colorado cannot afford to again compromise its strong and diversified economy, but that's what certain lawmakers are asking us to do. By gambling on oil shale and failing, the state could once again be driven into an economic and social recession.

WRA opposes development of oil shale resources in the West unless and until industry and government demonstrate that proven technologies can develop oil shale without unacceptable environmental, climate, economic, or social costs. The industry has barely begun to address that challenge.

One of the significant differences in Colorado today, when compared to 1982, is water availability. In 1982, water was a secondary concern. Now, because of a number of factors — including significant increases in population, an energy boom, and development of the state's recreational economy — water resources and related environmental values are increasingly stressed. Water is central to oil shale development — but it is also critical to Colorado's economic, social, and environmental foundation.

As the Obama Administration takes its seat in Washington, D.C., it is time for elected officials and administration officials at the federal, state, and local level to comprehensively review the federal government's oil shale policy. Front and center must be a hard look at the water requirements and the opportunities and constraints posed by large-scale commercial leasing.

This is a time of great challenge and opportunity in the West. The Colorado Plateau and neighboring Rocky Mountain states are changing dramatically. The Interior West is still a place of spectacular landscapes that support vital ecosystems, important wildlife habitat, and large areas of undeveloped land. But it is also a region characterized by accelerating growth. While the environmental challenges facing the region are huge, the opportunities to address and resolve them are huge as well. The public is increasingly aware of the need for new energy policies and practices, for careful management and conservation of water, and for stewardship of irreplaceable public land resources. Oil shale development runs counter to these needs.

EXECUTIVE SUMMARY

Colorado's oil shale deposits are once again the focus of potential development, intensifying the need to quantify the potential impacts to already limited water supplies. Development would require the use of large quantities of water — perhaps as much as 3-4 barrels of water for each barrel of shale oil for direct use, plus additional water for indirect demands, such as electricity generation and an increased population. Given the magnitude of development the U.S. Department of the Interior's Bureau of Land Management (BLM) projects is one-day feasible, as much as 378,000 acre-feet of water could be required annually to support oil shale development, more than the Denver Metro area uses each year.

The possible development and use of substantial water for oil shale production raise important considerations for Colorado because of their potential to adversely affect some existing water uses and many expected future water uses. Companies with an interest in oil shale development own enormous portfolios of water rights. While there is great uncertainty with respect to the manner in which these rights will be developed and used, the consequences of such development are unquestionable.

Among the many likely changes in the use of Colorado water resulting from oil shale development are changes in existing irrigated agriculture, limitations on existing and planned water development for the Front Range and the West Slope, and likely limitations on other water development for new uses on the West Slope. While these general impacts are relatively easy to project, it is harder to identify the exact development scenarios and the resulting impacts on a given water right or a specific project.

This report helps frame these and other issues central to the many technical and policy questions posed by oil shale development. The report:

- Projects water requirements associated with oil shale development.
- Identifies all major water rights currently owned by energy companies that could be used for oil shale development in Colorado, as well as conditional rights that could be exercised in the future. Rights are grouped by basin, source, point of diversion, and diversion amount.
- Analyzes legal and hydrological issues of the Colorado River Basin that affect future development of Colorado's allocation under the 1922 Colorado River Compact and subsequent 1948 Upper Basin Compact.
- Explains how the Upper Colorado River Endangered Fish Recovery Program affects and limits additional consumptive uses of water in the mainstem Colorado River.

In order to meet the significant water demands associated with oil shale development, oil companies as well as water supply districts have secured hundreds o f water rights through western Colorado. They have established conditional water associated with more than 200 separate proposed structures, such as reservoirs and pipelines in the Colorado and White River Basins, which could potentially be developed in support of oil shale production. Many of these rights

were established in the 1950s and 1960s, and collectively would enable the direct diversion of more than 10,000 cubic feet per second (cfs) of water and the storage of more than 1.7 million acre-feet (af). In addition, energy companies have acquired full or partial ownership of more than 100 existing irrigation ditches with decreed rights to divert more than 650 cfs in the two basins in proximity to the shale deposits.

ExxonMobil owns the most rights: 49 conditional claims and ownership in 48 irrigation ditches. Most of its rights are located in the White River Basin. Shell holds 31 conditional rights in the two basins and has purchased ownership in 5 irrigation ditches. It is now in the process of securing rights on the Yampa River. Chevron holds 28 conditional rights and ownership in 24 irrigation ditches, all located in the Colorado River Basin. Its Unocal subsidiary owns absolute rights to another 48 wells and springs, as well as ownership in 13 ditches in this basin. OXY USA holds conditional rights for 22 proposed structures in the Colorado River Basin. Tosco holds 17 conditional rights and ownership in 14 ditches in the White River Basin. The Colorado River Water Conservation District holds conditional claims to store over 900,000 af of water at locations in the two basins that could serve oil shale development.

In addition to quantifying water rights, the report raises a number of important issues that could disrupt traditional uses of water in Colorado:

1. **Impacts on agriculture:** Energy companies own large portions of the water rights historically used to irrigate lands in the region. Many of these rights date back to the late 1800s and early 1900s. As pre-Colorado River Compact rights, these diversions would not be affected by a call placed against the Upper Basin states. Additionally, most of the associated water still remains in irrigation use as energy companies lease back the water to ranchers. Should oil shale development move beyond the research phase, many, if not all, of these rights would be changed in use, and the lands historically irrigated would be taken out of agriculture. The result would be a dramatic transformation of land and water uses in these areas.

2. **Impacts on junior users:** A second and less obvious outcome of oil shale development would be the displacement of some existing uses by new oil-shale-related uses with senior priorities. Conditional water rights for oil shale development date back to the 1950s. Should these rights be placed into use, they would be senior to all existing uses from the same source of water with subsequent priority dates, thereby affecting rights used both in western Colorado and in Colorado's Front Range. Development would also affect some existing uses established under more junior water rights and would potentially limit much other planned water development from sources on Colorado's West Slope — including plans to take additional water to the Front Range.

3. **Restrictions under the 1922 Colorado River Compact:** An important uncertainty facing future water development in western Colorado is the legal availability of water for development under the 1922 Colorado River Compact and associated laws and requirements. Water development could be constrained by obligations under the compact, as increased consumption would also increase the risk of "call" by the Lower Colorado Basin states against the Upper Basin.

4. **Impacts on endangered fish:** The ultimate extent of new water development is also subject to constraints associated with the Upper Colorado River Endangered Fish Recovery Program. At issue is the continued survival of four species of fish found only in this basin. The U.S. Fish and Wildlife Service has determined that additional depletions of the Colorado River Basin's water would jeopardize the continued existence of these species and any new water development —whether for oil shale or otherwise — must satisfy substantial program requirements intended to protect and recover them.

SECTION I

INTRODUCTION

The oil shale deposits located in Colorado's Piceance Basin are perhaps the richest in the world. An estimated one-half trillion barrels of oil are considered potentially recoverable.[28] Their existence has long been known, but despite periodic experimental attempts, their recovery has not yet been demonstrated to be economically feasible. Interest in oil shale has heightened once again as oil prices have reached record levels in recent years.

The Piceance Basin is located in northwest Colorado, as shown in *Figure 1*. The portion of greatest interest for oil shale development is bounded on the north by the White River, on the east by the Grand Hogback, on the south by the Roan Cliffs and the Colorado River, and on the west by Cathedral Bluffs and Douglas Creek. This area is situated primarily within Garfield and Rio Blanco counties. Most of the land in the north and east is federally owned, while lands in the south are largely private (see *Figure 2*). It is a rugged and lightly populated area, with irrigated agriculture in the creek bottoms and grazing on much of the uplands. Development of the area's substantial natural gas deposits has increased sharply in recent years. The area also contains important wildlife resources, including native and introduced trout, greater sage grouse, elk, and mule deer.

Oil shale development requires an extensive amount of water. According to the Bureau of Land Management, water would be used directly in mining and drilling operations, as well as for cooling equipment, controlling dust, cooling processed shale after retorting, wetting processed shale prior to disposal, fire control, revegetation, and on-site human uses.[29] In-situ operations would

Photo courtesy of The Story Group

Figure 1. *Location of the White and Colorado River Basins and the Piceance Basin Oil Shale Deposits*

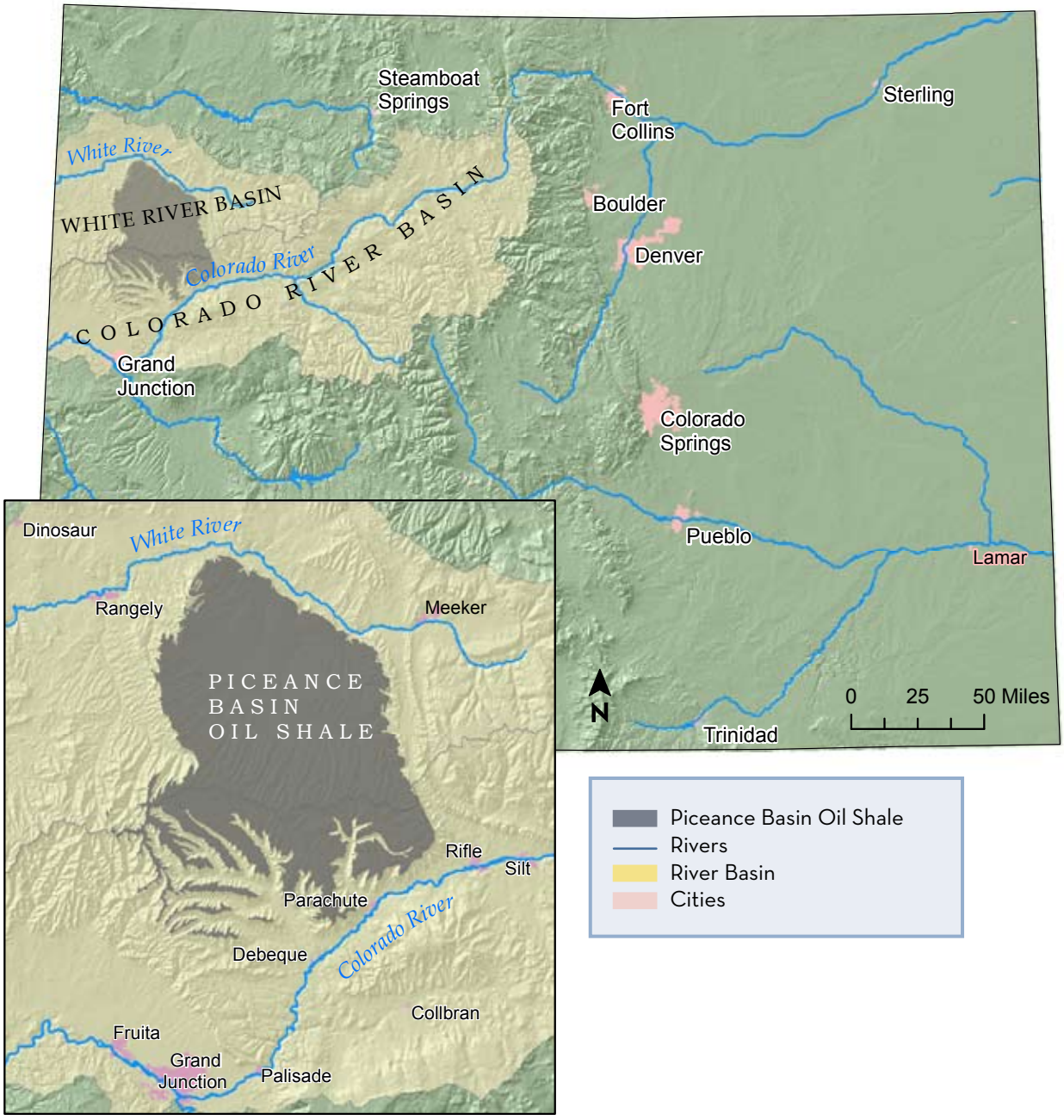
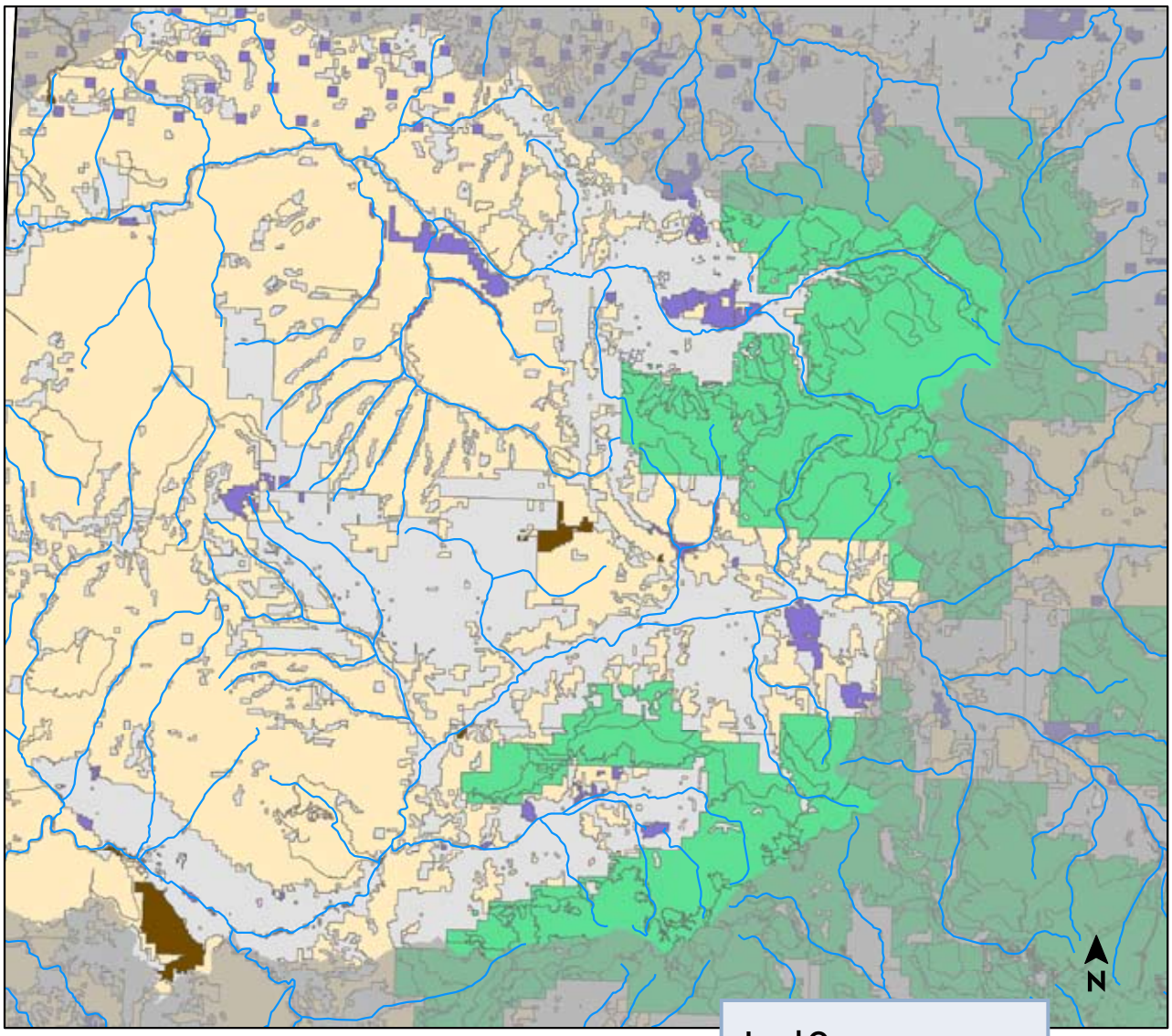


Figure 2. *Land Ownership in the White and Western Colorado River Basin*



Data Source: Theobald, D.M., G. Wilcox, S.E. Linn, N. Peterson, and M. Lineal. 2008. Colorado Ownership, Management, and Protection v7 database. Human Dimensions of Natural Resources and Natural Resource Ecology Lab, Colorado State University, Fort Collins, CO. 15 September. www.nrel.colostate.edu/projects/comap

use water for "hydrofracturing, steam generation, water flooding, quenching of kerogen products at producer holes, cooling of productive zones in the subsurface, cooling of equipment, and rinsing of oil shale after the extraction cycle."[30] Water would also be needed for indirect demands, including power generation and municipal needs resulting from the increased local population.

In anticipation of commercial-scale oil shale development, potential oil shale developers and local water districts filed for conditional water rights to secure the rights to develop significant quantities of water. Many of these rights date back to the 1950s. They also purchased existing agricultural water rights. This report provides a detailed examination of the extent and nature of these rights.

The report begins with a look at the anticipated water demands associated with oil shale development. It then summarizes water rights — both conditional rights and acquired irrigation rights — that could be used to support oil shale development. A more detailed look at these rights is provided next according to their ownership. Finally, the report considers some implications for other water users and water uses should these water rights be exercised for oil shale production.

WATER FOR OIL SHALE DEVELOPMENT

Water has long been identified as a critical component of oil shale development. A 2006 report produced by Argonne National Laboratory compared previous estimates of water requirements, focusing only on direct requirements and not assuming local refining of the oil.[31] These estimates are reproduced in *Table 1.*

Table 1.
Estimates of Water Requirements for Development of Oil Shale

Source	Oil Production (bpd)	Water Required (af/year)	Water Requirement Scaled to 100,000-bpd Oil Production (af/year)
Prien (1954)	1,000,000	227,000 diverted82,500 consumed	22,700 diverted 8,250 consumed
Cameron and Jones (1959)	1,250,000	252,000 diverted 159,000 consumed	20,000 diverted 8,250 consumed
Ely (1968)	2,000,000	500,000	25,000
U.S. Department of the Interior (1968)	1,000,000	145,000 diverted 61,000-96,000 consumed	14,500 diverted 6,100-9,600 consumed
U.S. Department of the Interior (1973a)	50,000 underground mine	8,700	17,400
	100,000 surface mine	16,800	16,800
	50,000 in-situ methods	4,400	8,800
	400,000 technology mix	65,000	16,300
	1,000,000 technology mix	155,000	15,500
McDonald (1980)	1,500,000	200,000	13,300
RAND (2005)	No specific value given; assume 3 barrels of water per 1 barrel of oil		14,125

Source: J.A. Veil and M.G. Puder, Potential Ground Water and Surface Water Impacts from Oil Shale and Tar Sands Energy-Production Operations, Argonne National Laboratory.

Clearly, the estimates vary somewhat. The early studies did not consider an in-situ production process. Some studies only consider amounts of water diverted, not consumed. In general, though, the assumptions respecting quantities of water required for mining and retorting are in the same range.

The most recent government estimates are contained in the September 2008 *Final Oil Shale and Tar Sands Programmatic Environmental Impact Statement (PEIS).* The U.S. Department of the Interior's Bureau of Land Management (BLM) assumes 1 to 3 barrels of water would be needed for every barrel of oil produced using an in-situ method and 2.6 to 4 barrels of water would be needed for every barrel of oil produced using the mining and surface retort

method.[32] Based on these water-to-oil ratios, the BLM estimates annual water consumption for a 200,000-bpd in-situ project would be 18,600 to 34,600 af per year. For production of 50,000 bpd using underground mining with surface retort, the BLM estimates water consumption of 4,900 to 7,400 af per year. Scaling this production up to 200,000 bpd, water consumption would be 19,600 to 29,600 af per year — somewhat less than would be required for the same production level using in-situ methods.

In a study recently prepared for the Colorado and Yampa/White River Roundtable Committees by URS, Inc., *Energy Development Water Needs Assessment*, analysts determined the annual water demand (not consumption) for a 50,000-bpd mine and retort to be 6,920 af annually, while a 50,000-bpd in-situ facility would require 3,576 af annually (not including water for electric power).[33] Assuming a long-term production mix of 1.5 million bpd from in-situ methods and 50,000 bpd using a surface retort, the report estimates direct water demands of 112,675 af per year. The report then goes on to estimate indirect water demands. Assuming a population increase of about 94,000 associated with production of 1.55 million bpd, the report estimates human water demands of 21,100 af annually.[34] The largest single demand for water would come from the electric power production needed primarily in support of in-situ processing, an estimated 242,535 af of water annually.

Table 2.
Summary of Estimated Oil Shale Water Demands

Source of Water Demand	Annual Quantity (af)
Direct demand (1.55 million bpd)	112,675
Electric power	244,535
Increased population	21,100
Total	**378,310**

Source: URS, Inc., Energy Development Water Needs Assessment

Thus, an oil shale industry in Colorado that produces 1.5 million bpd by in-situ means and another 50,000 bpd using the mine/retort method would require 378,310 af of water annually for direct and indirect uses.[35] Using a factor of 0.76 to convert demand for process water into consumption and 0.35 to convert other uses,[36] total annual consumption of water in support of oil shale development would be 280,439 af.

CONDITIONAL WATER RIGHTS

Under Colorado law, an appropriation of water is established at the time the appropriator's intent to divert and use water is made clear through overt actions that place others on notice of the intent. The date the intent is manifested is the appropriation date. The right is regarded as conditional, however, until water is physically controlled and placed to beneficial use. Holders of conditional water rights must file an application with the water court to obtain a decree determining that a conditional right has been established and fixing its priority date. Holders are obligated to pursue development of the appropriation with reasonable diligence and must demonstrate that diligence to the water court every six years until water is actually placed to beneficial use.

Every appropriation is given a name for the structure proposed to be built to control and divert water. The location of the structure is identified, including the source from which water will be diverted. For appropriations intended to directly divert water, a maximum rate of flow described in cubic feet per second is identified. For appropriations to store water, the expected capacity of the facility is stated as a volume of water, described in acre-feet (an acre-foot of water is approximately 326,000 gallons of water). The intended general purpose (or purposes) of use (e.g., municipal or industrial) also is identified.

SECTION III

WATER RIGHTS FOR OIL SHALE

Oil shale production and its associated requirements would represent a major new demand for water in Colorado. While some of this water would probably come from retirement of existing uses, most would come from new projects that would capture flows of water in the two primary rivers of the regions, the Colorado River and the White River, and move them to the places of use. This section summarizes the water rights that have been established in anticipation of serving oil shale production and the existing rights that have been purchased.[37]

As described below, oil companies have acquired agricultural rights and taken initial steps to secure other water rights (conditional rights). In order to reach large-scale commercial production of oil shale, companies would need to use both rights.

A. CONDITIONAL WATER RIGHTS

Companies interested in oil shale development have established conditional water rights (see sidebar) associated with more than 200 proposed structures, such as a diversion or storage dam in the Colorado River and White River Basins, dating back more than 50 years.[38] *Figures 3* and *4* provide an overview of the general location of these conditional rights. A chronological description of their development is provided in *Appendix A*. Tables listing these rights for each basin according to their priority can be found in *Appendix B*.

Companies first established conditional claims in the Colorado River Basin, as early attention focused on oil shale deposits in the Parachute Creek area. Several of the largest early conditional rights envision pumping water through pipelines from the Colorado River for use in the Parachute Creek and Roan Creek watersheds. Subsequent conditional rights added proposed storage reservoirs.

As more information about the quality of deposits in the Piceance Basin to the north became available in the 1950s and 1960s, individuals and companies began to establish conditional appropriations in the White River Basin. The richest oil shale deposits in the Piceance are located on the high plateau that separates the mainstem Colorado River and White River Basins. Unlike

in the Colorado River, there are multiple reservoirs proposed for construction on the North and South Forks as well as on the mainstem White River. Pipelines and pumps are proposed to lift the water from the White River into the Piceance watershed. *Figures 5* and *6* display the location of conditional water rights in this basin.

There are approximately 105 separate proposed structures with associated conditional water rights that could be used for oil shale development in the Colorado River Basin. These rights are for a mixture of both direct diversion and storage rights. In addition, there are 114 proposed structures with conditional rights in the White River Basin. These conditional structures include proposed reservoirs, pipelines (most with pumps), ditches, wells, and springs. These rights would enable a total direct diversion of approximately 5,000 cfs in the Colorado River Basin and nearly 5,700 cfs in the White River Basin. They would provide for total storage of approximately 735,000 af of water in the Colorado River Basin and over 1 million af in the White River Basin.

This information is summarized in the following tables and detailed in *Appendix B*.

Table 3.
Summary of Conditionally Decreed Structures – Colorado River Basin

Proposed Structures by Type	Total Conditionally Decreed Quantities of Water
Reservoirs: 27	736,770.6 af
Pumps and pipelines: 23	1,515.6 cfs
Ditches: 6	3,472.3 cfs
Wells: 5	1.36 cfs
Springs: 44	6.76 cfs
Total structures: 105	**Total quantities: 4,996.02 cfs 736,770.6 af**

Table 4.
Summary of Conditionally Decreed Structures – White River Basin

Proposed Structures by Type	Total Conditionally Decreed Quantities of Water
Reservoirs: 34	1,186,625.8 af
Pumps and pipelines: 33	4,274 cfs
Ditches: 24	1,363 cfs
Wells: 12	54.02 cfs
Springs: 11	2.45 cfs
Total structures: 114	**Total quantities: 5693.47 cfs 1,186,625.8 af**

B. AGRICULTURAL WATER RIGHTS

In addition to establishing conditional water rights, energy companies have been actively purchasing existing agricultural ditch rights in both basins. *Figure 7* shows the location of these ditches in the Colorado River Basin, and *Figure 8* shows their location in the White River Basin. *Appendix C* contains tables listing these rights. Acquisition of ditches provides control of water with senior priorities, especially important on the flow-limited tributaries in which they are located. In many cases, ownership of the ditches is shared by two or more energy companies. For the most part, the water associated with these ditches remains in irrigation use. Shifting the use to energy production or other purposes requires petitioning the Colorado water court

to change the use of the water. Among other requirements, the water right holder must demonstrate that a different use will not injure other existing rights.

As shown in *Table 5*, 57 irrigation ditches in the Colorado River Basin are now owned in whole or in part by energy companies, with decreed absolute rights to divert approximately 470 cfs of water. According to state records, average diversions under these rights are approximately 50,000 af of water per year.

Another 57 ditches in the White River Basin are now owned by energy companies. In many cases, companies have acquired only partial ownership of a ditch (less than 100% of total ditch shares). Sometimes several energy companies share in the ownership of the same ditch. The decreed absolute diversion rates associated with these ditches total approximately 200 cfs. The total annual volume of water diverted under these rights, on average, is approximately 19,000 af.

Table 5.
Summary of Irrigation Ditches Owned by Energy Companies

No. of Ditches	Decreed Diversion Rate	Average Volume Diverted Annually
Colorado: 57	468.55 cfs	50,293 af
White: 57	207.94 cfs	19,193 af

In sum, conditional water rights that could potentially be developed to provide water for oil shale development include storage rights to nearly 2,000,000 af of water and rights to divert more than 10,000 cfs of water in the two basins.[39] In addition, more than 100 irrigation ditches in the area of potential oil shale development now are owned by energy companies. Collectively, these ditches hold absolute rights to divert approximately 675 cfs of water.

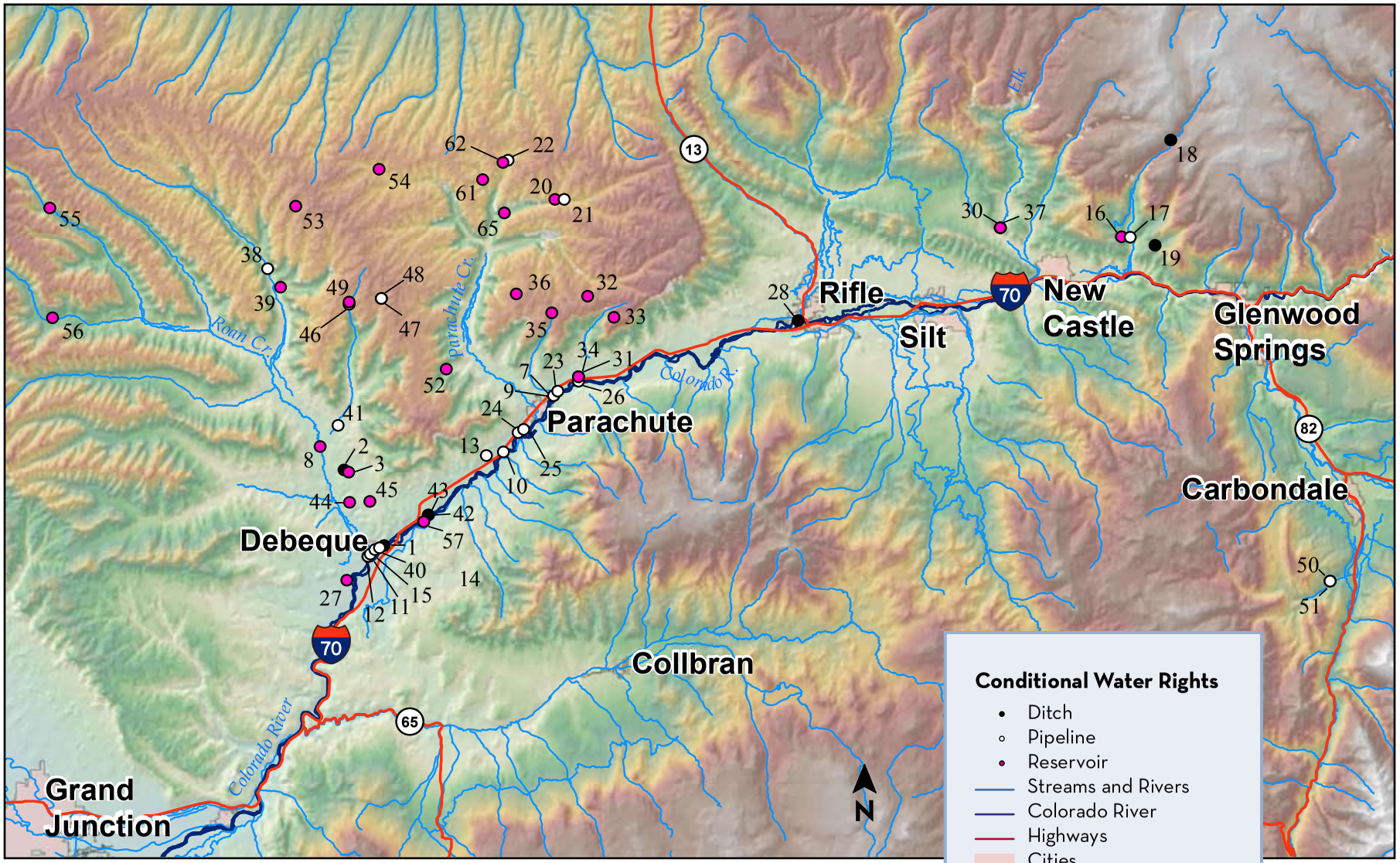
A NOTE ON OIL SHALE PRODUCTION TECHNOLOGIES

Oil shale can be mined using one of two methods: underground mining, using the room-and-pillar method, or surface mining. After mining, the oil shale is transported to a facility for retorting, a heating process that separates the oil fractions of oil shale from the mineral fraction. (The vessel in which retorting takes place is known as a retort.) After retorting, the oil must be upgraded by further processing before it can be sent to a refinery, and the spent shale must be disposed of.

Shell Oil is currently developing an in-situ conversion process (ICP). The process involves heating underground oil shale, using electric heaters placed in deep vertical holes drilled through a section of oil shale. The volume of oil shale is heated over a period of two to three years, until it reaches 650-700°F, at which point oil is released from the shale. The released product is gathered in collection wells positioned within the heated zone.

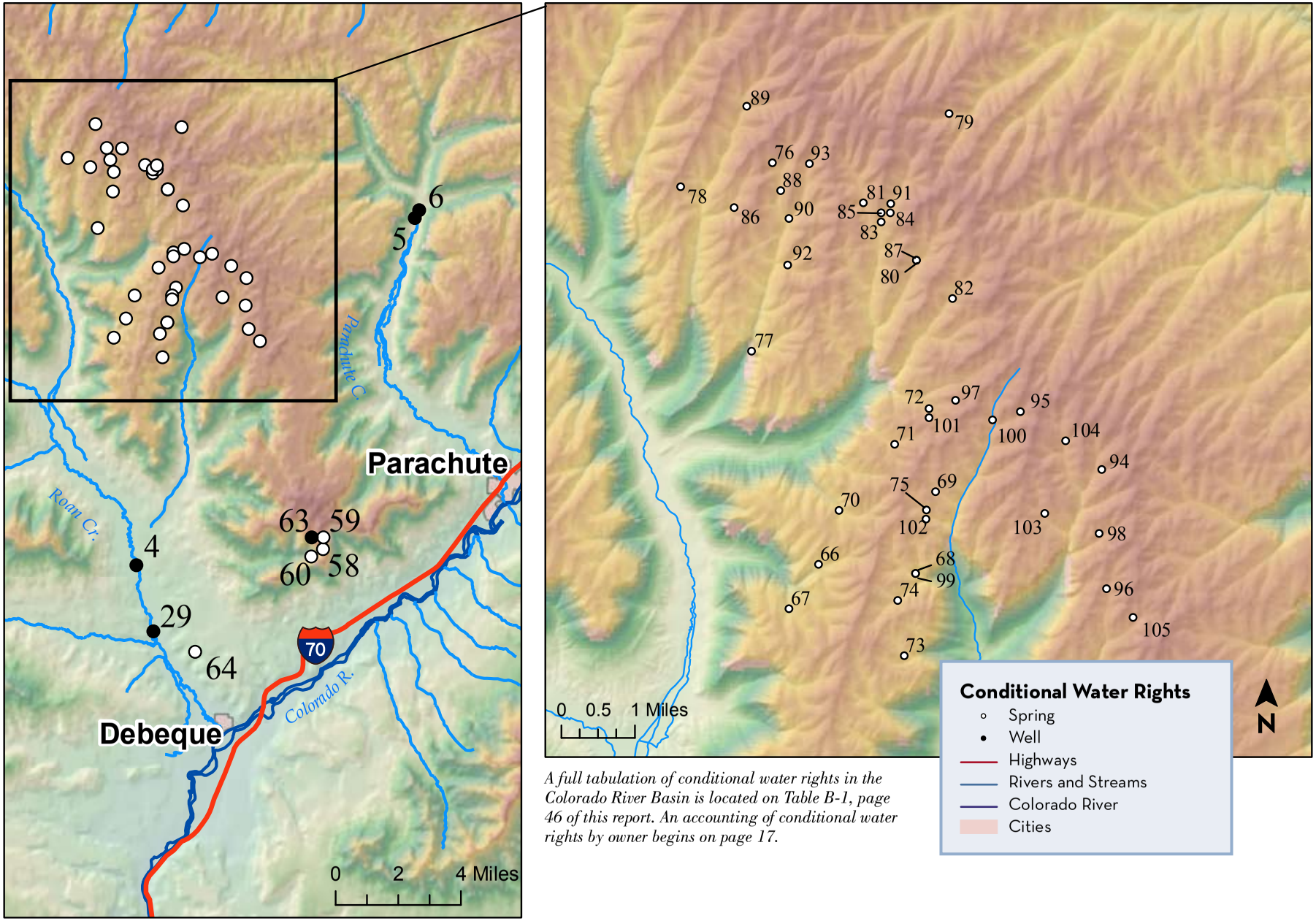
Source: Oil Shale & Tar Sands Programmatic EIS Information Center Web site, available at http://ostseis.anl.gov/guide/oilshale/index.cfm.

Figure 3. *Conditional Water Rights (Ditches, Pipelines, Reservoirs) for Oil Shale Development in the Colorado River Basin*



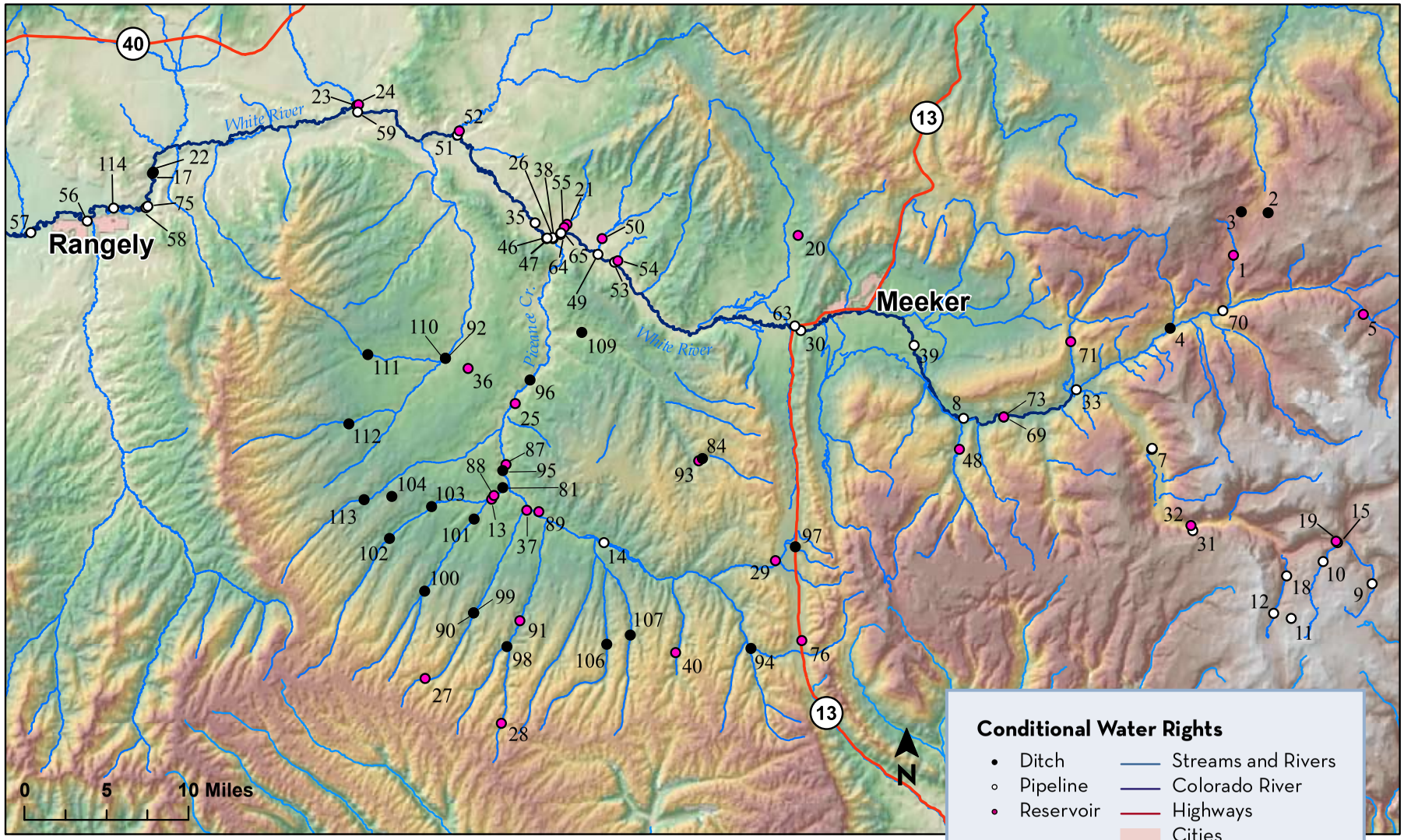
A full tabulation of conditional water rights in the Colorado River Basin is located on Table B-1, page 46 of this report.
An accounting of conditional water rights by owner begins on page 17.

Figure 4. *Conditional Water Rights (Springs and Wells) for Oil Shale Development in the Colorado River Basin*



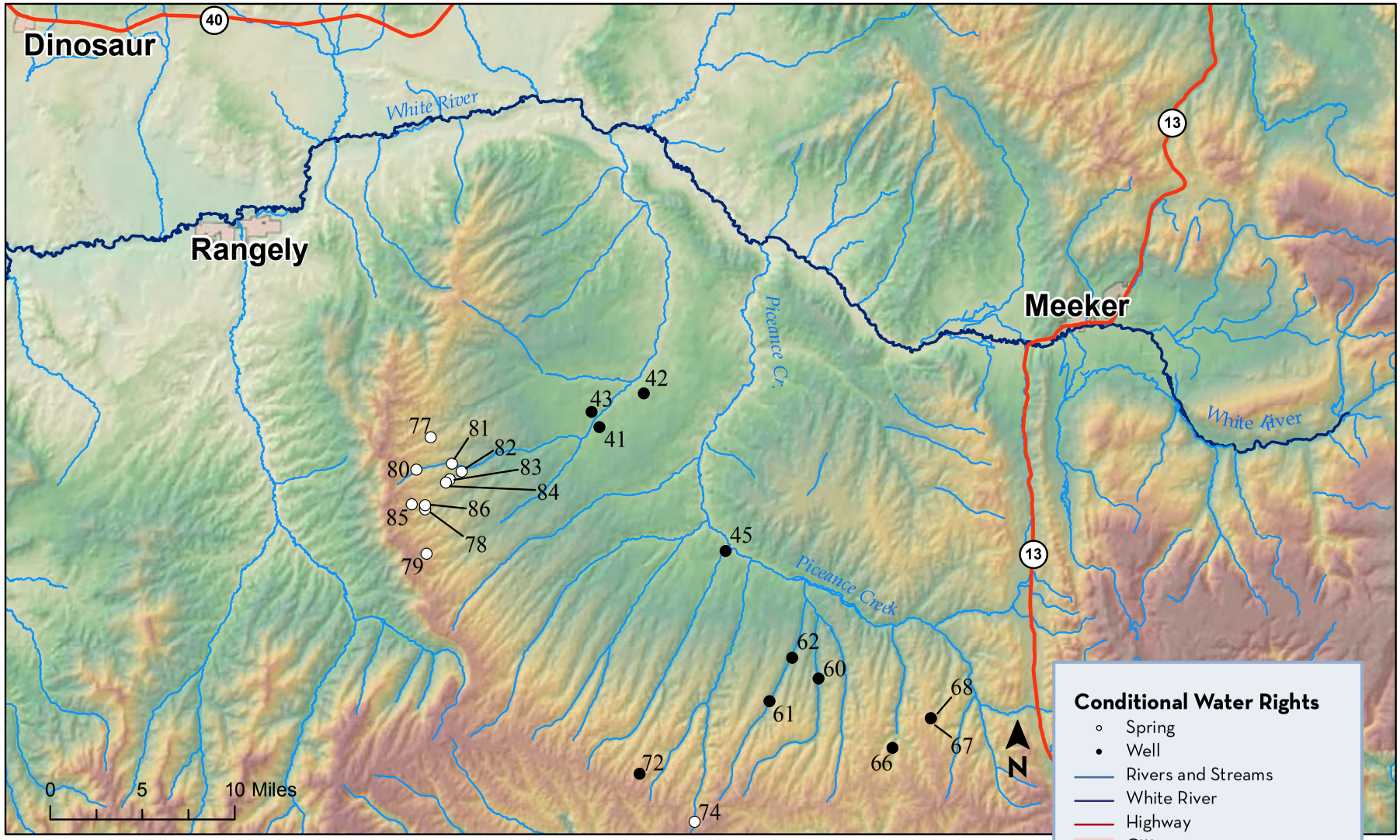
A full tabulation of conditional water rights in the Colorado River Basin is located on Table B-1, page 46 of this report. An accounting of conditional water rights by owner begins on page 17.

Figure 5. *Conditional Water Rights (Ditches, Pipelines, and Reservoirs) for Oil Shale Development in the White River Basin*



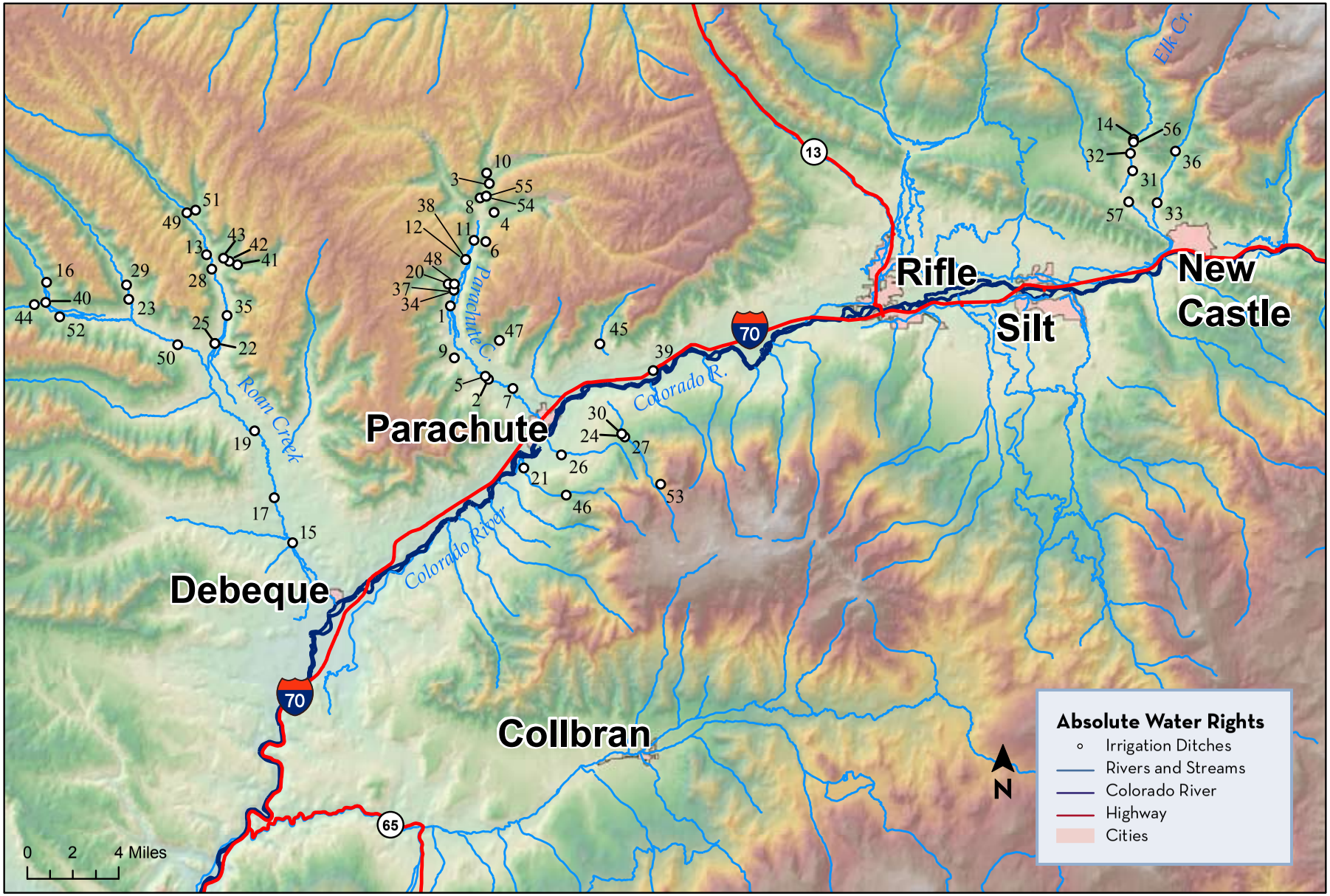
A full tabulation of conditional water rights in the White River Basin is located on Table B-2, page 50 of this report.
An accounting of conditional water rights by owner begins on page 26.

Figure 6. *Conditional Water Rights (Springs and Wells) for Oil Shale Development in the White River Basin*



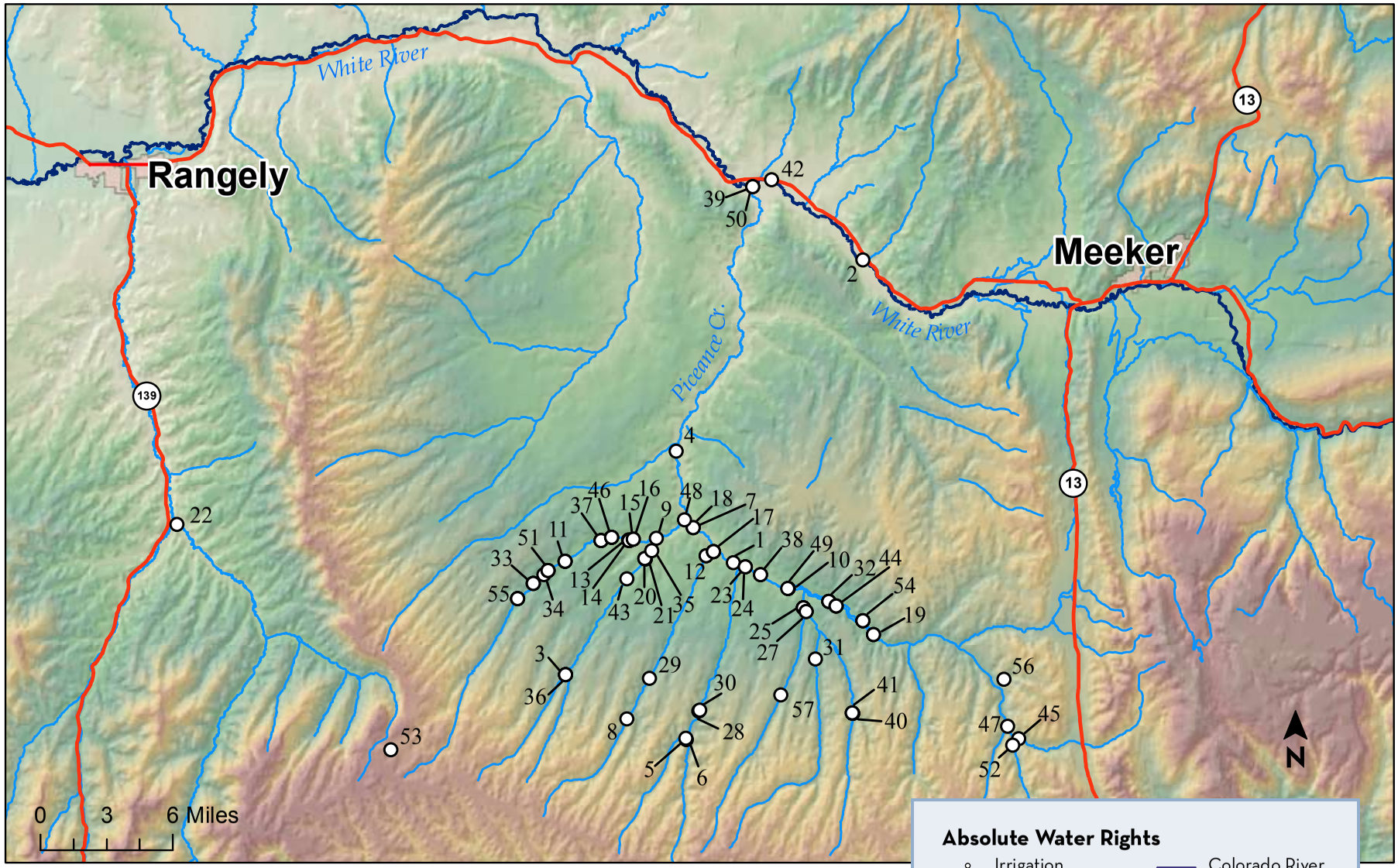
A full tabulation of conditional water rights in the White River Basin is located on Table B-2, page 50 of this report.
An accounting of conditional water rights by owner begins on page 26.

Figure 7. *Absolute Water Rights (Irrigation Ditches) for Oil Shale Development in the Colorado River Basin*



A full tabulation of absolute ditch water rights in the Colorado River Basin is located on Table C-1, page 55 of this report.
An accounting of absolute water rights by owner begins on page 18.

Figure 8. *Absolute Water Rights (Irrigation Ditches) for Oil Shale Development in the White River Basin*



A full tabulation of absolute ditch water rights in the White River Basin is located on Table C-2, page 57 of this report. An accounting of absolute water rights by owner begins on page 29.

SECTION IV

A CLOSER LOOK AT WATER RIGHTS FOR OIL SHALE

This section explores the portfolio of conditional and absolute rights owned by entities either historically or currently involved in oil shale development or by water suppliers that could provide water for oil shale development. The water rights are summarized in separate tables for conditional rights and, if applicable, for absolute rights. Locations of the proposed or existing structures are shown on maps for each basin. The discussion is organized by river basin.

For a complete list of all owners of conditional rights in both river basins, see *Appendix B*; for a complete list of all owners of absolute rights in both river basins, see *Appendixes C* and *D*.

A. COLORADO RIVER BASIN

1. Chevron Texaco

Chevron Texaco holds the rights to develop 28 conditionally decreed structures in the Colorado River Basin. These rights include 6 proposed reservoirs with a total storage capacity of over 100,000 af. Most of this storage would be located in the Roan Creek watershed. The rights also include 3 proposed pipelines with the decreed conditional right to pump approximately 300 cfs from the Colorado River.

Table 6.
Chevron Texaco – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
4	Galyean Well	Well	Roan Creek	0.5	0	5/15/1948
8	Roan Creek Reservoir	Reservoir	Roan Creek	0	71,300	1/7/1950
9	Dragert Pump Plant & Pl	Pump	Colorado River	194	0	1/7/1950
11	Getty Pipeline	Pump	Colorado River	56	0	9/3/1950
14	Pacific Oil Co Pl No 1	Pump	Colorado River	57.25	0	6/9/1953
27	Virginia Mesa Reservoir	Reservoir	Colorado River	0	50.52	7/18/1957
44	Getty Reservoir No 2	Reservoir	Roan Creek	0	2,0670.2	5/17/1965
45	Getty Reservoir No 1	Reservoir	Roan Creek	0	2,543.9	5/17/1965
53	Getty-Sleepy Gulch Res	Reservoir	Clear Creek	0	6,538	6/27/1967
54	Getty W Fk Parachute Cr	Reservoir	Parachute Creek	0	4,658	6/27/1967
76	Getty Spring 15b	Spring	Clear Creek	0.027	0	7/1/1983
77	Getty Spring 17a	Spring	Clear Creek	0.007	0	7/1/1983
78	Getty Spring 20a	Spring	Clear Creek	0.037	0	7/1/1983
79	Getty Spring 1b	Spring	Parachute Creek	0.097	0	7/1/1983
80	Getty Spring 10a	Spring	Clear Creek	0.787	0	7/1/1983
81	Getty Spring 12c	Spring	Clear Creek	0.027	0	7/1/1983
82	Getty Spring 09a	Spring	Clear Creek	0.327	0	7/1/1983
83	Getty Spring 11e	Spring	Clear Creek	0.007	0	7/1/1983
84	Getty Spring 11b	Spring	Clear Creek	0.027	0	7/1/1983
85	Getty Spring 11c	Spring	Clear Creek	0.027	0	7/1/1983
86	Getty Spring 19a	Spring	Clear Creek	0.007	0	7/1/1983
87	Getty Spring 10b	Spring	Clear Creek	0.017	0	7/1/1983
88	Getty Spring 15a	Spring	Clear Creek	0.047	0	7/1/1983
89	Getty Spring 18a	Spring	Clear Creek	0.637	0	7/1/1983
90	Getty Spring 14e	Spring	Clear Creek	0.027	0	7/1/1983
91	Getty Spring 11a	Spring	Clear Creek	0.187	0	7/1/1983
92	Getty Spring 16b	Spring	Clear Creek	0.057	0	7/1/1983
93	Getty Spring 14a	Spring	Clear Creek	0.127	0	7/1/1983
	Total structures: 28			**Total: 310.23 cfs**	**Total: 105,760.62 af**	

Chevron Texaco also owns 24 irrigation ditches, with the decreed right to divert approximately 265 cfs. These ditches are located both in the Parachute Creek and Roan Creek watersheds. The following table lists these rights.

Table 7.
Chevron Texaco – Absolute Water Rights – Colorado River Basin

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date
11	Granlee Ditch	Parachute Creek	12.69	1,690	5/17/1883
12	Benson and: Barnett Ditch	Parachute Creek	8.51	1,187	5/17/1883
13	Newton Ditch	Clear Creek	3.1	1,143	7/1/1883
15	Reservoir Ditch	Roan Creek	37.4	5,459	2/28/1884
16	Upper Roan Creek Ditch	Carr Creek	14.25	1,155	8/10/1884
17	Roan Creek No 3 Ditch	Roan Creek	7.4	1,762	10/13/1884
19	Creek and: Newman Ditch	Roan Creek	33	3,318	11/15/1884
20	Garden Gulch Ditch	Parachute Creek	5.25	314	4/15/1885
22	Himebaugh Ditch	Clear Creek	6.93	840	5/15/1885
23	Cannon Ditch	Brush Creek	11.65	1,387	6/3/1885
25	Clear Creek Ditch	Clear Creek	50.43	3,439	4/9/1886
28	Carr and: Himebaugh Ditch	Clear Creek	8.9	705	4/22/1887
29	Cannon Highline Ditch	Brush Creek	4.34	455	5/10/1887
34	Purdy Ditch	Parachute Creek	6.15	814	4/5/1890
35	Gibler Ditch	Clear Creek	4.52	404	10/1/1890
37	Jangle Ditch	Parachute Creek	12.97	1,521	11/12/1891
38	Benson and: Barnett Ditch	Parachute Creek	8.51	1,187	11/12/1891
40	Flume Ditch	Carr Creek	4.35	455	4/1/1895
44	Carlisle Ditch	Roan Creek	4.35	183	4/1/1900
48	Garden Gulch No 2 Ditch	Parachute Creek	1.33	175	5/1/1903
49	H A Newton Ditch	Clear Creek	2.86	97	5/15/1907
50	New Hobo Ditch	Roan Creek	11.56	566	6/6/1908
51	Parkes Ditch	Clear Creek	3.7	169	5/5/1908
52	Longseth No 1 Ditch	Roan Creek	1.67	143	5/3/1910
	Total structures: 24		**Total: 265.82 cfs**	**Total: 28,568 af**	

2. Colorado River Water Conservation District

The Colorado River Water Conservation District (CRWCD) is a special governmental district established under Colorado law to protect and develop water resources of the Colorado River Basin on Colorado's West Slope. It owns conditional water rights for 9 structures that could potentially be developed to provide water for uses that include oil shale development as well as to meet other water demands in the region. Included are 3 conditional reservoirs with the decreed capacity to store slightly less than 500,000 af. These rights are listed below.

Table 8.
CRWCD – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
1	Kobe Canal	Ditch	Colorado River	48.3	0	6/30/1936
2	Mt Logan Canal	Ditch	Roan Creek	75	0	6/30/1936
3	Mt Logan Dam & Reservoir	Reservoir	Roan Creek	0	10,000	6/30/1936
16	Flattops Proj Bearwl Res	Reservoir	Canyon Creek	0	96,488.9	6/28/1954
17	Flattops Proj Bearwl Con	Pipeline	Canyon Creek	200	0	6/28/1954
18	Flattops Proj Bench Flum	Ditch	Canyon Creek	254	0	6/28/1954
19	Flattops Proj Poss Coll1	Ditch	Canyon Creek	175	0	6/28/1954
28	Bluestone Project	Ditch	Colorado River	220	0	3/27/1958
42	Una Reservoir	Reservoir	Colorado River	0	369,460	3/16/1965 (includes refill right with a 1981 priority)
	Total structures: 9			**Total: 972.3 cfs**	**Total: 475,948.9 af**	

3. Exxon Mobil Corporation

Exxon Mobil Corporation (ExxonMobil) owns conditional water rights to develop 16 structures in the Colorado River Basin (see *Table 9*). Its rights are concentrated in the Parachute Creek watershed and the adjacent Colorado River. It also owns rights that would enable development on Main Elk Creek, an upstream tributary to the Colorado River. Collectively, these conditional rights would enable diversion of over 300 cfs and storage of approximately 45,000 af.

In addition, ExxonMobil has acquired ownership of 17 irrigation ditches in the Colorado River Basin, including several in Main Elk Creek. In total, these ditches are decreed to divert approximately 73 cfs. This information is displayed in *Table 10*. Exxon also holds contracts for 6,000 af of water stored in Ruedi Reservoir.

Table 9.
ExxonMobil – Conditional Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
10	Hayward & Wyatt Pl	Pipeline	Colorado River	12.725	0	2/2/1950
20	East Middle Fork Res	Reservoir	Parachute Creek	0	130.558	9/17/1954
21	Dow E Middle Fork Pl	Pipeline	Parachute Creek	13.54	0	10/19/1954
22	Dow Middle Fk Pipeline	Pipeline	Parachute Creek	1.088	0	10/20/1954
23	Dow Pump Plant And Pl	Pump	Colorado River	187.11	0	1/24/1955
30	Main Elk Wheeler G Pl	Pipeline	Main Elk Creek	40	0	6/19/1963
31	Mahaffey Pump P & Pl	Pump	Colorado River	60	0	6/19/1963
32	Sheep Trail H Term Res	Reservoir	Parachute Creek	0	160	6/19/1963
33	Cottonwood G Term Res	Reservoir	Cottonwood G.	0	160	6/19/1963
34	Mahaffey Terminal Res	Reservoir	Colorado River	0	160	6/19/1963
35	Allenwater Cr Term Res	Reservoir	Colorado River	0	160	6/19/1963
36	Rulison Gulch Term Res	Reservoir	Parachute Creek	0	160	6/19/1963
37	Main Elk Reservoir	Reservoir	Main Elk Creek	0	34,922	6/19/1963
61	Davis Gulch Reservoir	Reservoir	Parachute Creek	0	1,194	9/30/1974
62	Middle Fork Reservoir	Reservoir	Parachute Creek	0	1,470.002	9/30/1974
65	Lower E Middle Fork Res	Reservoir	Parachute Creek	0	6,200	2/2/1982
	Total structures: 16			**Total: 314.46 cfs**	**Total: 44,716.56 af**	

Table 10.
ExxonMobil – Absolute Water Rights – Colorado River Basin

Map Location	Structure Name	Water Source	Quantity (cfs)	Avg. Vol. Div. (af)	Appropriation Date
14	C O & C P Pierson Ditch	Main Elk Creek	5	1,001	2/15/1884
21	Dry Creek Ditch	Dry Creek (West)	2.02	52	4/23/1885
24	R F Ditch	Battlement Creek	9.855	538	11/25/1885
26	Werhonig Ditch	Monument Gulch	0.2	0	7/15/1886
27	Dobey Ditch	Battlement Creek	5.975	354	3/7/1887
30	Shutt Ditch	Battlement Creek	6	267	5/11/1887
31	Trout Ditch	Main Elk Creek	3.5	557	2/5/1888
32	Benson Pierson Nelson	Main Elk Creek	4	646	2/5/1888
33	Oak Grove Ditch	East Elk Creek	3	747	2/20/1890
36	Red Glen Highline Ditch	East Elk Creek	8	1,643	11/20/1890
39	Rulison Miller Ditch	Colorado River	4.1	453	12/8/1891
45	Jensen Ditch	Cottonwood Gulch	8.8	396	4/15/1901
46	Number One Ditch	Dry Creek (West)	3.86	153	5/1/1901
53	Hayward Spring Ditch	Battlement Creek	0.75	6	8/31/1912
54	Ryden No 2 Ditch	Main Elk Creek	1.76	279	4/6/1912
56	Ryden No 1 Ditch	Main Elk Creek	5.5	716	4/7/1915
57	W E Ditch	Main Elk Creek	1	458	7/1/1917
	Total structures: 17		**Total: 73.32 cfs**	**Total: 8,266 af**	

4. The Oil Shale Corporation

The Oil Shale Corporation (Tosco) owns rights to 2 proposed reservoirs: the Trail Gulch Reservoir, to be sited on Roan Creek, and Trail Gulch Reservoir Alternative Point, to be located on Carr Creek. The particulars of these rights are presented in the following table.

Table 11.
Tosco – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
55	Trail Gulch Res Alt Pt	Reservoir	Carr Creek	0	950.79	9/23/1967
56	Trail Gulch Reservoir	Reservoir	Roan Creek	0	5,669.21	9/23/1967
	Total structures: 2			**Total: 0 cfs**	**Total: 6,620 af**	

5. OXY USA

OXY USA, formerly Occidental Oil Company, purchased Cities Service in the early 1980s. OXY's Colorado River Basin conditional rights are concentrated in the Roan Creek area. In total, OXY owns rights that would enable it to develop 22 structures, providing for direct diversion of almost 124 cfs and storage of approximately 1,000 af. These rights are summarized in the following table.

Table 12.
OXY – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
12	Cities Service Pl and Pp	Pump	Colorado River	100	0	8/2/1951
46	Conn Creek Pipeline	Pipeline	Conn Creek	10	0	8/25/1966
47	Cascade Canyon Res	Reservoir	Conn Creek	0	619.47	8/25/1966
48	Cascade Canyon Pipeline	Pipeline	Conn Creek	10	0	8/25/1966
49	Conn Creek Reservoir	Reservoir	Conn Creek	0	422.75	8/25/1966
58	Logan Wash Mine	Spring	Roan Creek	0.11	0	9/1/1972
59	Lw-27 Well	Spring	Roan Creek	0.11	0	3/30/1973
60	Logan Wash Mine No 3-C	Spring	Roan Creek	0.11	0	2/1/1974
63	Ww-1 Well	Well	Roan Creek	0.165	0	11/22/1974
64	Logan Wash Pump No 1	Spring	Roan Creek	2.9	0	10/30/1979
94	Cities Service Spg 41	Spring	Conn Creek	0.03	0	7/19/1983
95	Cities Service Spg 17	Spring	Conn Creek	0.05	0	7/19/1983
96	Cities Service Spg 39	Spring	Conn Creek	0.09	0	7/19/1983
97	Cities Service Spg 07	Spring	Clear Creek	0.12	0	7/19/1983
98	Cities Service Spg 40	Spring	Conn Creek	0.03	0	7/19/1983
99	Cities Service Spg 13	Spring	Conn Creek	0.05	0	7/19/1983
100	Cities Service Spg 18	Spring	Conn Creek	0.05	0	7/19/1983
101	Cities Service Spg 08	Spring	Clear Creek	0.02	0	7/19/1983
102	Cities Service Spg 11a	Spring	Conn Creek	0.02	0	7/19/1983
103	Cities Service Spg 03	Spring	Conn Creek	0.02	0	7/19/1983
104	Cities Service Spg 22	Spring	Conn Creek	0.05	0	7/19/1983
105	Cities Service Spg 38	Spring	Conn Creek	0.06	0	7/19/1983
	Total structures: 22			**Total: 123.99 cfs**	**Total: 1,042.22 af**	

6. Shell Texaco

Shell Texaco owns the right to develop 14 structures in the Colorado River Basin. These conditional rights include diversion of 250 cfs and storage of over 1,500 af. The following table sets out this information. In addition, Shell Texaco has purchased 3 ditches, with the decreed right to divert approximately 8 cfs. These rights are listed in *Table 14*.

Table 13.
Shell Texaco – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
38	Clear Creek Feeder Pl	Pipeline	Clear Creek	50	0	2/8/1965
39	Deer Park Gulch Res	Reservoir	Clear Creek	0	1533.6	2/8/1965
40	Deer Park Gulch Pmp & Pl	Pump	Colorado River	150	0	2/8/1965
41	Conn Creek Feeder Pl	Pipeline	Conn Creek	50	0	2/8/1965
66	Pacific Spring No 2	Spring	Clear Creek	0.06	0	5/1/1982
67	Pacific Spring No 3	Spring	Clear Creek	0.03	0	5/1/1982
68	Pacific Spring No 9	Spring	Conn Creek	0.04	0	5/1/1982
69	Pacific Spring No 10	Spring	Conn Creek	0.04	0	5/1/1982
70	Pacific Spring No 1	Spring	Clear Creek	0.02	0	5/1/1982
71	Pacific Spring No 7	Spring	Clear Creek	0.06	0	5/1/1982
72	Pacific Spring No 8	Spring	Clear Creek	0.08	0	5/1/1982
73	Pacific Spring No 4	Spring	Conn Creek	0.02	0	5/1/1982
74	Pacific Spring No 5	Spring	Conn Creek	0.07	0	5/1/1982
75	Pacific Spring No 6	Spring	Conn Creek	0.05	0	5/1/1982
	Total structures: 14			**Total: 250.47 cfs**	**Total: 1,533.6 af**	

Table 14.
Shell Texaco – Absolute Water Rights – Colorado River Basin

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date
41	Long Gulch Ditch No 1	Clear Creek	2.24	239	11/20/1897
42	Long Gulch Ditch No 2	Clear Creek	2.98	213	11/11/1899
43	Short Gulch Ditch	Clear Creek	2.76	117	11/1/1899
	Total structures: 3		**Total: 7.98 cfs**	**Total: 569 af**	

7. Union Oil Company of California

The Union Oil Company of California (Unocal) is now part of Chevron. However, there are still numerous structures with water rights listed as owned by Unocal. Virtually all these rights are located in Parachute Creek. The 2 conditional structures, both proposed wells, are shown in *Table 15*. *Table 16* shows the 47 absolute structures, consisting of wells and springs, listed as owned by Unocal. Unocal also owns 13 irrigation ditches, which are shown in *Table 17*. The ditches have a total diversion right of 120 cfs.

Table 15.
Unocal – Conditional Water Rights – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
5	Union 76 Water Well No 3	Well	Parachute Creek	0.066	0	2/14/1949
6	Union 76 Water Well No 2	Well	Parachute Creek	0.124	0	2/14/1949
	Total structures: 2			**Total: 0.19 cfs**	**Total: 0 af**	

Table 16.
Unocal – Absolute Water Rights (Wells and Springs) – Colorado River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
1	Nelson Well No 1*	Well	Parachute Creek	0.018	0	5/17/1883
2	Sherwood Well No 1*	Well	Parachute Creek	0.022	0	5/17/1883
3	Sherwood Well No 2*	Well	Parachute Creek	0.018	0	5/17/1883
4	Seep Spring No 1*	Well	Parachute Creek	0.033	0	4/19/1922
5	Seep Spring No 2*	Well	Parachute Creek	0.033	0	4/19/1922
6	Seep Spring No 3*	Well	Parachute Creek	0.033	0	4/19/1922
7	House Log Gulch Sprg No 1*	Spring	Parachute Creek	0.033	0	4/19/1922
8	House Log Gulch Sprg No 2*	Spring	Parachute Creek	0.033	0	4/19/1922
9	House Log Gulch Sprg No 3*	Spring	Parachute Creek	0.033	0	4/19/1922
10	House Log Gulch Sprg No 4*	Spring	Parachute Creek	0.033	0	4/19/1922
11	House Log Gulch Sprg No 5*	Spring	Parachute Creek	0.033	0	4/19/1922
12	Red Spring No 1*	Spring	Parachute Creek	0.033	0	4/22/1922
13	Squire's Spring*	Spring	Parachute Creek	0.033	0	7/21/1922
14	Sheep Gulch Spring*	Spring	Parachute Creek	0.033	0	7/21/1922
15	Calf Spring*	Spring	Parachute Creek	0.033	0	8/9/1922
16	Long Ridge Spring No 1*	Spring	Parachute Creek	0.033	0	9/22/1922
17	Long Ridge Spring No 2*	Spring	Parachute Creek	0.033	0	9/22/1922
18	Long Ridge Spring No 3*	Spring	Parachute Creek	0.033	0	9/22/1922
19	Long Ridge Spring No 4*	Spring	Parachute Creek	0.033	0	9/22/1922
20	Long Ridge Spring No 5*	Spring	Parachute Creek	0.033	0	9/22/1922
21	Feather Springs*	Spring	Parachute Creek	0.033	0	11/10/1922
22	Grassy Spring*	Spring	Parachute Creek	0.033	0	11/27/1922
23	Hidden Spring*	Spring	Parachute Creek	0.033	0	7/11/1924
24	Cottonwood Spring No 1*	Spring	Cottonwood Ck	0.05	0	11/8/1940

Table 16. *(cont'd)*

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
25	Union 76 Water Well No 4*	Well	Parachute Creek	1.114	0	2/14/1949
26	Union 76 Water Well No 1*	Well	Parachute Creek	0.52	0	2/14/1949
27	Union 76 Water Well No1a*	Well	Parachute Creek	0.52	0	2/14/1949
28	Union 76 Water Well No 3*	Well	Parachute Creek	1.048	0	2/14/1949
29	Union 76 Water Well No 2*	Well	Parachute Creek	0.99	0	2/14/1949
30	Union 76 Water Well No 5*	Well	Parachute Creek	1.114	0	2/14/1949
31	Union 76 Water Well No 6*	Well	Parachute Creek	0.722	0	2/14/1949
32	Parkhurst Cabin Spg No 1*	Spring	Parachute Creek	0.033	0	3/22/1951
33	Parkhurst Cabin Spg No 2*	Spring	Parachute Creek	0.033	0	3/22/1951
34	Helm Gulch Spring No 1*	Spring	Parachute Creek	0.033	0	3/27/1952
35	Helm Gulch Spring No 2*	Spring	Parachute Creek	0.033	0	3/27/1952
36	Lone Tree Spring*	Spring	Parachute Creek	0.033	0	1/20/1954
37	Pete Spring*	Spring	Parachute Creek	0.033	0	5/31/1955
38	Wagon Spring*	Spring	Parachute Creek	0.033	0	6/2/1966
39	Light Gulch Spring No 1*	Spring	Parachute Creek	0.033	0	6/2/1966
40	Light Gulch Spring No 2*	Spring	Parachute Creek	0.033	0	6/2/1966
41	Cabin Spring*	Spring	Parachute Creek	0.066	0	6/2/1966
42	Cottonwood Spring No 2*	Spring	Cottonwood Ck	0.01	0	5/1/1967
43	Corral Spring No 1*	Spring	Parachute Creek	0.03	0	10/7/1986
43	Eisaguirre Spring No 1*	Spring	Parachute Creek	0.02	0	10/10/1986
44	Schutte Spring No 1*	Spring	Parachute Creek	0.033	0	10/10/1986
45	Schutte Spring No 2*	Spring	Parachute Creek	0.033	0	10/10/1986
46	Sage Spring No 2*	Spring	Parachute Creek	0.033	0	10/23/1986
	Total structures: 47			**Total: 7.32 cfs**	**Total: 0 af**	

**Absolute decree*

Table 17.
Unocal – Absolute Water Rights (Ditches) – Colorado River Basin

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date
1	Low Cost Ditch	Parachute Creek	27.94	3,945	5/17/1883
2	Vieweg Ditch	Parachute Creek	1.9	1,287	5/17/1883
3	C C D Ditch	Parachute Creek	2.53	309	5/17/1883
4	East Fork Ditch	Parachute Creek	6.56	243	5/17/1883
5	Parachute Ditch	Parachute Creek	27.22	1,965	5/17/1883
6	Ri Ley Ditch	Parachute Creek	1	106	5/17/1883
7	Cornell Ditch	Parachute Creek	15.675	1,546	5/17/1883
8	Spring Ditch	Parachute Creek	0.12	202	5/17/1883
9	Starkey Gulch Ditch	Parachute Creek	4.32	150	5/17/1883
10	Charley Dere Ditch	Parachute Creek	0.83	350	5/17/1883
18	Atkinson Canal	Roaring Fork River	26.33	2,420	10/20/1884
47	Wheeler Ditch	Parachute Creek	3	183	8/14/1901
55	Ida Dere Ditch	Parachute Creek	3	184	4/1/1914
	Total structures: 13		**Total: 120.43 cfs**	**Total: 12,890 af**	

Photo courtesy of The Story Group

B. WHITE RIVER BASIN

1. Colorado River Water Conservation District

The Colorado River Water Conservation District (CRWCD) holds 9 conditional rights to develop water in the White River Basin. Like the rights held in the Colorado River Basin, these rights could potentially be developed to provide water for uses that include oil shale development as well as to meet other water demands in the region. These rights include 5 proposed reservoir sites with a total storage capacity of nearly 530,000 af and 5 pipelines with the potential right to divert over 1,800 cfs. The conditional rights held by the CRWCD are presented in the following table.

Table 18.
CRWCD – Conditional Water Rights – White River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
15	Flattops Tunnel	Pipeline	South Fork	254	0	10/31/1961
16	Piceance Basin Pl Coll S	Pipeline	South Fork	60	0	10/31/1961
17	Rangely Reservoir	Reservoir	White River	0	131,034.5	10/31/1961
18	Patterson Cr Collect Sys	Pipeline	Patterson Ck	75	0	10/31/1961
19	Rio Blanco Reservoir	Reservoir	South Fork	0	131,034	10/31/1961
20	Strawberry Creek Res	Reservoir	Strawberry Ck	0	75,957	10/31/1961
21	Wray Gulch Dam & Res	Reservoir	Wray Gulch	0	29,374	10/31/1961
22	Douglas Canal	Ditch	White River	620	0	10/31/1961
23	Wolf Ck Res (Crwcd)	Reservoir	White River	0	162,400	7/3/1962
63	Strawberry Creek Pl	Pipeline	White River	400	0	6/16/1972
65	Wray Gulch Pipeline	Pipeline	White River	450	0	7/19/1972
	Total structures: 11			**Total: 1,859 cfs**	**Total: 529,799.5 af**	

2. Exxon Mobil Corporation

The Exxon Mobil Corporation (ExxonMobil) owns conditional water rights associated with 33 structures within the White River Basin. Its 17 proposed reservoirs have a conditionally decreed storage capacity of approximately 161,000 af. Its direct flow rights have a cumulative diversion rate of 1,100 cfs. The package of conditional rights owned by ExxonMobil is presented in the table below.

Table 19.
ExxonMobil – Conditional Water Rights – White River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
7	Stillwater Reservoir	Reservoir	South Fork	0	12,548	5/29/1955
13	Boies Reservoir	Reservoir	Black Sulphur Ck	0	31,020.8	7/10/1961
14	Piceance Canal	Pipeline	Piceance Ck	50	0	7/10/1961
24	Wolf Ck Res	Reservoir	Wolf Ck	0	35,000	7/3/1962
25	Ryan Gulch Reservoir	Reservoir	Piceance Ck	0	22,635.2	12/15/1963
26	White River Pumping Pl	Pipeline	White River	100	0	12/15/1963
27	Jumps Cabin Res	Reservoir	West Hunter Ck	0	7,868.8	5/27/1964
28	Howells Cabin Res	Reservoir	Willow Ck/Pic. Ck	0	8,096	5/27/1964
33	White River Pl No 2	Pipeline	White River	120	0	10/12/1964

Table 19. *(cont'd)*

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
34	South Fork Piceance Pl	Pipeline	South Fork	70	0	5/29/1965
45	Hunter Cr Wells	Well	Hunter Ck	30	0	3/8/1967
46	Superior Oil Term Res	Reservoir	White River	0	800	5/14/1968
47	Superior Oil Pl	Pipeline	White River	24	0	5/14/1968
49	Blacks Gulch Pipeline	Pipeline	White River	100	0	9/1/1968
50	Blacks Gulch Res	Reservoir	Blacks Gulch	0	13,900	9/1/1968
51	Crooked Wash P.L.	Pipeline	White River	100	0	9/1/1968
52	Crooked Wash Res	Reservoir	Crooked Wash	0	11,800	9/1/1968
53	Kellog Gulch P.L.	Pipeline	White River	100	0	9/1/1968
54	Kellogg Gulch Res	Reservoir	Kellogg Gulch	0	3,700	9/1/1968
55	Wray Gulch Res	Reservoir	Wray Gulch	0	13,500	9/1/1968
56	Superior Pumpback Pl 1	Pump	White River	12	0	10/5/1968
57	Superior Pumpback Pl 2	Pump	White River	12	0	10/5/1968
58	Superior Pumpback Pl 3-1	Pump	White River	12	0	10/5/1968
59	Wolf Ck Pl	Pipeline	White River	70	0	9/30/1971
64	Wray Gulch Pipeline	Pipeline	White River	100	0	7/19/1972
75	Mobil Pump Station Pl	Pump	White River	200	0	5/4/1984
87	Exxon Love Ranch Res	Reservoir	Piceance Ck	0	30	11/17/1998
88	Exxon Boies Bl.Sulp Res	Reservoir	Black Sulphur Ck	0	50	11/17/1998
89	Exxon B&M Res	Reservoir	Piceance Ck	0	50	11/17/1998
90	Exxon Hunter Creek Res	Reservoir	Hunter Ck	0	30	11/17/1998
91	Exxon Willow Creek Res	Reservoir	Willow Ck/ Pic. Ck	0	30	11/17/1998
92	Exxon Yellow Creek Res	Reservoir	Yellow Ck	0	30	11/17/1998
93	Exxon Dry Creek Res	Reservoir	Trib.-Piceance Ck	0	20	11/17/1998
	Total structures: 33			**Total: 1,100 cfs**	**Total: 161,108.8 af**	

In addition, ExxonMobil has acquired either full or partial ownership in 31 irrigation ditches in the White River Basin. These ditches provide for decreed rights to divert approximately 88 cfs. Information about these ditches is displayed in the following table.

Table 20.
ExxonMobil – Absolute Water Rights – White River Basin

Map Location	StructureName	Water Source	Quantity (cfs)	Avg. Vol. Div. (af)	Appropriation Date
1	P & L Ditch	Piceance Ck	0.5	144	6/1/1883
3	Mckee Ditch	Black Sulphur Ck	3	303	5/10/1884
5	Willow Creek Ditch No 2	East Willow Ck	1.2	294	9/29/1884
6	Willow Creek Ditch No 3	East Willow Ck	1.2	230	9/29/1884
7	M H M German Cons D	Piceance Ck	17.54	880	10/22/1884
8	Gilmor Ditch	Hunter Ck	1.5	320	5/10/1886
9	Boies Ditch	Black Sulphur Ck	2	363	10/16/1886
11	D D Taylor Ditch*	Black Sulphur Ck	2	418	4/5/1887
13	Black Eagle D No 1*	Black Sulphur Ck	5.95	321	4/16/1887
14	Black Eagle D No 2*	Black Sulphur Ck	5.95	276	4/16/1887
15	Black Eagle Alt Pt 1	Black Sulphur Ck	0	92	4/16/1887
16	Black Eagle Alt Pt 2	Black Sulphur Ck	0	85	4/16/1887
18	M H And M Ditch	Piceance Ck	17.54	880	4/18/1887
20	O I See Ditch*	Fawn Ck	1.2	225	4/27/1887
21	No Name Ditch*	Fawn Ck	0.4	173	5/1/1887
22	Decker Irrigation Ditch	East Douglas Ck	2.8	94	5/6/1887
23	Belot Moffat Ditch	Piceance Ck	11.6	1,304	5/10/1887
28	Taylor Ditch	Willow Ck/Pic Ck	2	279	5/09/1888
29	Hunter Ditch	Hunter Ck	1	267	5/15/1888
30	Ebler Ditch	Willow Ck/Pic Ck	1	170	5/20/1888
33	Schweizer Ditch*	Black Sulphur Ck	2.6	437	9/30/1888
34	Schweizer Ditch Alt Pt	Black Sulphur Ck	0	110	9/30/1888
35	Hutchinson Spring Ditch	Fawn Ck	0.5	159	7/18/1889
36	Mcgee Ditch*	Fawn Ck	1.16	270	5/1/1890
37	J W Bainbrick D No 1&2*	Black Sulphur Ck	0.86	181	7/1/1893
43	N & L Ditch	Fawn Ck	1	271	5/1/1901
46	Bainbrick Mikkelsen 1&2*	Black Sulphur Ck	0.375	264	5/1/1904
48	Milo Ditch	Black Sulphur Ck	0.3	36	5/1/1911
51	Desert Ditch*	Black Sulphur Ck	1.43	182	6/12/1914
53	Edmund Pauls Ditch	Sulphur Ck	0.1	11	7/21/1915
55	Duckett Ditch*	Black Sulphur Ck	1.2	242	6/10/1918
	Total structures: 31		**Total: 87.91 cfs**	**Total: 9,281 af**	

**Joint ownership*

3. Shell Frontier

Shell Frontier owns conditional rights associated with 16 structures in the White River Basin. Two large proposed reservoirs would store approximately 145,000 af. Shell holds conditional direct diversion rights that would allow diversion of over 625 cfs. These rights are listed in *Table 21*. Shell also owns 2 irrigation ditches in the basin; these rights are listed in *Table 22*.

Table 21.
Shell Frontier – Conditional Water Rights – White River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
6	Stillwater Power Plant	Pipeline	South Fork	300	0	5/29/1955
29	Fourteen Mile Res 1	Reservoir	Fourteen M. Ck	0	60,000	6/24/1964
30	White R Fourteen M. Ck Pl	Pipeline	White River	200	0	9/12/1964
31	South Fork Pipeline	Pipeline	South Fork	100	0	9/14/1964
32	South Fork Reservoir	Reservoir	South Fork	0	85,342	9/14/1964
77	Swepi Spring 1	Spring	Duck Ck	0.367	0	6/13/1988
78	Swepi Spring 10	Spring	Spruce Gulch	0.489	0	6/13/1988
79	Swepi Spring 13	Spring	Stake Springs Ck	0.222	0	6/13/1988
80	Swepi Spring 2	Spring	Water Gulch	0.233	0	6/13/1988
81	Swepi Spring 3	Spring	Water Gulch	0.178	0	6/13/1988
82	Swepi Spring 5	Spring	Water Gulch	0.044	0	6/13/1988
83	Swepi Spring 6	Spring	Corral Gulch	0.178	0	6/13/1988
84	Swepi Spring 7	Spring	Corral Gulch	0.078	0	6/13/1988
85	Swepi Spring 8	Spring	Spruce Gulch	0.011	0	6/13/1988
86	Swepi Spring 9	Spring	Spruce Gulch	0.011	0	6/13/1988
114	Shell Pumping Plant	Pump	White River	25	0	1/1/1999
	Total structures: 16			**Total: 626.81 cfs**	**Total: 145,342 af**	

Table 22.
Shell Frontier – Absolute Rights – White River Basin

Map Location	Structure name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div.	Appropriation Date
2	Calhoun Ditch	White River	8.17	285	8/25/1883
32	Rye Grass Ditch*	Piceance Ck	0	0	6/5/1888
	Total structures: 2		**Total: 8.17 cfs**	**Total: 285 af**	

**Joint ownership*

4. The Oil Shale Corporation

The Oil Shale Corporation (Tosco) owns a substantial portfolio of water rights in the White River Basin. As listed in *Table 23*, these rights include conditional claims to 17 structures. There are 3 proposed reservoirs with conditional rights to store approximately 95,000 af, as well as conditional rights to divert a total of 244 cfs. In addition, Tosco has established either partial or total ownership of rights in 14 existing ditches that cumulatively hold absolute rights to divert 73 cfs; *Table 24* lists these rights.

Table 23.
Tosco – Conditional Rights – White River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
8	Miller Creek Pump Pl	Pump	White River	100	0	5/26/1957
9	Ertl Pipeline Hg 1	Pipeline	Buck Ck	15	0	5/26/1957
10	Ertl Pipeline Hg 2	Pipeline	Wagon Wheel Ck	1	0	5/26/1957
11	Ertl Pipeline Hg 3	Pipeline	Patterson Ck	7	0	5/26/1957
12	Ertl Pipeline Hg 4	Pipeline	Patterson Ck	7	0	5/26/1957
37	Hunter Ck Res	Reservoir	Hunter Ck	0	24,362	2/28/1967
38	Ohio Ertl Pl	Pipeline	White River	55	0	2/28/1967
39	Story G Parachute Pl	Pipeline	White River	55	0	2/28/1967
40	Story Gulch Res	Reservoir	Story Gulch	0	25,000	2/28/1967
48	Miller Ck Res	Reservoir	Miller Ck	0	45,900	7/18/1968
60	Tg 71-5 Well	Well	Stewart Gulch	1.111	0	11/29/1971
61	Tg 71-4 Well	Well	Stewart Gulch	0.888	0	12/3/1971
62	Tg 71-3 Well	Well	Stewart Gulch	0.444	0	12/13/1971
66	Liberty Bell Well No 12	Well	Story Gulch	0.888	0	12/5/1972
67	Camp Bird Well 12	Well	Trib-Piceance Ck	0.444	0	9/6/1973
68	Camp Bird Well 12a	Well	Trib-Piceance Ck	0.444	0	9/6/1973
72	Ohio Well No 41	Well	West Willow Ck	0.044	0	8/22/1977
	Total structures: 17			**Total: 244.26 cfs**	**Total: 95,262 af**	

Table 24.
Tosco – Absolute Water Rights – White River Basin

Map Location	Structure Name	Water Source	Quantity. Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date
10	Emily Ditch*	Piceance Ck	5.85	794	11/05/1886
12	Last Chance Ditch*	Hunter Ck	1.4	294	4/13/1887
17	Robert Mckee Ditch*	Piceance Ck	6.33	1,235	4/18/1887
19	Oldland Ditch 1*	Piceance Ck	13.8	1,000	4/27/1887
25	Jessup Ditch 1*	Stewart Gulch	1.2	204	6/16/1887
26	Blue Grass Ditch*	Stewart Gulch	0.6	262	7/11/1887
27	Jessup Ditch 2*	Stewart Gulch	0.6	134	4/14/1888
32	Rye Grass Ditch*	Piceance Ck	8.2	901	6/5/1888
38	Gardenheir Ditch*	Piceance Ck	2.04	350	3/5/1895
40	E Stewart Gulch D No 1*	East Stewart Gulch	0.6	46	11/1/1899
41	E Stewart Gulch D No 2*	East Stewart Gulch	0.6	35	10/15/1900
44	Oldland Ditch 3*	Piceance Ck	1.4	199	5/15/1902
50	Forney Corcoran Ditch	White River	11.47	0	5/10/1913
54	Oldland Ditch 2*	Piceance Ck	18.94	660	5/1/1917
	Total structures: 14		**Total: 73.03 cfs**	**Total: 6,114 af**	

**Joint ownership*

5. Yellow Jacket Water Conservancy District

The Yellow Jacket Water Conservancy District (WCD) owns 9 conditional water rights in the White River Basin that could potentially provide water in support of oil shale development. Included are 4 reservoir storage rights with total capacity of almost 250,000 af, 2 pipelines with diversion rights of 1,000 cfs, and 3 ditches with diversion rights of 700 cfs. These rights are listed below.

Table 25.
Yellow Jacket WCD – Conditional Water Rights – White River Basin

Map Location	Structure Name	Structure Type	Water Source	Quantity (cfs)	Quantity (af)	Appropriation Date
1	Lost Park Reservoir	Reservoir	Lost Ck	0	33,541	11/9/1953
2	Lost Park Feeder Canal 1	Ditch	Trib-North Fk	100	0	11/9/1953
3	Lost Park Feeder Canal 2	Ditch	Trib-North Fk	100	0	11/9/1953
4	Yellow Jacket Canal	Ditch	North Fork	500	0	11/9/1953
5	Ripple Creek Reservoir	Reservoir	North Fork	0	27,992	11/19/1953
69	Colo White R Hydro Plant	Pipeline	White River	500	0	9/6/1973
70	North Fork Fdr Conduit	Pipeline	North Fork	500	0	10/7/1976
71	Sawmill Mountain Res	Reservoir	Big Beaver Ck	0	80,000	10/7/1976
73	Colo White R Res	Reservoir	White River	0	105,000	11/17/1981
	Total structures: 9			**Total: 1,700 cfs**	**Total: 246,533 af**	

SECTION V

KEY IMPLICATIONS OF AND LIMITATIONS ON WATER DEVELOPMENT FOR OIL SHALE

The possible development and use of substantial amounts of water for oil shale production raises important considerations for Colorado because of the potential to adversely affect some existing water uses and many expected future water uses. Companies with an interest in oil shale development own enormous portfolios of water rights. While there is great uncertainty with respect to the manner in which these rights will be developed and used, the consequences of such development are unquestionable.

Among the many likely changes in the use of Colorado water resulting from oil shale development are changes in existing irrigated agriculture, limitations on existing and planned water development for the Front Range and the West Slope, and likely limitations on other water development for new uses on the West Slope. While these general impacts are relatively easy to project, it is harder to identify the exact development scenarios and the resulting impacts on a given water right or a specific project. This uncertainty largely stems from not knowing which water rights will be used or which storage and delivery systems will be utilized (including which ones will be built).

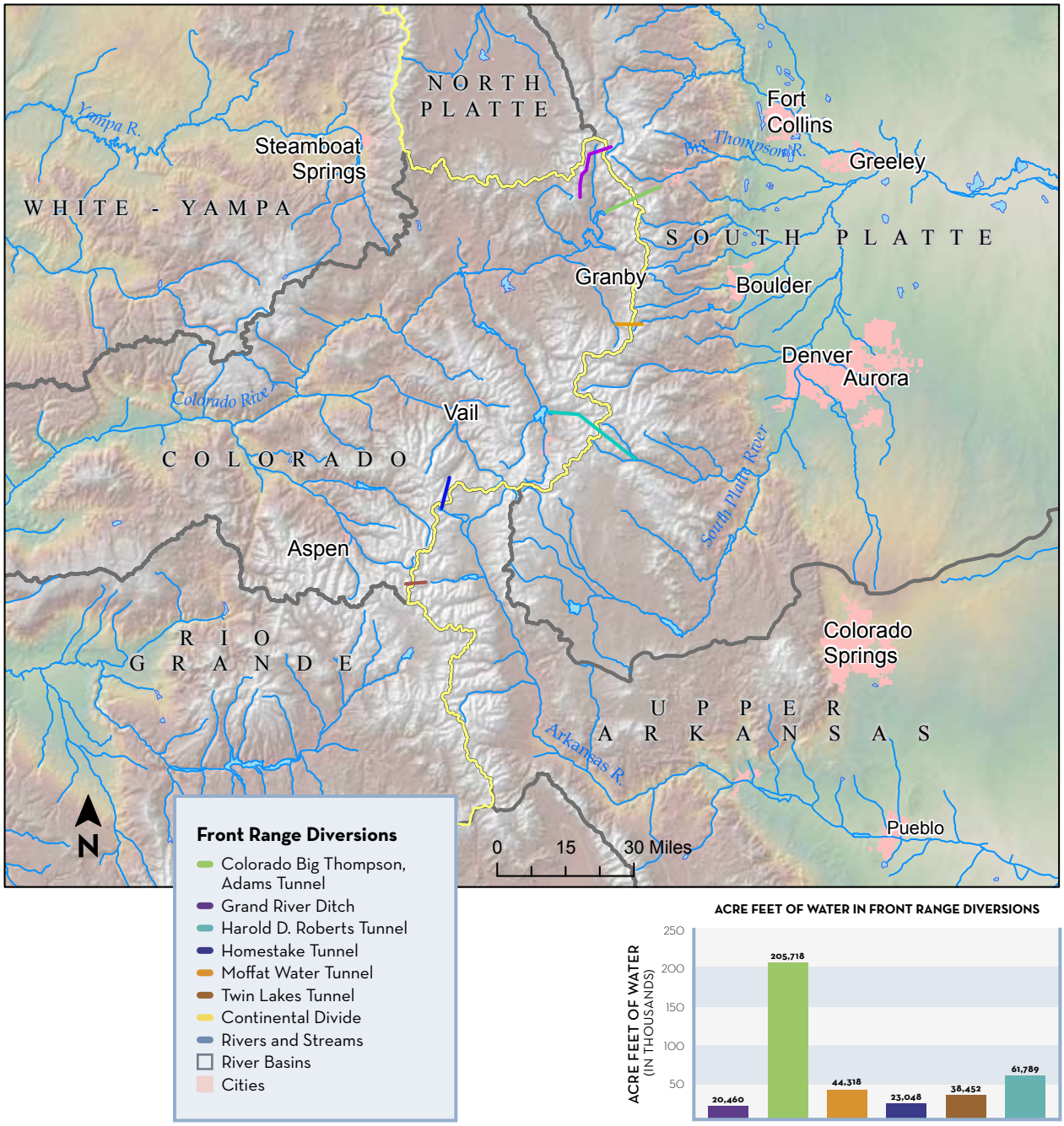
A. OIL SHALE AND EXISTING WATER USES

Perhaps the most immediately evident effect on existing water uses from potential oil shale development would be the shift of water from irrigated agriculture in the area to industrial uses. Energy companies own large portions of the water rights historically used to irrigate lands in the region. Many of these rights date back to the late 1800s and early 1900s. As pre-Colorado River Compact rights, these diversions would not be affected by a call placed against the Upper Basin. Most of the associated water still remains in irrigation use as energy companies lease back the water to ranchers. Should oil shale development move beyond the research phase, many, if not all, of these rights would be changed in use, and the lands historically irrigated would be taken out of agriculture. The result would be a dramatic transformation of land and water uses in these areas.

A second, less obvious outcome of oil shale development would be the displacement of some existing uses by new oil shale-related uses with senior priorities. As mentioned earlier in this report, conditional rights for oil shale development date back to the 1950s. Should these rights be placed into use, they would be senior to all existing uses from the same source of water with subsequent priority dates, thereby affecting rights used both in western Colorado and in Colorado's Front Range.

Front Range water providers divert several hundred thousand acre-feet of water annually out of the Colorado River Basin for both urban and agricultural use. Most of the existing transbasin diversions occur under water rights senior to conditional rights established for oil shale development. Plans to enlarge these diversions and to develop new projects, however, are more likely to

Figure 9. *Major Diversions to the Front Range of Colorado*



have priority dates junior to some of the oil shale rights. Should these oil shale rights be developed, they will have to be satisfied before the more junior transbasin rights. (See *Figure 9*)

West Slope communities have grown considerably since the 1950s. The headwaters towns in the Colorado River Basin now support substantial year-round populations as well as large numbers of second homes. The wintertime, ski-based tourist industry has extended into a year-round tourist and business economy. Much of the water supply that has been developed to serve this population depends on water rights with relatively recent appropriation dates.

Appendix E shows the relative priorities of selected oil shale and non-oil shale conditional water rights in the Colorado River Basin. As illustrated, there are significant oil shale rights senior to these other rights. For example, as-yet-undeveloped elements of the Homestake Project that would provide additional water to Colorado Springs and Aurora hold a priority junior to several

large downstream rights for oil shale on the Colorado River. Denver Water's Williams Fork project, for example, holds a conditional claim for the Darling Creek Enlargement decreed to divert 90 cfs that is junior to conditional rights for oil shale. Those rights collectively have the decreed right to divert over 950 cfs from the Colorado River downstream of Williams Fork. Its refill right for Williams Fork Reservoir would also be junior to these oil shale conditionals, as would its proposed Straight Creek Collection System for Roberts Tunnel. Even more junior are its conditional rights to the Piney River Unit.

Likewise, the Colorado River Water Conservation District holds the conditional water rights associated with the proposed Wolcott Reservoir, to be located in the Eagle River Basin. This project is intended to store water from the Eagle River watershed as well as from the Colorado River. Wolford Mountain Reservoir is also an important junior right, providing critical water for both the Western Slope and Denver Water.

Finally, the Northern Colorado Water Conservancy District's Windy Gap Reservoir has a 1967 priority date.[40] While presently only used to divert modest amounts of water from the Colorado River Basin, this project has already encountered difficulties because of its relatively junior priority. While efforts are presently underway to improve the yield from this project, substantial new downstream development of senior rights for oil shale development would make this task much harder to achieve.

B. OIL SHALE AND THE COLORADO RIVER COMPACT

Still another important uncertainty facing future water development in western Colorado is the legal availability of water for development under the Colorado River Compact and associated laws and requirements. Under the terms of the 1922 Colorado River Compact, the four Upper Basin states (Colorado, New Mexico, Utah, and Wyoming) were thought to be entitled to consume 7.5 million af of basin water annually. Based on this assumption, in 1948 the Upper Basin states apportioned use of their share; under that agreement, Colorado was given 3.8 million af (51.75% of the Upper Basin share). However, as explained below, Colorado's rights are in actuality less than this amount.

In 1988 and again in 2007, the Bureau of Reclamation produced hydrologic determinations that make clear the Upper Basin states cannot expect to consume the allocated 7.5 million af.[41] The actual amount remains uncertain, but the 2007 analysis indicated a maximum consumption of about 5.75 million af per year. Using this assumption, Colorado would be entitled to consume just under 3 million af annually.

In a very thoughtful analysis of the state of Colorado's Colorado River entitlement, Eric Kuhn of the Colorado River Water Conservation District reviewed the hydrologic determinations and, using the Bureau of Reclamation's 2007 model, developed his own estimate. The primary difference between his assessment and Bureau of Reclamation's was his extension of the hydrology back to 1800 based on paleoclimatic data.[42] (The extended record had an average annual flow of 14.23 million af.) With this longer and somewhat drier record, he estimated that the Upper Basin entitlement would be 5.25 million af and that Colorado's share would be 2.69 million af.

Kuhn also evaluated how much water Colorado now uses under its entitlement and, based on data of the Colorado River Water Conservation Board, concluded that average use for the period 1988 to 2004 was 2.11 million af. Using his assumptions and calculations, it would appear that Colorado has roughly 580,000 af remaining in its development account.

However, Kuhn takes his analysis one step further by suggesting that a longer paleo-record reveals extended dry periods and droughts. Climate modeling projects warmer and drier conditions for the Colorado River Basin and elsewhere in the Interior West that are likely to affect both supply and demand.[43] With this in mind, Kuhn produced a table, reproduced below, of development risk levels for the state's remaining Colorado River water. The risk is of compact curtailment based on an assumption about the likely future of available supplies.

Table 26.
Risk Levels of Remaining Supply of Colorado River Water

Risk Level	Available Development (af)
Little or No Risk	Up to 150,000
Moderate Risk	150,000 to 300,000
High Risk	300,000 to 600,000
Extreme Risk	More than 600,000

Based on Kuhn's analysis, there is a high risk of Colorado having its use of Colorado River water curtailed by the Colorado River Compact if full-scale development (1.5 million bpd) of oil shale were to occur. That conclusion, importantly, does not account for other planned developments within Colorado, which would further stress water availability under the Colorado River Compact.

Because of the increasing possibility of water shortages in the basin that will force curtailment of some existing uses, the state of Colorado has funded a study to examine more closely the assumptions underlying the state's remaining developable water. Getting a more reliable estimate of existing depletions is important, but more critical is an evaluation of expected physical water availability in the Upper and Lower Basins to meet demands. Evidence of warming temperatures in large parts of the basin suggests the likelihood that there will be less water available for use and that needs for water will increase, independent of the normal demand increases associated with population growth.

Since all the major rivers on the West Slope are tributary to the Colorado River Basin, depletions in any one of these rivers will limit the ability to develop and use water from the others. Each of these regions of the state anticipates growth with its associated needs for water. And, as mentioned, there are active plans for development of water for use on Colorado's Front Range.[44] Should oil shale develop in the manner the BLM projects, competition for water on Colorado's West Slope will be intense.

A key issue is the effect of over-development of the compact entitlement on all post-compact water rights, including rights senior to oil shale. Transmountain diversions would be among the first to be restricted in the event of a compact call. The risk that over-development by juniors would result in curtailment of senior rights under the compact's 10-year delivery accounting procedure is one of the important issues identified by Eric Kuhn. The resulting demand for pre-1922 irrigation rights to use for compact replacement would have even more serious implications for the agricultural economy on the West Slope.

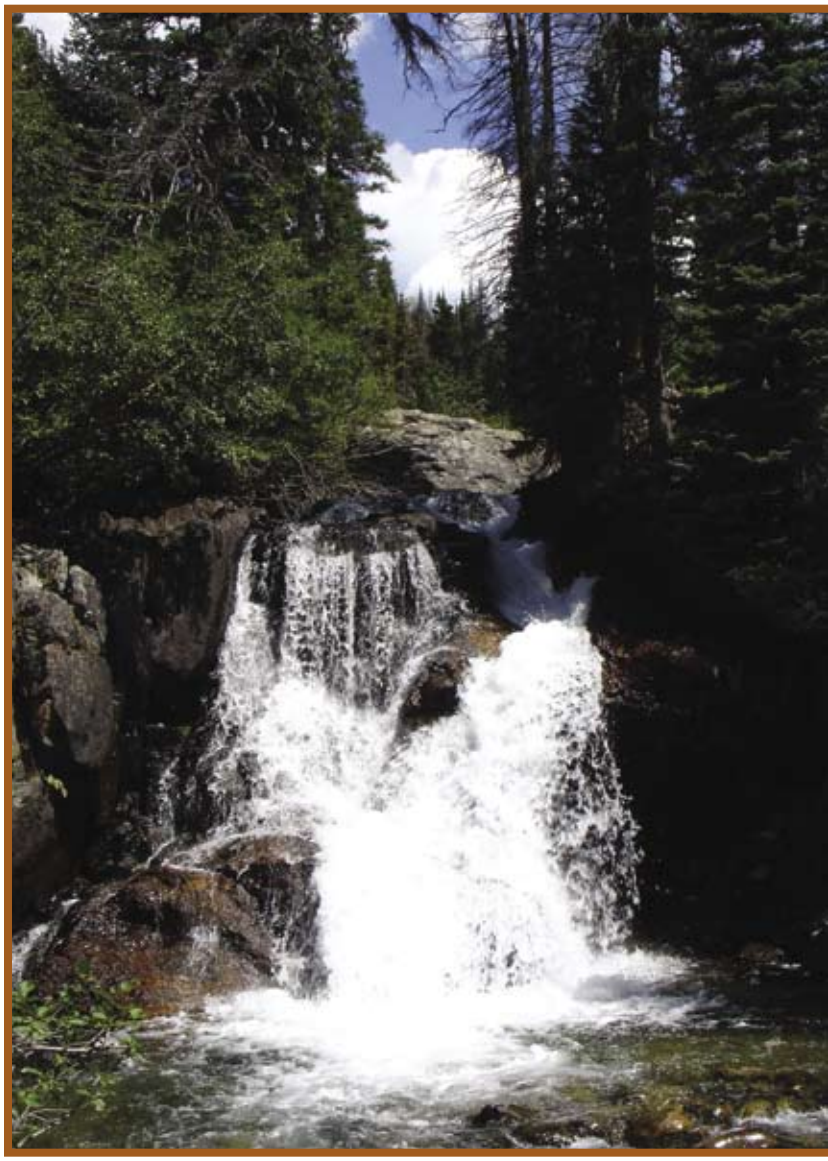
C. OIL SHALE AND THE UPPER COLORADO RIVER RECOVERY PROGRAM

Beginning in the 1970s, the U.S. Fish and Wildlife Service (USFWS) began reviewing proposed federal actions related to additional water development in the upper Colorado River Basin under the Endangered Species Act. At issue was the continued survival of four species of fish found only in this basin. USFWS had determined that additional depletions of the basin's water would jeopardize their continued existence. Concern for survival of these species continues today, and any new water development — whether for oil shale or otherwise—must satisfy substantial program requirements intended to protect and recover these species. This section describes these requirements and their significance for further development of water in Colorado's portion of the Upper Basin.

If the Colorado River's endangered fish (Colorado River pikeminnow, humpback chub, bonytail, and razorback sucker) are ever to be restored, it will be in the upper reaches of the Colorado River Basin, where there is still some remaining habitat. Oil shale development in Colorado, were it to occur on even a modest scale, would find itself in competition for some of the very

same water that is currently dedicated to recovery of the fish. Two of the most important basins for the native fish in Colorado — the mainstem of the Colorado River and the White River — are the very ones in which oil shale development is most likely to occur and in which, as described above, energy companies hold extensive water rights.

Under the late 1980s Upper Colorado River Endangered Fish Recovery Implementation Program (RIP), an agreement among the states of Colorado, Wyoming, and Utah, federal agencies, water users, and environmentalists, the parties assumed that the native fish could be recovered while allowing states to develop water to which they were entitled under the Colorado River Compact and the Upper Colorado River Compact. The RIP is designed to make compact entitlement development possible, but within specific parameters and not at all places in the basin.



1. Colorado River

The mainstem Colorado River from Rifle, Colorado, to Lake Powell, Utah, supports populations of humpback chub and Colorado pikeminnow, and is recognized as important to the recovery of all four endangered fishes. Relatively large and healthy humpback chub populations occur at Black Rocks and Westwater Canyon near the Utah-Colorado state line. A smaller humpback chub population occurs in Cataract Canyon, and some of the last wild bonytail were collected in this river reach. All life stages of Colorado pikeminnow occur in the section of river from Palisade, Colorado, downstream to Lake Powell. Razorback sucker populations, while present in the mainstem, have declined precipitously in the past 20 years.

In 1992, Colorado filed an application in state water court for a 581-cfs instream-flow right in the 15-Mile Reach (Colorado River upstream of the Gunnison River confluence and downstream of Debeque and Parachute, the locations of almost all of the oil shale sites). A final decree was issued in 1997. A programmatic biological opinion (PBO) for this reach was completed in December 1999, which requires additional deliveries of water and restricts future depletions. The future depletions-restriction limits are up to two 60,000 acre-feet increments, the second of which depends on the status of the native fish (i.e., the adult pikeminnow population, estimated to be approximately 870, must reach 1,100).[45] Even the first depletion increment of 60,000 af depends on the condition of the native fish. If the population estimate of pikeminnow declines, no additional depletions against this increment are allowed.[46] Two projects now under environmental review — the Windy Gap Firming Project of the Northern Colorado Water Conservancy District and the Moffat System expansion of Denver Water — would take 50,000 af of the first increment, leaving at most only 10,000 af.

The instream-flow requirements of the 15-Mile Reach PBO illustrate the complexities of the recovery program and the way in which depletion limits are intertwined with the water needs of the endangered fish. In addition to the depletion limits, there are also provisions for increased

flows for the 15-Mile Reach in the PBO. The Bureau of Reclamation has made available 5,000 af of water annually, plus an additional 5,000 af in four of every five years, from Ruedi Reservoir (on the Fryingpan River) to augment flows during July, August, and September. In addition, water is available from the lease of 10,825 af per year of water from Ruedi Reservoir and permanent commitment of 10,825 af per year from Front Range and West Slope water users. By 2009, the Colorado River Water Conservation District and Denver Water must have a plan in place to permanently provide the 10,825 af that is now delivered from existing reservoirs. Additional water is being provided through a memorandum of agreement with CRWCD for delivery of up to 6,000 af of water from Wolford Mountain Reservoir.

Other sources of water for the 15-Mile Reach include implementation of the Grand Valley Water Management Project that creates a pool of water for the fish in Green Mountain Reservoir. Water users are also exploring ways to increase participation in the expanded coordinated reservoir operations as recommended in the PBO. Superimposing oil shale development at almost any scale on top of this complex agreement is a challenge. The development of senior conditional rights by energy companies may affect the RIP's success through additional depletions. Additionally, depending on USFWS' success in recovering these fish populations, junior rights may be seriously constrained by the PBO.

In the Colorado River, all oil shale development would take place in areas north of Debeque and Parachute, primarily within the Roan Creek and Parachute Creek watersheds. In that case, all the development would be upstream of the 15-Mile Reach, a stretch of the river managed, in part, under the PBO described above. Because the first increment of 60,000 af is, for all practical purposes, spoken for by Denver's Moffat expansion and Northern's Windy Gap Firming Project, only the second increment might be available.[47]

2. White River

Adult Colorado pikeminnow occupy the White River downstream of Taylor Draw Dam near Rangely, Colorado, in relatively high numbers. Adult Colorado pikeminnow in the White River spawn in the Green and Yampa Rivers. Juvenile and sub-adult Colorado pikeminnow also utilize the White River on a year-round basis. Incidental captures of razorback sucker have been recorded in the lower White River.

Interim flow recommendations for the White River were completed in 2004 and are now under USFWS review for possible refinement. This review involves the addition of peak flows to the base flow targets in the 2004 recommendations. Instream-flow filings are on hold pending re-evaluation of how flows will be legally protected in Colorado, but with their protection, whatever form it may take, future depletions will be constrained. When the flow recommendations are available and their review complete, the USFWS RIP office plans to initiate a PBO process that will, among other things, establish depletion limits on the White River in both Colorado and Utah. If the PBO is structured like its neighbor on the Colorado River, oil shale development may likewise face major constraints.

If, in the White River Basin, USFWS were to employ a PBO structured around development increments coupled with habitat restoration activities (i.e., like the 15-Mile Reach PBO), then it is very likely that, in the near future, the White River will also face depletion limits that will be tied to the status of endangered native fish in the basin and that will put constraints on oil shale development capacity.

SECTION VI

CONCLUSION

The prospect of tapping Colorado's enormous deposits of oil shale has tantalized the energy industry for many years. Oil companies have established a large number of conditional water rights in both the Colorado River and White River Basins, proposing the use of pipelines, pumps, springs, wells, and reservoirs to be able to obtain the necessary water. In addition, they and others have acquired a large number of agricultural irrigation ditches in the area for the purpose of shifting the use of the associated water to industrial and other purposes as needed. The result is the accumulation of the rights to use a large share of the water available in that portion of western Colorado.

Companies have pursued obtaining rights largely independently, based on their own needs and interests.[48] Some conditional claims are directly overlapping, such as plans to build dams at essentially the same location. The feasibility of developing some claims is questionable because of their location in sensitive areas, cost, physical availability of sufficient water, or other reasons. In short, even if oil shale production goes forward, many of these conditional rights will never be developed.

Beyond the many issues associated with actual development of existing conditional rights for oil shale use, there are the matters of the ability to develop water under the Upper Colorado Endangered Fishes Recovery Program and the Colorado River Compact. There are unresolved questions about the amount of water that will be available for any new consumptive use. The prospect of substantial water demands associated with oil shale development simply further complicates an already complex future.

Almost certainly, irrigated agriculture in the Piceance Basin would diminish sharply. Flow regimes in the various rivers and creeks would be altered, sometimes dramatically, as dams are constructed to capture peak flows, and flows are pumped into storage. Effects on local fisheries will be a concern as will effects on water quality.

Perhaps even more significant are the potential effects on some existing and all planned water uses, not only in the mainstem Colorado River and White River Basins, but also in the Yampa and San Juan River Basins, and even on the Front Range. Colorado is approaching a zero-sum game in which new depletions for oil shale would displace some existing uses and could well preclude or make more difficult other future uses, dependent on the manner and speed of development. Many of the conditional rights have priorities dating back to the 1950s and 1960s. Their seniority suggests that, if they are developed, they will use up much of Colorado's remaining share of basin water. Such an outcome would obviously have important consequences for the state.

APPENDIX A

CHRONOLOGICAL DEVELOPMENT OF CONDITIONAL WATER RIGHTS FOR OIL SHALE DEVELOPMENT

A. DEVELOPMENT IN THE COLORADO RIVER BASIN

The earliest oil shale conditional water right is the Pumping Pipeline of the Union Oil Company of California. It has a 1949 appropriation date. This pipeline is conditionally decreed for diversion of 118.5 cubic feet per second (cfs) from the Colorado River. It is now owned by EnCana Oil and Gas. The following year, the Pacific Oil Company (now Chevron) established the Dragert Pumping Plant and Pipeline, intended to divert 94 cfs from the Colorado River.

In 1951, the Cities Service Pipeline and Pumping Plant conditionally appropriated 100 cfs further downstream on the Colorado, and Getty Oil established the Pumping Pipeline of the Pacific Western Oil Corporation with a diversion of 56 cfs. OXY now owns the Cities Service Pipeline, while Chevron owns the Pumping Pipeline of the Pacific Western Oil Corporation. Also that year, the Eaton Shale Company established the Eaton Pumping Plant and Pipeline, with a diversion decreed for 100 cfs. This right is now owned by Chevron. This early flurry of activity anticipated direct diversions from the Colorado, using pumps to lift the water through pipelines to the ultimate point of use.

In 1953, the Pacific Oil Company established the Pacific Oil Company Pipeline and Pumping Plant No. 1 and No. 2. There are 2 separate appropriations for No. 1: 57.25 and 114.5 cfs; the diversion rate for No. 2 is 28.63 cfs. Chevron now owns the 57.25 portion of No. 1; Shell Frontier owns No. 2.

In 1954 and 1955, Dow Chemical Company established 3 conditional rights: the Dow Pumping Plant and Pipeline with the right to divert 178 cfs from the Colorado River; the Dow East Middle Fork Pipeline with the right to divert 20 cfs from the East Middle Fork of Parachute Creek; and the Dow Middle Fork Pipeline with the right to divert 10 cfs from the Middle Fork of Parachute Creek. Dow also established 3 decreed reservoirs in the Parachute Creek watershed: Davis Gulch with a decreed capacity of 204 acre-feet (af); East Middle Fork with a capacity of 130 af; and Middle Fork with a capacity of 171 af. ExxonMobil now owns these rights.

In 1956, Sinclair Oil established the Sinclair Oil & Gas Co. Pumping Plant and Pipeline, with the conditional right to divert 33 cfs from the Colorado. This right is now owned by the Puckett Land Company. The Oil Shale Corporation established the Oil Shale Corporation Pipeline and Pumping Plant, with a diversion from the Colorado of 100 cfs. Also that year, Rea Eaton established the Eaton Pipeline No. 1 and No. 2, each with a diversion of 10 cfs from the Colorado River. No. 1 is now owned by the Puckett Land Company; No. 2 is owned by the Battlement Mesa Metro District.

The Shale Pumps and Pipeline, established in 1959, provides for diversion of 11.11 cfs from the Colorado River. This right is now owned by Frac Tech Services.

Attention then shifted further downstream and in the adjacent Roan Creek watershed. The Colorado River Water Conservation District established several water rights with appropriation

dates relating back to 1936 involving the water of Roan Creek. The Kobe Canal would divert 50 cfs from the Colorado River. The Mt. Logan Dam and Reservoir provides for storage of 10,000 af of Roan Creek water in an off-channel location. The Roan Creek Feeder Canal is decreed for 75 cfs from Roan Creek. The Mt. Logan Canal would carry water from the dam at a rate of 40 cfs.

In 1965, Sohio established rights to 4 structures in this watershed. Deer Park Gulch Pumping Pipeline would take 150 cfs of Colorado River water and store it in Deer Park Gulch Reservoir, decreed for a capacity of 1533.6 af. The Clear Creek Feeder Canal and the Conn Creek Feeder Canal are each decreed for a diversion rate of 50 cfs. Shell now owns the Deer Park Pipeline, the Deer Park Gulch Reservoir, the Clear Creek Feeder Canal, and the Conn Creek Feeder Canal.

Also in 1965, Getty Oil established a conditional right for Getty Reservoir No. 1, located on an unnamed tributary to Roan Creek, with a storage capacity of 2,543.9 af and Getty Reservoir No. 2, also located on an unnamed tributary to Roan Creek, with a capacity of 20,670.2 af. In addition, Getty established the Cascade Creek Pipeline that would divert 10 cfs from Cascade, which is a tributary to Conn Creek, also tributary to Roan Creek. Getty established Cascade Canyon Reservoir, to be located on Cascade Creek with a capacity of 619.47 af. The Colorado River, through the Cities Service Pipeline, was decreed as an alternate source of supply for this reservoir. Finally, Cities Service established the Conn Creek Pipeline to take up to 10 cfs from Conn Creek as well as Conn Creek Reservoir, with a capacity of 422.75 af. The Colorado River is also an alternate source of supply for this reservoir. Getty Reservoirs 1 and 2 have been abandoned. OXY USA now owns the rights to Cascade Canyon Reservoir, Cascade Creek Pipeline, Conn Creek Pipeline, and Conn Creek Reservoir.

In that same year, an individual established rights to Roan Creek Reservoir. Subsequently, Getty purchased the rights to Long Point Reservoir, which were senior, and transferred these rights to Roan Creek Reservoir. This reservoir holds a 1961 priority for 12,397 af of storage. The right is now owned by Chevron Texaco.

In 1967, Getty established the Getty-Sleepy Gulch Reservoir, with a capacity of 6,538 af. Sleepy Gulch is tributary to Roan Creek. Getty also established Trail Gulch Reservoir in Roan Creek, with a capacity of 5,669.21 af. Sleepy Gulch is now owned by Texaco, while The Oil Shale Corporation owns Trail Gulch.

Occidental (now OXY USA) established the Logan Wash Pump No. 1 in Roan Creek with a 1979 priority date. This right is decreed for 1.1 cfs absolute and 2.9 cfs conditional.

The Main Elk Reservoir was established with a 1963 priority date on Main Elk Creek above the Town of New Castle, with a capacity of 34,922 af. Also established was the Main Elk Wheeler G Pipeline with a decreed rate of diversion of 40 cfs from Main Elk Creek. These rights are now owned by Exxon.

Even further upstream are the Deep Creek Reservoir and Deep Creek Pipeline, established by ARCO with a 1966 priority date. The reservoir had a decreed capacity of 14,557 af, and the pipeline was decreed for a diversion rate of 33 cfs. These rights have been abandoned.

The Roan Plateau Pumping Pipeline, decreed to divert 100 cfs from the Colorado River, has a 1964 appropriation date. It is owned by Humble Oil Company (Exxon). Humble Oil established the Humble Division Forebay Pump with a 1966 appropriation date, providing for the storage of 8,582 af of Colorado River water. This right has been abandoned.

Chevron established Parachute Creek Reservoir with an appropriation date of 1966 and a capacity of 33,733 af. Water is to come primarily from the Colorado River via the Eaton Pumping Plant and Pipeline, the Dragert Pumping Plant and Pipeline, and the Pumping Pipeline of the Union Oil Company of California.

ARCO then established the Starkey Gulch Reservoir and the South Starkey Gulch Reservoir, on tributaries to Parachute Creek, with 1967 priority dates. South Starkey has a decreed capacity of 5,541 af, and Starkey has a decreed capacity of 7,360 af. In addition to storing legally available water from Starkey Gulch, the reservoirs were decreed to store water appropriated under other rights from the Colorado River, Deep Creek, and Thompson Creek. South Starkey is now owned by Chevron. Starkey is owned by the Puckett Land Company.

Getty established the Getty West Fork of Parachute Creek Reservoir, with a decreed capacity of 4,658 af, also with a 1967 appropriation date. Water is to come primarily from the Colorado River via the Pumping Pipeline of the Pacific Western Oil Corporation. This right is now owned by Chevron Texaco.

The Colony Development Corporation and ARCO obtained a decree for the enlargement of Davis Gulch Reservoir in Parachute Creek by an additional 996 af, to a total capacity of 1,200 af, with a 1974 appropriation date. They also obtained an enlargement of Middle Fork Reservoir by 1438.4 af. Exxon now owns these rights.

Photo courtesy of The Story Group

In 1982, Exxon established the Lower East Middle Fork Reservoir in Parachute Creek, with a decreed capacity of 6,200 af. The water is to come primarily from the Colorado River via the Dow Pumping Plant and Pipeline.

Also in 1982, Exxon established 5 additional storage rights, each for 160 af: the Mahaffey Terminal Reservoir and the Allenwater Creek Terminal Reservoir, both in the Colorado River; the Rulison Gulch Terminal Reservoir and the Sheep Trail H Terminal Reservoir in Parachute Creek; and the Cottonwood G Terminal Reservoir in Cottonwood Gulch. Exxon also established the Mahaffey Pumping Plant and Pipeline, to withdraw 60 cfs from the Colorado River.

In 1983, Getty filed on 11 springs in Parachute Creek, with a collection rate of 1.15 cfs. These rights are now owned by Chevron. Shortly thereafter, Cities Service filed on five springs in Parachute Creek, with a collective rate of 0.22 cfs. OXY USA now owns Cities Service.

Shell holds 10 decrees for springs in Clear and Conn Creeks, tributaries to Roan Creek. The appropriation date is 1982. The collective flow rate for these springs is 0.47 cfs. Getty filed on 17 springs in Clear Creek, with an appropriation date of 1983. Chevron now owns these rights. Cities Service filed shortly thereafter on 13 springs in Clear and Conn Creeks. OXY now owns these rights.

B. DEVELOPMENT IN THE WHITE RIVER BASIN

Initiation of conditional water rights for oil shale in the White River Basin was not far behind that in the Colorado River Basin. Two individuals established rights to Stillwater Reservoir, Stillwater Power Plant, and South Fork-Piceance Pipeline on the South Fork of the White River with a 1955 appropriation date. The reservoir is decreed to store 12,548 af, the power plant 300 cfs, and the pipeline 70 cfs. Exxon now owns the reservoir decree, while Shell owns the power plant and pipeline decrees.

The Yellow Jacket Water Conservancy District initiated plans for the Yellow Jacket Project, located in the North Fork of the White River, in the early 1950s. This project includes Ripple Creek Reservoir on the North Fork, with a decreed capacity of 27,992 af; Lost Park Reservoir on Lost Creek, with a decreed capacity of 33,541 af; Lost Creek Feeder Canals 1 and 2, which would bring water to Lost Park Reservoir, with headgates on tributaries to the Williams Fork River in the Colorado River Basin, both decreed for 100 cfs; and the Yellow Jacket Canal, which would divert water out of the North Fork and carry it 38 miles for distribution to different uses, with a decreed capacity of 500 cfs.

In 1957, the Energy Resources Technology Land Company established claims to water from several tributaries of the South Fork as part of the ERTL Pipeline. Headgate No. 1 is located on Buck Creek; Headgate No. 2 is located on Wagon Wheel Creek; Headgate No. 3 is located on the East Branch of Patterson Creek; and Headgate No. 4 is located on the West Branch of Patterson Creek. The original decree was for 30 cfs. Now Headgate 1 is decreed for 15 cfs, Headgate 2 for 1 cfs, Headgate 3 for 7 cfs, and Headgate 4 for 7 cfs. Tosco now owns these rights.

Also in 1961, the Socony-Mobil Oil Company initiated an appropriation for Boies Reservoir, Piceance Pipeline, and Piceance Canal. The sources of water for Boies Reservoir are Black Sulfur Creek, Fawn Creek, Piceance Creek, and water diverted into Piceance Creek from other drainages. The reservoir is decreed for storage of 31,020.8 af. The canal is decreed for 50 cfs. These rights are now owned by ExxonMobil.

Later that same year, the CRWCD established the Flattops Project. The remaining elements of this project include the Rio Blanco Reservoir, to be constructed on the South Fork, and the Patterson Creek Collection System. The reservoir is decreed for 131,035 af. The collection system is decreed for 75 cfs.

Shortly thereafter, the Moon Lake Electric Association initiated the Moon Lake-Staley Mine Pipeline and Reservoir on the White River. The pipeline is decreed for 125 cfs. In 1964, Moon Lake appropriated an additional 55 cfs for this pipeline, which is now owned by Blue Mountain Energy.

In 1962, the CRWCD initiated an appropriation for the Rangely Project, including a reservoir. Subsequently, CRWCD changed the place of storage for 49,256 af to the Wolf Creek Reservoir, to be located on the White River.

In 1963, the Humble Oil Company established Ryan Gulch Reservoir, to be located on Piceance Creek, with a capacity of 22,635.2 af. Simultaneously, it established the White River Pumping

Pipeline, to withdraw 100 cfs of water from the White River for delivery to Ryan Gulch Reservoir. These rights are now owned by Exxon.

The same two individuals who first initiated an oil shale-related conditional right in the White Basin established the White River Pumping Pipeline in late 1963. The pipeline is decreed to divert 100 cfs from the White River. The owners are Wheeler and Phillips.

In 1964, Humble established an appropriation for Jumps Cabin Reservoir, to be located on West Hunter Creek, with a decreed capacity of 7,868.8 af. Humble is still listed as the owner. At the same time, it established Howells Cabin Reservoir, to be constructed on Willow Creek, a tributary of Piceance Creek, with a decreed capacity of 8,096 af. Also established with the same priority date is Dietz Cabin Reservoir, also to be constructed on Willow Creek, with a decreed capacity of 29,900 af. This right is currently owned by an individual, Pat Johnson. Later in 1964, Humble established the White River Pipeline No. 2, decreed for 120 cfs. Exxon currently owns this right.

Also in 1964, the Fourteen Mile Land Company initiated the Fourteen Mile Reservoir 1, to be located on Fourteen Mile Creek, with a decreed capacity of 85,988 af. In addition to taking water from Twelve Mile, Thirteen Mile, and Fourteen Mile Creeks, all tributaries of Piceance Creek, water is to come from the South Fork of the White River through the South Fork-Piceance Pipeline and from the White River. Shell Frontier currently owns this right. The same company also established the White River-Fourteen Mile Pipeline at this time, with the decreed right to divert 200 cfs from the White River. This right is now owned by Shell Frontier.

Just two days later, the same company established the South Fork Reservoir and the South Fork Pipeline, both located on the South Fork of the White River. The reservoir is decreed for a capacity of 85,342 af. The pipeline is decreed to divert 100 cfs. Both of these rights are now owned by Shell.

In 1967, Mobil Oil Company established appropriations for the Hunter Creek Wells, Nos. 1-30. The source of water is the Parachute Creek member of the Green River Formation. Each well is decreed to withdraw 1 cfs. In a subsequent proceeding, Mobil obtained recognition that the Hunter Creek Wells are part of an integrated water supply system that also includes Boies Reservoir, Piceance Pipeline, and Piceance Canal.

In 1968, the Superior Oil Company established a diversion and storage project that included the Superior Oil Company Pipeline and Terminal Reservoirs and the Superior Oil Company Storage System. The pipeline is decreed to divert 12 cfs from the White River and carry water to 2 terminal reservoirs, with a combined capacity of 800 af. Superior obtained an enlargement, adding an additional 12 cfs in a subsequent filing. The storage system consists of 4 reservoirs and 4 pipelines. Crooked Wash Reservoir is decreed for 11,800 af, Wray Gulch Reservoir for 13,500 af, Blacks Gulch Reservoir for 13,900 af, and Kellog Gulch Reservoir for 3,700 af. Water for these reservoirs would come from the White River through pipelines with the names of the reservoir sites, each decreed for a capacity of 100 cfs. Superior also established the Superior Oil Company Pumpback Pipeline Nos. 1, 2, and 3-1, each decreed for 12 cfs. These rights are now owned by Exxon.

An entity called White River Resources then established the White River-Piceance Pipeline, decreed to carry 100 cfs from the White River to Powell Park Reservoir, to be constructed in the Piceance Basin. The reservoir is decreed for storage of 75,970 af. These rights are now owned by two individuals, Walter Wilson and Thomas Cameron.

The Atlantic Richfield Company initiated the White River Figure Four Pipeline later that same year, with a decreed capacity of 70 cfs to come from the White River. This right is now owned by the Puckett Land Company.

Industrial Resources, Inc. initiated the appropriation for the Wolf Ridge Reservoir and the Wolf Ridge Feeder Pipeline in 1966, but did not obtain an adjudication until 1971. The reservoir has a decreed capacity of 7,379.7 af. The pipeline has a decreed capacity of 100 cfs with its point of diversion on the White River. These rights are now owned by Natural Soda, Inc.

In 1967, the Oil Shale Corporation (Tosco) established the Ohio/Ertl Pipeline and the Story Gulch/Parachute Pipeline, each decreed to divert 55 cfs from the White River. Simultaneously, Tosco established Hunter Creek Reservoir, with a decreed capacity of 24,362 af; Story Gulch Reservoir, with a decreed capacity of 10,200 af; and Miller Creek Reservoir, with a decreed capacity of 22,600 af.

In 1971, two individuals — Winston Wheeler and L.E. Phillips — established two new appropriations: Wolf Creek Reservoir and Wolf Creek Pipeline. The reservoir is decreed for 35,000 af; the pipeline is decreed to divert 70 cfs from the White River. These rights are now owned by Exxon.

In 1972, the CRWCD initiated the Wray Gulch Pipeline, the Wray Gulch Dam and Reservoir, the Strawberry Creek Pipeline, and the Strawberry Creek Dam and Reservoir. The Wray Gulch pipeline is decreed to divert 450 cfs from the White River. The Wray Gulch Reservoir has a decreed capacity of 29,374 af. The Strawberry Creek pipeline has a decreed capacity of 400 cfs, and Strawberry Creek Reservoir has a decreed capacity of 75,957 af. In 1974, the CRWCD obtained a change of right to shift 31,944 af of water from the Rangely Enlargement to Wolf Creek Reservoir. Wolf Creek Reservoir now is decreed to store 81,200 af.

In 1976, the Yellow Jacket WCD established the Sawmill Mountain Reservoir and the North Fork Feeder Conduit. The reservoir is decreed to store 80,000 af; the conduit is decreed to carry 500 cfs of water from the North Fork.

Also in 1976, Tosco established the Miller Creek Reservoir with the right to store 23,300 af of water, including that brought from the White River through the Miller Creek Pipeline with its 100-cfs capacity. In 1979, Tosco established an enlargement of Story Gulch Reservoir from 10,200 af to 25,000 af.

In 1981, the Yellow Jacket WCD established the Colorado White River Reservoir at Warner Point, with a decreed capacity of 105,000 af. It also established the Colorado White River Hydroelectric Plant, decreed for 500 cfs.

In 1984, Mobil established the Mobil Pumping Station and Pipeline, with a decreed capacity of 200 cfs. Its purpose is to exchange water upstream to Taylor Draw as necessary to enable pumping of up to 30 cfs from its Hunter Creek Wells. This right is now owned by Exxon.

APPENDIX B

CONDITIONAL WATER RIGHTS FOR OIL SHALE DEVELOPMENT

Table B-1.
Colorado River Basin – Conditional Rights

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
1	Kobe Canal	Colorado River	Ditch	48.3	0	6/30/1936	Colorado River Water Cons Dist
2	Mt Logan Canal	Roan Creek	Ditch	75	0	6/30/1936	Colorado River Water Cons Dist
3	Mt Logan Dam & Reservoir	Roan Creek	Reservoir	0	10,000	6/30/1936	Colorado River Water Cons Dist
4	Galyean Well	Roan Creek	Well	0.5	0	5/15/1948	Texaco Inc
5	Union 76 Water Well No 3	Parachute Creek	Well	0.066	0	2/14/1949	Union Oil - American Soda
6	Union 76 Water Well No 2	Parachute Creek	Well	0.124	0	2/14/1949	Union Oil - American Soda
7	Pumping Pl Union Oil Cal	Colorado River	Pipeline	110.16	0	2/14/1949	EnCana Oil & Gas Company
8	Roan Creek Reservoir	Roan Creek	Reservoir	0	71,300	1/7/1950	Chevron Texaco Shale Oil Co
9	Dragert Pump Plant & Pl	Colorado River	Pipeline	194	0	1/7/1950	Chevron Shale Oil Cp
10	Hayward & Wyatt Pl	Colorado River	Pipeline	12.725	0	2/2/1950	Exxon Colony Project
11	Getty Pipeline	Colorado River	Pipeline	56	0	9/3/1950	Chevron Texaco Shale Oil Co
12	Cities Service Pl And Pp	Colorado River	Pipeline	100	0	8/2/1951	OXY USA Wtp Lp
13	Shale Pumps & Pl	Colorado River	Pipeline	11.11	0	10/7/1951	Frac Tech Services
14	Pacific Oil Co Pl No 1	Colorado River	Pipeline	57.25	0	6/9/1953	Chevron Shale Oil
15	Pacific Oil Co Pl No 2	Colorado River	Pipeline	27.63	0	6/9/1953	Shell Frontier Oil & Gas
16	Flattops Proj Bearwl Res	Canyon Creek	Reservoir	0	96,488.9	6/28/1954	Colorado River Water Cons Dist
17	Flattops Proj Bearwl Con	Canyon Creek	Pipeline	200	0	6/28/1954	Colorado River Water Cons Dist
18	Flattops Proj Bench Flum	Canyon Creek	Ditch	254	0	6/28/1954	Colorado River Water Cons Dist
19	Flattops Proj Poss Coll1	Canyon Creek	Ditch	175	0	6/28/1954	Colorado River Water Cons Dist

Table B-1. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
20	East Middle Fork Res	Parachute Creek	Reservoir	0	130.558	9/17/1954	Exxon Oil Company
21	Dow E Middle Fork Pl	Parachute Creek	Pipeline	13.54	0	10/19/1954	Exxon Mobil Corp
22	Dow Middle Fk Pipeline	Parachute Creek	Pipeline	1.088	0	10/20/1954	Exxon Mobil Corp
23	Dow Pump Plant And Pl	Colorado River	Pipeline	187.11	0	1/24/1955	Exxon Mobil Corp
24	Sinclair Oil & Gas Pump	Colorado River	Pipeline	33	0	11/29/1956	Puckett Land Company
25	Eaton Pipeline No 1	Colorado River	Pipeline	9	0	12/17/1956	Puckett Land Company
26	Oil Shale Corp P & Pl	Colorado River	Pipeline	100	0	12/3/1956	Puckett Land Company
27	Virginia Mesa Reservoir	Colorado River	Reservoir	0	50.52	7/18/1957	Chevron Shale Oil
28	Bluestone Project	Colorado River	Ditch	220	0	3/27/1958	Colorado River Water Cons Dist
29	Letson Well	Roan Creek	Well	0.5	0	9/18/1959	Texaco Inc
30	Main Elk Wheeler G Pl	Main Elk Creek	Pipeline	40	0	6/19/1963	Main Elk Corp & Exxon Mobil
31	Mahaffey Pumping P & Pl	Colorado River	Pipeline	60	0	6/19/1963	Main Elk Corp & Exxon Mobil
32	Sheep Trail H Term Res	Parachute Creek	Reservoir	0	160	6/19/1963	Main Elk Corp/ Mobil
33	Cottonwood G Term Res	Cotton-wood G.	Reservoir	0	160	6/19/1963	Main Elk Corp/ Mobil
34	Mahaffey Terminal Res	Colorado River	Reservoir	0	160	6/19/1963	Main Elk Corp/ Mobil
35	Allenwater Cr Term Res	Colorado River	Reservoir	0	160	6/19/1963	Main Elk Corp/ Mobil
36	Rulison Gulch Term Res	Parachute Creek	Reservoir	0	160	6/19/1963	Main Elk Corp/ Mobil
37	Main Elk Reservoir	Main Elk Creek	Reservoir	0	34,922	6/19/1963	Main Elk Corp/ Mobil
38	Clear Creek Feeder Pl	Clear Creek	Pipeline	50	0	2/8/1965	Shell Frontier Oil & Gas Inc
39	Deer Park Gulch Res	Clear Creek	Reservoir	0	1,533.6	2/8/1965	Shell Frontier Oil & Gas Inc
40	Deer Park Gulch Pmp & Pl	Colorado River	Pipeline	150	0	2/8/1965	Shell Frontier Oil & Gas Inc
41	Conn Creek Feeder Pl	Conn Creek	Pipeline	50	0	2/8/1965	Shell Frontier Oil & Gas Inc
42	Una Reservoir	Colorado River	Reservoir	0	369,460	3/16/1965	Colorado River Water Cons Dist
43	Una Res Power Conduit	Colorado River	Ditch	2700	0	3/16/1965	Colorado River Water Cons Dist
44	Getty Reservoir No 2	Roan Creek	Reservoir	0	20,670.2	5/17/1965	Texaco Inc
45	Getty Reservoir No 1	Roan Creek	Reservoir	0	2,543.9	5/17/1965	Texaco Inc
46	Conn Creek Pipeline	Conn Creek	Pipeline	10	0	8/25/1966	OXY USA Wtp Lp

Table B-1. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
47	Cascade Canyon Reservoir	Conn Creek	Reservoir	0	619.47	8/25/1966	OXY USA Wtp Lp
48	Cascade Canyon Pipeline	Conn Creek	Pipeline	10	0	8/25/1966	OXY USA Wtp Lp
49	Conn Creek Reservoir	Conn Creek	Reservoir	0	422.75	8/25/1966	OXY USA Wtp Lp
50	Thompson Creek Res	Thomp-son Creek	Reservoir	0	23,893	12/17/1966	Puckett Land Co
51	Thompson Creek Pipeline	Thomp-son Creek	Pipeline	33	0	12/17/1966	Puckett Land Co
52	Starkey Gulch Reservoir	Parachute Creek	Reservoir	0	7,360	2/20/1967	Pucket Land Company
53	Getty-Sleepy Gulch Res	Clear Creek	Reservoir	0	6,538	6/27/1967	Texaco Inc
54	Getty W Fk Parachute Cr	Parachute Creek	Reservoir	0	4,658	6/27/1967	Chevron Texaco Shale Oil Co
55	Trail Gulch Res Alt Pt	Carr Creek	Reservoir	0	950.79	9/23/1967	Oil Shale Corp
56	Trail Gulch Reservoir	Roan Creek	Reservoir	0	5,669.21	9/23/1967	Oil Shale Corp
57	Paradise Reservoir	Colorado River	Reservoir	0	69,895.7	3/23/1968	Pure Cycle
58	Logan Wash Mine	Roan Creek	Spring	0.11	0	9/1/1972	Occidental Shale Oil
59	Lw-27 Well	Roan Creek	Spring	0.11	0	3/30/1973	Occidental Shale Oil
60	Logan Wash Mine No 3-C	Roan Creek	Spring	0.11	0	2/1/1974	Occidental Shale Oil
61	Davis Gulch Reservoir	Parachute Creek	Reservoir	0	1,194	9/30/1974	Exxon Oil Company
62	Middle Fork Reservoir	Parachute Creek	Reservoir	0	1,470	9/30/1974	Exxon Mobil Corp
63	Ww-1 Well	Roan Creek	Well	0.165	0	11/22/1974	Occidental Shale Oil
64	Logan Wash Pump No 1	Roan Creek	Spring	2.9	0	10/30/1979	Occidental Shale Oil
65	Lower E Middle Fork Res	Parachute Creek	Reservoir	0	6,200	2/2/1982	Exxon Oil Company
66	Pacific Spring No 2	Clear Creek	Spring	0.06	0	5/1/1982	Shell Western E & P
67	Pacific Spring No 3	Clear Creek	Spring	0.03	0	5/1/1982	Shell Western E & P
68	Pacific Spring No 9	Conn Creek	Spring	0.04	0	5/1/1982	Shell Western E & P
69	Pacific Spring No 10	Conn Creek	Spring	0.04	0	5/1/1982	Shell Western E & P
70	Pacific Spring No 1	Clear Creek	Spring	0.02	0	5/1/1982	Shell Western E & P
71	Pacific Spring No 7	Clear Creek	Spring	0.06	0	5/1/1982	Shell Western E & P
72	Pacific Spring No 8	Clear Creek	Spring	0.08	0	5/1/1982	Shell Western E & P

Table B-1. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
73	Pacific Spring No 4	Conn Creek	Spring	0.02	0	5/1/1982	Shell Western E & P
74	Pacific Spring No 5	Conn Creek	Spring	0.07	0	5/1/1982	Shell Western E & P
75	Pacific Spring No 6	Conn Creek	Spring	0.05	0	5/1/1982	Shell Western E & P
76	Getty Spring 15b	Clear Creek	Spring	0.027	0	7/1/1983	Chevron Texaco Shale Oil Co
77	Getty Spring 17a	Clear Creek	Spring	0.007	0	7/1/1983	Chevron Texaco Shale Oil Co
78	Getty Spring 20a	Clear Creek	Spring	0.037	0	7/1/1983	Chevron Texaco Shale Oil Co
79	Getty Spring 1b	Parachute Creek	Spring	0.097	0	7/1/1983	Chevron Texaco Shale Oil Co
80	Getty Spring 10a	Clear Creek	Spring	0.787	0	7/1/1983	Chevron Texaco Shale Oil Co
81	Getty Spring 12c	Clear Creek	Spring	0.027	0	7/1/1983	Chevron Texaco Shale Oil Co
82	Getty Spring 09a	Clear Creek	Spring	0.327	0	7/1/1983	Chevron Texaco Shale Oil Co
83	Getty Spring 11e	Clear Creek	Spring	0.007	0	7/1/1983	Chevron Texaco Shale Oil Co
84	Getty Spring 11b	Clear Creek	Spring	0.027	0	7/1/1983	Chevron Texaco Shale Oil Co
85	Getty Spring 11c	Clear Creek	Spring	0.027	0	7/1/1983	Chevron Texaco Shale Oil Co
86	Getty Spring 19a	Clear Creek	Spring	0.007	0	7/1/1983	Chevron Texaco Shale Oil Co
87	Getty Spring 10b	Clear Creek	Spring	0.017	0	7/1/1983	Chevron Texaco Shale Oil Co
88	Getty Spring 15a	Clear Creek	Spring	0.047	0	7/1/1983	Chevron Texaco Shale Oil Co
89	Getty Spring 18a	Clear Creek	Spring	0.637	0	7/1/1983	Chevron Texaco Shale Oil Co
90	Getty Spring 14e	Clear Creek	Spring	0.027	0	7/1/1983	Chevron Texaco Shale Oil Co
91	Getty Spring 11a	Clear Creek	Spring	0.187	0	7/1/1983	Chevron Texaco Shale Oil Co
92	Getty Spring 16b	Clear Creek	Spring	0.057	0	7/1/1983	Chevron Texaco Shale Oil Co
93	Getty Spring 14a	Clear Creek	Spring	0.127	0	7/1/1983	Chevron Texaco Shale Oil Co
94	Cities Service Spg 41	Conn Creek	Spring	0.03	0	7/19/1983	OXY USA Inc, C/O Legal Div
95	Cities Service Spg 17	Conn Creek	Spring	0.05	0	7/19/1983	OXY USA Inc, Legal Div
96	Cities Service Spg 39	Conn Creek	Spring	0.09	0	7/19/1983	OXY USA Inc, Legal Div
97	Cities Service Spg 07	Clear Creek	Spring	0.12	0	7/19/1983	OXY USA Inc, C/O Legal Div
98	Cities Service Spg 40	Conn Creek	Spring	0.03	0	7/19/1983	OXY USA Inc, C/O Legal Div
99	Cities Service Spg 13	Conn Creek	Spring	0.05	0	7/19/1983	OXY USA Inc, C/O Legal Div

Table B-1. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
100	Cities Service Spg 18	Conn Creek	Spring	0.05	0	7/19/1983	OXY USA Inc, C/O Legal Div
101	Cities Service Spg 08	Clear Creek	Spring	0.02	0	7/19/1983	OXY USA Inc, C/O Legal Div
102	Cities Service Spg 11a	Conn Creek	Spring	0.02	0	7/19/1983	OXY USA Inc, C/O Legal Div
103	Cities Service Spg 03	Conn Creek	Spring	0.02	0	7/19/1983	OXY USA Inc, C/O Legal Div
104	Cities Service Spg 22	Conn Creek	Spring	0.05	0	7/19/1983	OXY USA Inc, C/O Legal Div
105	Cities Service Spg 38	Conn Creek	Spring	0.06	0	7/19/1983	OXY USA Inc, C/O Legal Div
	Total structures: 105			**Total: 4,996.03 cfs**	**Total: 736,770.6 af**		

Table B-2.
White River Basin – Conditional Rights

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
1	Lost Park Reservoir	Lost Ck	Reservoir	0	33,541	11/9/1953	Yellow Jacket Water Cons Dist
2	Lost Park Feeder C. 1	Tributar-ies-N. Fk	Ditch	100	0	11/9/1953	Yellow Jacket Water Cons Dist
3	Lost Park Feeder C. 2	Tributar-ies-N. Fk	Ditch	100	0	11/9/1953	Yellow Jacket Water Cons Dist
4	Yellow Jacket Canal	North Fork	Ditch	500	0	11/9/1953	Yellow Jacket Water Cons Dist
5	Ripple Creek Reservoir	North Fork	Reservoir	0	27,992	11/19/1953	Yellow Jacket Water Cons Dist
6	Stillwater Power Plant	South Fork	Pipeline	300	0	5/29/1955	Shell Frontier Oil & Gas Inc
7	Stillwater Reservoir	South Fork	Reservoir	0	12,548	5/29/1955	Exxon Mobil Corporation
8	Miller Creek Pumping Pl	White River	Pipeline	100	0	5/26/1957	Tosco Corporation
9	Ertl Pipeline Hg 1	Buck Ck	Pipeline	15	0	5/26/1957	Tosco Corporation
10	Ertl Pipeline Hg 2	Wagon Wheel Ck	Pipeline	1	0	5/26/1957	Tosco Corporation
11	Ertl Pipeline Hg 3	Patterson Ck	Pipeline	7	0	5/26/1957	Tosco Corporation
12	Ertl Pipeline Hg 4	Patterson Ck	Pipeline	7	0	5/26/1957	Tosco Corporation
13	Boies Reservoir	Black Sulphur Ck	Reservoir	0	31,020.8	7/10/1961	Exxon Mobil Corporation
14	Piceance Canal	Piceance Ck	Pipeline	50	0	7/10/1961	Exxon Mobil Corporation
15	Flattops Tunnel	South Fork	Pipeline	254	0	10/31/1961	Colorado River Water Cons Dist
16	Piceance Basin Pl Coll S	South Fork	Pipeline	60	0	10/31/1961	Colorado River Water Cons Dist

Table B-2. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
17	Rangely Reservoir	White River	Reservoir	0	131,034.5	10/31/1961	Colorado River Water Cons Dist
18	Patterson Cr Coll. Sys	Patterson Ck	Pipeline	75	0	10/31/1961	Colorado River Water Cons Dist
19	Rio Blanco Reservoir	South Fork	Reservoir	0	131,034.5	10/31/1961	Colorado River Water Cons Dist
20	Strawberry Creek Res	Straw-berry Ck	Reservoir	0	7,5957	10/31/1961	Colorado River Water Cons Dist
21	Wray Gulch Dam & Res	Wray Gulch	Reservoir	0	2,9374	10/31/1961	Colorado River Water Cons Dist
22	Douglas Canal	White River	Ditch	620	0	7/3/1962	Colorado River Water Cons Dist
23	Wolf Ck Res(Crwcd)	White River	Reservoir	0	162,400	7/3/1962	Colorado River Water Cons Dist
24	Wolf Ck Res	Wolf Ck	Reservoir	0	35,000	7/3/1962	Exxon Mobil Corporation
25	Ryan Gulch Reservoir	Piceance Ck	Reservoir	0	22,635.2	12/15/1963	Exxon Mobil Corporation
26	White River Pumping Pl	White River	Pipeline	100	0	12/15/1963	Exxon Mobil Corporation
27	Jumps Cabin Res	West Hunter Ck	Reservoir	0	7,868.8	5/27/1964	Humble Oil Company
28	Howells Cabin Res	Willow Ck/Pic. Ck	Reservoir	0	8,096	5/27/1964	?
29	Fourteen Mile Res 1	Fourteen Mile Ck	Reservoir	0	60,000	6/24/1964	Shell Frontier Oil & Gas Inc
30	White R. Fourteen M. Pl	White River	Pipeline	200	0	9/12/1964	Shell Frontier Oil & Gas Inc
31	South Fork Pipeline	South Fork	Pipeline	100	0	9/14/1964	Shell Frontier Oil & Gas Inc
32	South Fork Reservoir	South Fork	Reservoir	0	8,5342	9/14/1964	Shell Frontier Oil & Gas Inc
33	White River Pl No 2	White River	Pipeline	120	0	10/12/1964	Exxon Mobil Corporation
34	South Fork Piceance Pl	South Fork	Pipeline	70	0	5/29/1965	Exxon Mobil Corporation
35	Wolf Ridge Feeder Pl	White River	Pipeline	100	0	11/19/1966	Ehs Manager, Natural Soda Inc
36	Wolf Ridge Res	Yellow Ck	Reservoir	0	7,380	11/19/1966	Ehs Manager, Natural Soda Inc
37	Hunter Ck Res	Hunter Ck	Reservoir	0	24,362	2/28/1967	Tosco Corporation
38	Ohio Ertl Pl	White River	Pipeline	55	0	2/28/1967	Tosco Corporation
39	Story G Parachute Pl	White River	Pipeline	55	0	2/28/1967	Tosco Corporation
40	Story Gulch Res	Story Gulch	Reservoir	0	25,000	2/28/1967	Tosco Corporation
41	Colo Min Well No 28-1	Yellow Ck	Well	4.94	0	2/28/1967	Ehs Manager, Natural Soda Inc
42	Colo Min Well No 14-1	Yellow Ck	Well	4.94	0	2/28/1967	Ehs Manager, Natural Soda Inc

Table B-2. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
43	Dunn Well No 20-1	Yellow Ck	Well	4.94	0	2/28/1967	Ehs Manager, Natural Soda Inc
44	Savage Well No 24-1	Yellow Ck	Well	4.94	0	2/28/1967	Ehs Manager, Natural Soda Inc
45	Hunter Cr Wells	Hunter Ck	Well	30	0	3/8/1967	Exxon Mobil Corporation
46	Superior Oil Term Res	White River	Reservoir	0	800	5/14/1968	Exxon Mobil Corporation
47	Superior Oil Pl	White River	Pipeline	24	0	5/14/1968	Exxon Mobil Corporation
48	Miller Ck Res	Miller Ck	Reservoir	0	45,900	7/18/1968	Tosco Corporation
49	Blacks Gulch Pipeline	White River	Pipeline	100	0	9/1/1968	Exxon Mobil Corporation
50	Blacks Gulch Res	Blacks Gulch	Reservoir	0	13,900	9/1/1968	Exxon Mobil Corporation
51	Crooked Wash P.L.	White River	Pipeline	100	0	9/1/1968	Exxon Mobil Corporation
52	Crooked Wash Res	Crooked Wash	Reservoir	0	11,800	9/1/1968	Exxon Mobil Corporation
53	Kellogg Gulch P.L.	White River	Pipeline	100	0	9/1/1968	Exxon Mobil Corporation
54	Kellogg Gulch Res	Kellogg Gulch	Reservoir	0	3700	9/1/1968	Exxon Mobil Corporation
55	Wray Gulch Res	Wray Gulch	Reservoir	0	13,500	9/1/1968	Exxon Mobil Corporation
56	Superior Pumpback Pl 1	White River	Pipeline	12	0	10/5/1968	Exxon Mobil Corporation
57	Superior Pumpback Pl 2	White River	Pipeline	12	0	10/5/1968	Exxon Mobil Corporation
58	Superior Pumpback Pl 3	White River	Pipeline	12	0	10/5/1968	Exxon Mobil Corporation
59	Wolf Ck Pl	White River	Pipeline	70	0	9/30/1971	Exxon Mobil Corporation
60	Tg 71-5 Well	Stewart Gulch	Well	1.111	0	11/29/1971	Oil Shale Corporation
61	Tg 71-4 Well	Stewart Gulch	Well	0.888	0	12/3/1971	Oil Shale Corporation
62	Tg 71-3 Well	Stewart Gulch	Well	0.444	0	12/13/1971	Oil Shale Corporation
63	Strawberry Creek Pl	White River	Pipeline	400	0	6/16/1972	Colorado River Water Cons Dist
64	Wray Gulch Pipeline	White River	Pipeline	100	0	7/19/1972	Exxon Mobil Corporation
65	Wray Gulch Pl (Crwcd)	White River	Pipeline	450	0	7/19/1972	Colorado River Water Cons Dist
66	Liberty Bell Well No 12	Story Gulch	Well	0.888	0	12/5/1972	Oil Shale Corporation
67	Camp Bird Well 12	Trib.-Piceance Ck	Well	0.444	0	9/6/1973	Oil Shale Corporation
68	Camp Bird Well 12a	Trib.-Piceance Ck	Well	0.444	0	9/6/1973	Oil Shale Corporation

Table B-2. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
69	Colo White R Hyd.Plant	White River	Pipeline	500	0	9/6/1973	Yellow Jacket Water Cons Dist
70	North Fork Fdr Conduit	North Fork	Pipeline	500	0	10/7/1976	Yellow Jacket Water Cons Dist
71	Sawmill Mountain Res	Big Beaver Ck	Reservoir	0	80,000	10/7/1976	Yellow Jacket Water Cons Dist
72	Ohio Well No 41	West Willow Ck	Well	0.044	0	8/22/1977	Oil Shale Corporation
73	Colo White R Res	White River	Reservoir	0	105,000	11/17/1981	Yellow Jacket Water Cons Dist
74	Getty Spring 3b	Willow Ck/Pic. Ck	Spring	0.637	0	7/1/1983	Getty Oil
75	Mobil Pump Station Pl	White River	Pipeline	200	0	5/4/1984	Exxon Mobil Corporation
76	Larson Res	Trib.- Piceance Ck	Reservoir	0	1,200	4/5/1988	Ehs Manager, Natural Soda Inc
77	Swepi Spring 1	Duck Ck	Spring	0.367	0	6/13/1988	Shell Frontier Oil & Gas Inc
78	Swepi Spring 10	Spruce Gulch	Spring	0.489	0	6/13/1988	Shell Frontier Oil & Gas Inc
79	Swepi Spring 13	Stake Springs Ck	Spring	0.222	0	6/13/1988	Shell Frontier Oil & Gas Inc
80	Swepi Spring 2	Water Gulch	Spring	0.233	0	6/13/1988	Shell Frontier Oil & Gas Inc
81	Swepi Spring 3	Water Gulch	Spring	0.178	0	6/13/1988	Shell Frontier Oil & Gas Inc
82	Swepi Spring 5	Water Gulch	Spring	0.044	0	6/13/1988	Shell Frontier Oil & Gas Inc
83	Swepi Spring 6	Corral Gulch	Spring	0.178	0	6/13/1988	Shell Frontier Oil & Gas Inc
84	Swepi Spring 7	Corral Gulch	Spring	0.078	0	6/13/1988	Shell Frontier Oil & Gas Inc
85	Swepi Spring 8	Spruce Gulch	Spring	0.011	0	6/13/1988	Shell Frontier Oil & Gas Inc
86	Swepi Spring 9	Spruce Gulch	Spring	0.011	0	6/13/1988	Shell Frontier Oil & Gas Inc
87	Exxon Love Ranch Res	Piceance Ck	Reservoir	0	30	11/17/1998	Exxon Mobil Corporation
88	Exxon Boies Bsulpur Res	Black Sulphur Ck	Reservoir	0	50	11/17/1998	Exxon Mobil Corporation
89	Exxon B&M Reservoir	Piceance Ck	Reservoir	0	50	11/17/1998	Exxon Mobil Corporation
90	Exxon Hunter Creek Res	Hunter Ck	Reservoir	0	30	11/17/1998	Exxon Mobil Corporation
91	Exxon Willow Creek Res	Willow Ck/ Pic Ck	Reservoir	0	30	11/17/1998	Exxon Mobil Corporation
92	Exxon Yellow Ck Res	Yellow Ck	Reservoir	0	30	11/17/1998	Exxon Mobil Corporation

Table B-2. *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity (cfs)	Quantity (af)	Appropriation Date	Appropriation Owner
93	Exxon Dry Creek Res	Trib.-Piceance Ck	Reservoir	0	20	11/17/1998	Exxon Mobil Corporation
94	Exxon Upper Piceance Ck	Piceance Ck	Ditch	4	0	11/17/1998	Exxon Mobil Corporation
95	Exxon Piceance Ck Div	Piceance Ck	Ditch	4	0	11/17/1998	Exxon Mobil Corporation
96	Exxon Lower Piceance	Piceance Ck	Ditch	4	0	11/17/1998	Exxon Mobil Corporation
97	Exxon Thirteen Mile Ck	Thirteen Mile Ck	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
98	Exxon Willow Ck Div	Willow Ck/Pic Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
99	Exxon Hunter Ck Div	Hunter Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
100	Exxon Upper Fawn Ck	Fawn Ck	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
101	Exxon Lower Fawn Ck	Fawn Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
102	Exxon Up. B. Sulphur Ck	Black Sulphur Ck	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
103	Exxon Mid Blk Sulphur	Black Sulphur Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
104	Exxon B Sulp-Fawn Ck	Black Sulphur Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
105	Exxon Blk Sulphur-Pic	Black Sulphur Ck	Ditch	2	0	11/17/1998	Exxon Mobil Corporation
106	Exxon M. Fk Stewart Ck	Stewart Gulch	Ditch	3	0	11/17/1998	Exxon Mobil Corporation
107	Exxon E. Fk Stewart Ck	Stewart Gulch	Ditch	3	0	11/17/1998	Exxon Mobil Corporation
108	Exxon Upper Dry Fork	Trib.-Piceance Ck	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
109	Exxon Lower Dry Fork	Trib.-Piceance Ck	Ditch	3	0	11/17/1998	Exxon Mobil Corporation
110	Exxon Yellow Ck Div	Yellow Ck	Ditch	3	0	11/17/1998	Exxon Mobil Corporation
111	Exxon Duck Ck Div	Duck Ck	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
112	Exxon Corral Ck Div	Corral Gulch	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
113	Exxon Ryan Gulch Div	Ryan Gulch	Ditch	1	0	11/17/1998	Exxon Mobil Corporation
114	Shell Pumping Plant	White River	Pipeline	25	0	1/1/1999	Shell Frontier Oil & Gas Inc
	Total structures: 114			**Total: 5,693.47 cfs**	**Total: 1,186,625.8 af**		

APPENDIX C

IRRIGATION DITCHES PURCHASED BY ENERGY COMPANIES

Table C-1.
Colorado River Basin – Absolute Ditch Rights

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
1	Low Cost Ditch	Parachute Creek	27.94	3,945	5/17/1883	Unocal
2	Vieweg Ditch	Parachute Creek	1.9	1,287	5/17/1883	Unocal
3	C C D Ditch	Parachute Creek	2.53	309	5/17/1883	Unocal
4	East Fork Ditch	Parachute Creek	6.56	243	5/17/1883	Unocal
5	Parachute Ditch	Parachute Creek	27.22	1,965	5/17/1883	Unocal
6	Riley Ditch	Parachute Creek	1	106	5/17/1883	Unocal
7	Cornell Ditch	Parachute Creek	15.675	1,546	5/17/1883	Unocal
8	Spring Ditch	Parachute Creek	0.12	202	5/17/1883	Unocal
9	Starkey Gulch Ditch	Parachute Creek	4.32	150	5/17/1883	Unocal
10	Charley Dere Ditch	Parachute Creek	0.83	350	5/17/1883	Unocal
11	Granlee Ditch	Parachute Creek	12.69	1,690	5/17/1883	Chevron Oil Company
12	Benson And Barnett Ditch	Parachute Creek	8.51	1,187	5/17/1883	Chevron Texaco Shale Oil
13	Newton Ditch	Clear Creek	3.1	1,143	7/1/1883	Chevron Texaco Shale Oil
14	C O & C P Pierson Ditch	Main Elk Creek	5	1,001	2/15/1884	Exxon Mobil Corp
15	Reservoir Ditch	Roan Creek	37.4	5,459	2/28/1884	Chevron Texaco Shale Oil
16	Upper Roan Creek Ditch	Carr Creek	14.25	1,155	8/10/1884	Texaco Inc
17	Roan Creek No 3 Ditch	Roan Creek	7.4	1,762	10/13/1884	Chevron Texaco Shale Oil
18	Atkinson Canal	Roaring Fork River	26.33	2,420	10/20/1884	Union Oil Co
19	Creek And Newman Ditch	Roan Creek	33	3,318	11/15/1884	Chevron Texaco Shale Oil

Table C-1. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
20	Garden Gulch Ditch	Parachute Creek	5.25	314	4/15/1885	Chevron Oil Company
21	Dry Creek Ditch	Dry Creek (West)	2.02	52	4/23/1885	Exxon Colony Project
22	Himebaugh Ditch	Clear Creek	6.93	840	5/15/1885	Chevron Texaco Shale Oil
23	Cannon Ditch	Brush Creek	11.65	1,387	6/3/1885	Texaco Inc
24	R F Ditch	Battlement Creek	9.855	538	11/25/1885	Exxon Oil Company
25	Clear Creek Ditch	Clear Creek	50.43	3,439	4/9/1886	Chevron Texaco Shale Oil
26	Werhonig Ditch	Monument Gulch	0.2	0	7/15/1886	Exxon Colony Project
27	Dobey Ditch	Battlement Creek	5.975	354	3/7/1887	Exxon Colony Project
28	Carr And Himebaugh Ditch	Clear Creek	8.9	705	4/22/1887	Chevron Texaco Shale Oil
29	Cannon Highline Ditch	Brush Creek	4.34	455	5/10/1887	Texaco Inc
30	Shutt Ditch	Battlement Creek	6	267	5/11/1887	Exxon Colony Project
31	Trout Ditch	Main Elk Creek	3.5	557	2/5/1888	Exxon Mobil Corp
32	Benson Pierson Nelson D	Main Elk Creek	4	646	2/5/1888	Exxon Mobil Corp
33	Oak Grove Ditch	East Elk Creek	3	747	2/20/1890	Exxon Mobil Corp
34	Purdy Ditch	Parachute Creek	6.15	814	4/5/1890	Chevron Oil Company
35	Gibler Ditch	Clear Creek	4.52	404	10/1/1890	Chevron Oil Company
36	Red Glen Highline Ditch	East Elk Creek	8	1,643	11/20/1890	Exxon Mobil Corp
37	Jangle Ditch	Parachute Creek	12.97	1,521	11/12/1891	Chevron Texaco Shale Oil
38	Benson And Barnett Ditch	Parachute Creek	8.51	1,187	11/12/1891	Chevron Oil Company
39	Rulison Miller Ditch	Colorado River	4.1	453	12/8/1891	Exxon Mobil Corp
40	Flume Ditch	Carr Creek	4.35	455	4/1/1895	Texaco Inc
41	Long Gulch Ditch No 1	Clear Creek	2.24	239	11/20/1897	Shell Frontier Oil And Gas
42	Long Gulch Ditch No 2	Clear Creek	2.98	213	11/11/1899	Shell Frontier Oil And Gas
43	Short Gulch Ditch	Clear Creek	2.76	117	11/1/1899	Shell Western Esp
44	Carlisle Ditch	Roan Creek	4.35	183	4/1/1900	Texaco Inc
45	Jensen Ditch	Cot-tonwood Gulch	8.8	396	4/15/1901	Exxon Mobil Corp
46	Number One Ditch	Dry Creek (West)	3.86	153	5/1/1901	Exxon Colony Project

Table C-1. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
47	Wheeler Ditch	Parachute Creek	3	183	8/14/1901	Unocal
48	Garden Gulch No 2 Ditch	Parachute Creek	1.33	175	5/1/1903	Chevron Oil Company
49	H A Newton Ditch	Clear Creek	2.86	97	5/15/1907	Chevron Texaco Shale Oil Co
50	New Hobo Ditch	Roan Creek	11.56	566	6/6/1908	Chevron Texaco Shale Oil Co
51	Parkes Ditch	Clear Creek	3.7	169	5/5/1908	Chevron Texaco Shale Oil Co
52	Longseth No 1 Ditch	Roan Creek	1.67	143	5/3/1910	Texaco Inc
53	Hayward Spring Ditch	Battlement Creek	0.75	6	8/31/1912	Exxon Oil Company
54	Ryden No 2 Ditch	Main Elk Creek	1.76	279	4/6/1912	Exxon Mobil Corp
55	Ida Dere Ditch	Parachute Creek	3	184	4/1/1914	Unocal
56	Ryden No 1 Ditch	Main Elk Creek	5.5	716	4/7/1915	Exxon Mobil Corp
57	W E Ditch	Main Elk Creek	1	458	7/1/1917	Exxon Mobil Corp
	Total Structures: 57		**Total: 468.55 cfs**	**Total: 50,293 af**		

Table C-2.
White River Basin – Absolute Ditch Rights

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
1	P & L Ditch	Piceance Ck	0.5	144	6/1/1883	Exxon Mobil Corp.
2	Calhoun Ditch	White River	8.17	285	8/25/1883	Shell Frontier
3	Mckee Ditch	Black Sulphur Ck	3	303	5/10/1884	Exxon Mobil Corp.
4	Ryan Ditch	Piceance Ck	10.5	408	6/1/1884	Coastal Oil
5	Willow Creek Ditch No 2	East Willow Ck	1.2	294	9/29/1884	Exxon Mobil Corp.
6	Willow Creek Ditch No 3	East Willow Ck	1.2	230	9/29/1884	Exxon Mobil Corp.
7	M H M German Cons D	Piceance Ck	17.54	880	10/22/1884	Exxon Mobil Corp.
8	Gilmor Ditch	Hunter Ck	1.5	320	5/10/1886	Exxon Mobil Corp.
9	Boies Ditch	Black Sulphur Ck	2	363	10/16/1886	Exxon Mobil Corp.
10	Emily Ditch*	Piceance Ck	5.85	794	11/5/1886	Tosco Co.
10	Emily Ditch*	Piceance Ck	0	0	11/5/1886	Puckett Land Co.
11	D D Taylor Ditch*	Black Sulphur Ck	2	418	4/5/1887	Atlantic Richfield Co.

Table C-2. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
11	D D Taylor Ditch*	Black Sulphur Ck	0	0	4/5/1887	Exxon Mobil Corp.
11	D D Taylor Ditch*	Black Sulphur Ck	0	0	4/5/1887	Equity Oil
12	Last Chance Ditch*	Hunter Ck	1.4	294	4/13/1887	Puckett Land Co.
12	Last Chance Ditch*	Hunter Ck	0	0	4/13/1887	Tosco Co.
13	Black Eagle D No 1*	Black Sulphur Ck	5.95	321	4/16/1887	Exxon Mobil Corp.
13	Black Eagle D No 1*	Black Sulphur Ck	0	0	4/16/1887	Equity Oil
13	Black Eagle D No 1*	Black Sulphur Ck	0	0	4/16/1887	Atlantic Richfield Co.
14	Black Eagle D No 2*	Black Sulphur Ck	5.95	276	4/16/1887	Exxon Mobil Corp.
14	Black Eagle D No 2*	Black Sulphur Ck	0	0	4/16/1887	Equity Oil
14	Black Eagle D No 2*	Black Sulphur Ck	0	0	4/16/1887	Atlantic Richfield Co.
15	Black Eagle Alt Pt 1	Black Sulphur Ck	0	92	4/16/1887	Exxon Mobil Corp.
16	Black Eagle Alt Pt 2	Black Sulphur Ck	0	85	4/16/1887	Exxon Mobil Corp.
17	Robert Mckee Ditch*	Piceance Ck	6.33	1,235	4/18/1887	Tosco Co.
17	Robert Mckee Ditch*	Piceance Ck	0	0	4/18/1887	Puckett Land Co.
17	Robert Mckee Ditch*	Piceance Ck	0	0	4/18/1887	McMurry Oil
18	M H And M Ditch	Piceance Ck	17.54	880	4/18/1887	Exxon Mobil Corp.
19	Oldland Ditch 1*	Piceance Ck	13.8	1,000	4/27/1887	Puckett Land Co.
19	Oldland Ditch 1*	Piceance Ck	0	0	4/27/1887	Tosco Co.
20	O I See Ditch*	Fawn Ck	1.2	225	4/27/1887	Equity Oil
20	O I See Ditch*	Fawn Ck	0	0	4/27/1887	Exxon Mobil Corp.
21	No Name Ditch*	Fawn Ck	0.4	173	5/1/1887	Equity Oil
21	No Name Ditch*	Fawn Ck	0	0	5/1/1887	Exxon Mobil Corp.
22	Decker Irrigation Ditch	East Douglas Ck	2.8	94	5/6/1887	Exxon Mobil Corp.
23	Belot Moffat Ditch	Piceance Ck	11.6	1,304	5/10/1887	Exxon Mobil Corp.
24	B & M Ditch	Piceance Ck	0.9	551	5/25/1887	McMurry Oil
25	Jessup Ditch 1*	Stewart Gulch	1.2	204	6/16/1887	Puckett Land Co.
25	Jessup Ditch 1*	Stewart Gulch	0	0	6/16/1887	Tosco Co.
26	Blue Grass Ditch*	Stewart Gulch	0.6	262	7/11/1887	Puckett Land Co.

Table C-2. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
26	Blue Grass Ditch*	Stewart Gulch	0	0	7/11/1887	Tosco Co.
27	Jessup Ditch 2*	Stewart Gulch	0.6	134	4/14/1888	Puckett Land Co.
27	Jessup Ditch 2*	Stewart Gulch	0	0	4/14/1888	Tosco Co.
28	Taylor Ditch	Willow Ck Of Pic. Ck	2	279	5/9/1888	Exxon Mobil Corp.
29	Hunter Ditch	Hunter Ck	1	267	5/15/1888	Exxon Mobil Corp.
30	Ebler Ditch	Willow Ck Of Pic.E Ck	1	170	5/20/1888	Exxon Mobil Corp.
31	Florence Ditch	Mid Fk Stewart G.	2.9	77	6/3/1888	Puckett Land Co.
32	Rye Grass Ditch*	Piceance Ck	8.2	901	6/5/1888	Tosco Co.
32	Rye Grass Ditch*	Piceance Ck	0	0	6/5/1888	Puckett Land Co.
32	Rye Grass Ditch*	Piceance Ck	0	0	6/5/1888	Shell Frontier
33	Schweizer Ditch*	Black Sulphur Ck	2.6	437	9/30/1888	Exxon Mobil Corp.
33	Schweizer Ditch*	Black Sulphur Ck	0	0	9/30/1888	Equity Oil
33	Schweizer Ditch*	Black Sulphur Ck	0	0	9/30/1888	Atlantic Richfield Co.
34	Schweizer Ditch Alt Pt	Black Sulphur Ck	0	110	9/30/1888	Exxon Mobil Corp.
35	Hutchinson Spring Ditch	Fawn Ck	0.5	159	7/18/1889	Exxon Mobil Corp.
36	Mcgee Ditch*	Fawn Ck	1.16	270	5/1/1890	Equity Oil
36	Mcgee Ditch*	Fawn Ck	0	0	5/1/1890	Exxon Mobil Corp.
36	Mcgee Ditch*	Fawn Ck	0	0	5/1/1890	Atlantic Richfield Co.
37	J W Bainbrick D No 1&2*	Black Sulphur Ck	0.86	181	7/1/1893	Exxon Mobil Corp.
37	J W Bainbrick D No 1&2*	Black Sulphur Ck	0	0	7/1/1893	Equity Oil
37	J W Bainbrick D No 1&2*	Black Sulphur Ck	0	0	7/1/1893	Atlantic Richfield Co.
38	Gardenheir Ditch*	Piceance Ck	2.04	350	3/5/1895	Puckett Land Co.
38	Gardenheir Ditch*	Piceance Ck	0	0	3/5/1895	Tosco Co.
39	Forney Corcoran Ditch	White River	11.47	974	3/15/1898	Puckett Land Co.
40	E Stewart Gulch D No 1*	East Stewart Gulch	0.6	46	11/1/1899	Tosco Co.
40	E Stewart Gulch D No 1*	East Stewart Gulch	0	0	11/1/1899	Puckett Land Co.

Table C-2. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
41	E Stewart Gulch D No 2*	East Stewart Gulch	0.6	35	11/1/1899	Puckett Land Co.
41	E Stewart Gulch D No 2*	East Stewart Gulch	0	0	10/15/1900	Tosco Co.
42	Mcwilliams & George D	White River	4.1	495	10/15/1900	Puckett Land Co.
43	N & L Ditch	Fawn Ck	1	271	5/1/1901	Exxon Mobil Corp.
44	Oldland Ditch 3*	Piceance Ck	1.4	199	5/15/1902	Tosco Co.
44	Oldland Ditch 3*	Piceance Ck	0	0	5/15/1902	Puckett Land Co.
44	Oldland Ditch 3*	Piceance Ck	0	0	5/15/1902	McMurry Oil
45	Piceance Ditch	Piceance Ck	0.5	79	6/10/1902	XTO Energy Inc.
46	Bainbrick Mikkelsen 1&2*	Black Sulphur Ck	0.375	264	5/1/1904	Exxon Mobil Corp.
46	Bainbrick Mikkelsen 1&2*	Black Sulphur Ck	0	0	5/1/1904	Atlantic Richfield Co.
46	Bainbrick Mikkelsen 1&2*	Black Sulphur Ck	0	0	5/1/1904	Equity Oil
47	Mccarthy Spring Ditch	Piceance Ck	0.6	49	5/11/1905	XTO Energy Inc.
48	Milo Ditch	Black Sulphur Ck	0.3	36	5/1/1911	Exxon Mobil Corp.
49	Oldland Magor Ditch	Piceance Ck	2.86	476	5/10/1913	Puckett Land Co.
50	Forney Corcoran Ditch	White River	11.47	0	5/10/1913	Tosco Co.
51	Desert Ditch*	Black Sulphur Ck	1.43	182	6/12/1914	Exxon Mobil Corp.
51	Desert Ditch*	Black Sulphur Ck	0	0	6/12/1914	Atlantic Richfield Co.
51	Desert Ditch*	Black Sulphur Ck	0	0	6/12/1914	Equity Oil
52	Cow Creek Ditch	Cow Ck	0.8	96	5/20/1915	XTO Energy Inc.
53	Edmund Pauls Ditch	Sulphur Ck	0.1	11	7/21/1915	Exxon Mobil Corp.
54	Oldland Ditch 2*	Piceance Ck	18.94	660	5/1/1917	Puckett Land Co.
54	Oldland Ditch 2*	Piceance Ck	0	0	5/1/1917	McMurry Oil
54	Oldland Ditch 2*	Piceance Ck	0	0	5/1/1917	Tosco Co.
55	Duckett Ditch*	Black Sulphur Ck	1.2	242	6/10/1918	Atlantic Richfield Co.
55	Duckett Ditch*	Black Sulphur Ck	0	0	6/10/1918	Exxon Mobil Corp.
55	Duckett Ditch*	Black Sulphur Ck	0	0	6/10/1918	Equity Oil
56	Davis Ditch	Davis Gulch	0.4	63	8/16/1926	XTO Energy Inc.

Table C-2. *(cont'd)*

Map Location	Structure Name	Water Source	Quantity Abs. (cfs)	Avg. Vol. Div. (af)	Appropriation Date	Appropriation Owner
57	West Stewart Res Ditch	West Stewart Gulch	2.6	113	?	Atlantic Richfield Co.
	Total structures: 57		**Total: 206.74 cfs**	**Total: 19,061 af**		

* *Joint ownership*

APPENDIX D

COLORADO RIVER BASIN — ABSOLUTE WELLS AND SPRINGS

Map Location	Structure Name	Water Source	Structure Type	Quantity Abs. (cfs)	Av. Vol. Div. (af)	Appropriation Date	Appropriation Owner
1	Nelson Well No 1*	Parachute Creek	Well	0.018	0	5/17/1883	Union Oil
2	Sherwood Well No 1*	Parachute Creek	Well	0.022	0	5/17/1883	Union Oil
3	Sherwood Well No 2*	Parachute Creek	Well	0.018	0	5/17/1883	Union Oil
4	Seep Spring No 1*	Parachute Creek	Well	0.033	0	4/19/1922	Union Oil
5	Seep Spring No 2*	Parachute Creek	Well	0.033	0	4/19/1922	Union Oil
6	Seep Spring No 3*	Parachute Creek	Well	0.033	0	4/19/1922	Union Oil
7	House Log Gulch Sprg No 1*	Parachute Creek	Spring	0.033	0	4/19/1922	Union Oil
8	House Log Gulch Sprg No 2*	Parachute Creek	Spring	0.033	0	4/19/1922	Union Oil
9	House Log Gulch Sprg No 3*	Parachute Creek	Spring	0.033	0	4/19/1922	Union Oil
10	House Log Gulch Sprg No 4*	Parachute Creek	Spring	0.033	0	4/19/1922	Union Oil
11	House Log Gulch Sprg No 5*	Parachute Creek	Spring	0.033	0	4/19/1922	Union Oil
12	Red Spring No 1*	Parachute Creek	Spring	0.033	0	4/22/1922	Union Oil
13	Squire's Spring*	Parachute Creek	Spring	0.033	0	7/21/1922	Union Oil
14	Sheep Gulch Spring*	Parachute Creek	Spring	0.033	0	7/21/1922	Union Oil
15	Calf Spring*	Parachute Creek	Spring	0.033	0	8/9/1922	Union Oil
16	Long Ridge Spring No 1*	Parachute Creek	Spring	0.033	0	9/22/1922	Union Oil Company Of Calif
17	Long Ridge Spring No 2*	Parachute Creek	Spring	0.033	0	9/22/1922	Union Oil Company Of Calif

COLORADO RIVER BASIN — ABSOLUTE WELLS AND SPRINGS *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity Abs. (cfs)	Av. Vol. Div. (af)	Appropriation Date	Appropriation Owner
18	Long Ridge Spring No 3*	Parachute Creek	Spring	0.033	0	9/22/1922	Union Oil Company Of Calif
19	Long Ridge Spring No 4*	Parachute Creek	Spring	0.033	0	9/22/1922	Union Oil Company Of Calif
20	Long Ridge Spring No 5*	Parachute Creek	Spring	0.033	0	9/22/1922	Union Oil Company Of Calif
21	Feather Springs*	Parachute Creek	Spring	0.033	0	11/10/1922	Union Oil Company Of Calif
22	Grassy Spring*	Parachute Creek	Spring	0.033	0	11/27/1922	Union Oil Company Of Calif
23	Hidden Spring*	Parachute Creek	Spring	0.033	0	7/11/1924	Union Oil Company Of Calif
24	Cottonwood Spring No 1*	Cotton-wood Ck	Spring	0.05	0	11/8/1940	Union Oil Comp Of California
25	Union 76 Water Well No 4*	Parachute Creek	Well	1.114	0	2/14/1949	Union Oil - American Soda
26	Union 76 Water Well No 1*	Parachute Creek	Well	0.52	0	2/14/1949	Union Oil of Calif
27	Union 76 Water Well No1a*	Parachute Creek	Well	0.52	0	2/14/1949	Union Oil of Calif
28	Union 76 Water Well No 3*	Parachute Creek	Well	1.048	0	2/14/1949	Union Oil - American Soda
29	Union 76 Water Well No 2*	Parachute Creek	Well	0.99	0	2/14/1949	Union Oil - American Soda
30	Union 76 Water Well No 5*	Parachute Creek	Well	1.114	0	2/14/1949	Union Oil - American Soda
31	Union 76 Water Well No 6*	Parachute Creek	Well	0.722	0	2/14/1949	Union Oil Co Of Cal
32	Parkhurst Cabin Spg No 1*	Parachute Creek	Spring	0.033	0	3/22/1951	Union Oil Company Of Calif
33	Parkhurst Cabin Spg No 2*	Parachute Creek	Spring	0.033	0	3/22/1951	Union Oil Company Of Calif
34	Helm Gulch Spring No 1*	Parachute Creek	Spring	0.033	0	3/27/1952	Union Oil Company Of Calif
35	Helm Gulch Spring No 2*	Parachute Creek	Spring	0.033	0	3/27/1952	Union Oil Company Of Calif
36	Lone Tree Spring*	Parachute Creek	Spring	0.033	0	1/20/1954	Union Oil Company Of Calif
37	Pete Spring*	Parachute Creek	Spring	0.033	0	5/31/1955	Union Oil Company Of Calif
38	Wagon Spring*	Parachute Creek	Spring	0.033	0	6/2/1966	Union Oil Company Of Calif

COLORADO RIVER BASIN — ABSOLUTE WELLS AND SPRINGS *(cont'd)*

Map Location	Structure Name	Water Source	Structure Type	Quantity Abs. (cfs)	Av. Vol. Div. (af)	Appropriation Date	Appropriation Owner
39	Light Gulch Spring No 1*	Parachute Creek	Spring	0.033	0	6/2/1966	Union Oil Company Of Calif
40	Light Gulch Spring No 2*	Parachute Creek	Spring	0.033	0	6/2/1966	Union Oil Company Of Calif
41	Cabin Spring*	Parachute Creek	Spring	0.066	0	6/2/1966	Union Oil Company Of Calif
42	Cottonwood Spring No 2*	Cotton-wood Ck	Spring	0.01	0	5/1/1967	Union Oil Comp Of California
43	Corral Spring No 1*	Parachute Creek	Spring	0.03	0	10/7/1986	Union Oil Of Calif
44	Eisaguirre Spring No 1*	Parachute Creek	Spring	0.02	0	10/10/1986	Union Oil Of Calif
45	Schutte Spring No 1*	Parachute Creek	Spring	0.033	0	10/10/1986	Union Oil Of Calif
46	Schutte Spring No 2*	Parachute Creek	Spring	0.033	0	10/10/1986	Union Oil Of Calif
47	Sage Spring No 2*	Parachute Creek	Spring	0.033	0	10/23/1986	Union Oil Of Calif
	Total Structures: 47			**Total: 7.32 cfs**	**Total: 0 af**		

APPENDIX E

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN

In the table below, oil shale structures are listed in the light blue lines, and non-oil-shale structures are listed in the darker blue lines.

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
36204.00000	Pumping Pl Union Oil Cal	Colorado River	Pipeline	110.16	0		2/14/1949	Encana Oil & Gas Company
37103.00000	Cities Service Pl And Pp	Colorado River	Pipeline	100	0		8/2/1951	OXY USA Wtp Lp
37503.36770	Getty Pipeline	Colorado River	Pipeline	56	0		9/3/1950	Chevron Texaco Shale Oil
37503.36991	Dragert Pump Plant & Pl	Colorado River	Pipeline	194	0		4/12/1951	Chevron Shale Oil Cp
37780.00000	Pacific Oil Co Pl No 1	Colorado River	Pipeline	57.25	0		6/9/1953	Chevron Shale Oil
37780.00000	Pacific Oil Co Pl No 2	Colorado River	Pipeline	27.63	0		6/9/1953	Shell Frontier Oil & Gas
38164.00000	Flattops Proj Bearwl Res	Canyon Creek	Reservoir	0	96,488.9		6/28/1954	Colorado Riv Water Cons Dist
38164.00000	Flattops Bearwl Con	Canyon Creek	Pipeline	200	0		6/28/1954	Colorado Riv Water Cons Dist
38164.00000	Flattops Bench Flum	Canyon Creek	Ditch	254	0		6/28/1954	Colorado Riv Water Cons Dist
38164.00000	Flattops Proj Poss Coll1	Canyon Creek	Ditch	175	0		6/28/1954	Colorado Riv Water Cons Dist
38277.00000	Dow E Middle Fork Pl	Para-chute Creek	Pipeline	13.54	0	6.46 cfs	10/19/1954	Exxon Mobil Corp
38278.00000	Dow Middle Fk Pipeline	Para-chute Creek	Pipeline	1.09	0	8.91 cfs	10/20/1954	Exxon Mobil Corp
38374.00000	Dow Pump Plant And Pl	Colorado River	Pipeline	187.11	0	30.89 cfs	1/24/1955	Exxon Mobil Corp
38753.37520	Homestake Proj Conduit	Home-stake Creek	Pipeline	120	0		9/22/1952	Colorado Springs & Aurora

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN *(cont'd)*

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	118.7	0	41.3 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Fall Creek	Pipeline	260	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	80	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Cross Creek	Pipeline	130	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Peterson Creek	Pipeline	50	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	91.4	0	38.6 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	80.2	0	39.8 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Cross Creek	Pipeline	300	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	50	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Cross Creek	Pipeline	60	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	119.9	0	60.1 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Homestake Creek	Pipeline	1350.2	0	179.8 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Proj Conduit	Cross Creek	Pipeline	200	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Eagle River	Ditch	230	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Piney Creek	Ditch	20	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Piney Creek	Ditch	20	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Cataract Creek	Ditch	90	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Piney Creek	Ditch	30	0		9/22/1952	Colorado Springs & Aurora

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN *(cont'd)*

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
38753.37520	Homestake Eagle-Ark	Piney Creek	Ditch	30	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake East Fork	Home-stake Creek	Pipeline	189.2	0	70.8 cfs	9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Jones Gulch	Ditch	90	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Piney Creek	Pipeline	530	0		9/22/1952	Colorado Springs & Aurora
38753.37520	Homestake Eagle-Ark	Sheep Gulch	Ditch	20	0		9/22/1952	Colorado Springs & Aurora
39049.00000	Sinclair Oil & Gas Pump	Colorado River	Pipeline	33	0		11/29/1956	Pucket Land Company
39053.00000	Oil Shale Corp P & Pl	Colorado River	Pipeline	100	0		12/3/1956	Pucket Land Company
39067.00000	Eaton Pipeline No 1	Colorado River	Pipeline	9	0	1 cfs	12/17/1956	Puckett Land Company
39095.37858	Williams Fork Div Proj	Williams Fk R	Ditch/PL	130	0		8/26/1953	Denver Water Board
39095.37858	Darling Creek Enl	Williams Fk R	Pipeline	90	0		8/26/1953	Denver Water Board
39095.38998	Williams Fork Res	Williams Fk R	Reservoir	0.	93,637		10/9/1956	Denver Water Board
39102.00000	Roberts Tunnel Coll Sys	Straight Ck		115	0		1/21/1957	Denver Water Board
39291.00000	Ruedi Reservoir	Frying-pan R	Reservoir	0	0	102,369 af	7/29/1957	U.S. Bureau of Reclamation
39532.00000	Bluestone Project	Colorado River	Ditch	220	0		3/27/1958	Colorado Riv Water Cons Dist
40069.00000	Davis Gulch Reservoir	Para-chute Creek	Reservoir	0	1194	6 af	9/30/1974	Exxon Oil Company
40071.00000	East Middle Fork Res	Para-chute Creek	Reservoir	0	130.56		9/17/1954	Exxon Oil Company
40091.00000	Shale Pumps & Pl	Colorado River	Pipeline	11.11	0		10/7/1951	Frac Tech Services
40785.00000	Goose Pasture Tarn	Blue River	Reservoir	0	2,196.4	27257.7 af	8/31/1961	Town of Breckenridge
41442.00000	Main Elk Wheeler G Pl	Main Elk Creek	Pipeline	40	0		6/19/1963	Main Elk Co & Exxon Mobil
41442.00000	Main Elk Reservoir	Main Elk Creek	Reservoir	0	34,922		6/19/1963	Main Elk Corp/Mobil

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN *(cont'd)*

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
41489.00000	Parshall Project	Williams Fk R	Ditch	145	0	0	8/5/1963	Colorado Riv Water Cons Dist
42042.00000	Conn Creek Feeder Pl	Conn Creek	Pipeline	50	0		2/8/1965	Shell Frontier Oil & Gas Inc
42042.00000	Clear Creek Feeder Pl	Clear Creek	Pipeline	50	0		2/8/1965	Shell Frontier Oil & Gas Inc
42042.00000	Deer Park Gulch Res	Clear Creek	Reservoir	0	1,533.6		2/8/1965	Shell Frontier Oil & Gas Inc
42042.00000	Deer Park Gulch Pmp & Pl	Colorado River	Pipeline	150	0		2/8/1965	Shell Frontier Oil & Gas Inc
42078.00000	Una Reservoir	Colorado River	Reservoir	0	369,460		3/16/1965	Colorado Riv Water Cons Dist
42078.00000	Una Res Power Conduit	Colorado River	Ditch	2700	0		3/16/1965	Colorado Riv Water Cons Dist
42140.00000	Getty Reservoir No 1	Roan Creek	Reservoir	0	2543.9		5/17/1965	Texaco Inc
42140.00000	Getty Reservoir No 2	Roan Creek	Reservoir	0	20,670.2		5/17/1965	Texaco Inc
42162.00000	Roberts Tunnel-Piney R	Piney Ck	Pipeline	170	0		6/13/1965	Denver Water Board
42485.00000	Wolcott Reservoir	Ute Ck	Reservoir	0	65975		4/27/1966	Colorado Riv Cons Dist
42485.00000	Wolcott Pipeline	Eagle River	Pipeline	492.5	0		4/27/1966	Colorado Riv Cons Dist
42605.00000	Cascade Canyon Res	Conn Creek	Reservoir	0	619.47		8/25/1966	OXY USA Wtp Lp
42605.00000	Conn Creek Reservoir	Conn Creek	Reservoir	0	422.75		8/25/1966	OXY USA Wtp Lp
42605.00000	Conn Creek Pipeline	Conn Creek	Pipeline	10	0		8/25/1966	OXY USA Wtp Lp
42605.00000	Cascade Canyon Pipeline	Conn Creek	Pipeline	10	0		8/25/1966	OXY USA Wtp Lp
42719.00000	Thompson Creek Res	Thomp-son Creek	Reservoir	0	23,893		12/17/1966	Puckett Land Co
42719.00000	Thompson Creek Pipeline	Thomp-son Creek	Pipeline	33	0		12/17/1966	Puckett Land Co
42794.00000	Roan Creek Reservoir	Roan Creek	Reservoir	0	71,300		3/2/1967	Chevron Texaco Shale Oil

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN *(cont'd)*

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
42911.00000	Getty-Sleepy Gulch Res	Clear Creek	Reservoir	0	6538		6/27/1967	Texaco Inc
42999.00000	Trail Gulch Reservoir	Roan Creek	Reservoir	0	5,669.21		9/23/1967	Oil Shale Corp
42999.00000	Trail Gulch Res Alt Pt	Carr Creek	Reservoir	0	950.79		9/23/1967	Oil Shale Corp
43404.00000	Paradise Reservoir	Colorado River	Reservoir	0	69,895.70		11/1/1968	Pure Cycle
43621.42906	Jasper Pl	Willow Ck	Pipeline	300	0		6/22/1967	Northern Col Water Cons Dist
43621.42906	Windy Gap Reservoir	Colorado R	Reservoir	0	1,101.14	445 af	6/22/1967	Northern Col Water Cons Dist
43621.42906	Windy Gap Pump Plant	Colorado R	Pipeline	0	0	300 cfs	6/22/1967	Northern Col Water Cons Dist
43621.42906	Jasper Reservoir	Willow Ck	Reservoir	0	11,292.6		6/22/1967	Northern Col Water Cons Dist
43829.36557	Hayward & Wyatt Pl	Colorado River	Pipeline	0	0	12.725 cfs	2/2/1950	Exxon Colony Project
43829.39280	Virginia Mesa Reservoir	Colorado River	Reservoir	0	50.52		7/18/1957	Chevron Shale Oil
44526.00000	Eagle-Colorado Res	Alkali Creek	Reservoir	0	350,000	0	11/28/1971	Denver Water Board
44559.00000	Starkey Gulch Reservoir	Para-chute Creek	Reservoir	0	7,360		2/20/1967	Puckett Land Company
45290.42911	Getty W Fk Parachute Cr	Para-chute Creek	Reservoir	0	4,658		6/27/1967	Chevron Texaco Shale Oil
46751.46211	Windy Gap Pump Canal	Colorado R	Pipeline	0	0	100 cfs	7/9/1976	Northern Col Water Cons Dist
47116.45563	Middle Fork Reservoir	Para-chute Creek	Reservoir	0	1,470		9/30/1974	Exxon Mobil Corp
47602.00000	Windy Gap Pump Canal	Colorado R	Pipeline	0	0	200 cfs	4/30/1980	Northern Col Water Cons Dist
48212.48007	Mahaffey Pumping P & Pl	Colorado River	Pipeline	60	0		6/9/1981	Main Elk & Exxon Mobil
48245.00000	Lower E Middle Fork Res	Para-chute Creek	Reservoir	0	6,200		2/2/1982	Exxon Oil Company
48486.00000	Sheep Trail H Term Res	Para-chute Creek	Reservoir	0	160		10/1/1982	Main Elk Corp/Mobil

COMPARING SELECTED OIL SHALE AND NON-OIL SHALE CONDITIONAL RIGHTS IN THE COLORADO BASIN *(cont'd)*

Administrative Number	Structure Name	Water Source	Structure Type	Cond'l Quantity (cfs)	Cond'l Quantity (af)	Quantity Absolute (cfs and af)	Appropriation Date	Appropriation Owner
48486.00000	Cotton-wood G Term Res	Cotton-wood G.	Reservoir	0	160		10/1/1982	Main Elk Corp/Mobil
48486.00000	Allenwater Cr Term Res	Colorado River	Reservoir	0	160		10/1/1982	Main Elk Corp/Mobil
48486.00000	Rulison Gulch Term Res	Para-chute Creek	Reservoir	0	160		10/1/1982	Main Elk Corp/Mobil
48486.00000	Mahaffey Terminal Res	Colorado River	Reservoir	0	160		10/1/1982	Main Elk Corp/Mobil
50019.00000	Fraser V Down-stream	Fraser River	Ditch	170	0	0	12/12/1986	Middle Park W Cons Dist
50019.00000	Fraser V Upstream	Fraser River	Ditch	170	0	0	12/12/1986	Middle Park W Cons Dist
50386.00000	Wolford Mt. Res	Muddy Creek	Reservoir		30,000	65,993 af	12/14/1987	Colorado Riv Cons Dist
50386.00000	Wolford Mt Reservoir	Muddy Creek	Reservoir	0	59,930	59,930 af	12/14/1987	Colorado Riv Cons Dist
52067.00000	Fraser R Div Project	St. Louis Creek	Ditch	48	0		7/21/1992	Denver Water Board

GLOSSARY OF WATER TERMS

absolute water right
A water right that has been put to beneficial use; see also "conditional water right."

acre-feet annually (afa)
The volume of water, measured in acre-feet, over the course of a year.

acre-foot (af)
The volume of water required to cover one acre to a depth of one foot; the equivalent of 325,851 gallons, which is enough to satisfy the annual water needs of approximately eight people.

adjudication
A judicial proceeding in which water rights are decreed priority dates based on their date of first use.

administration
The act of ensuring that, in times of water shortage, water rights are satisfied in order of their priority; through administration, senior water rights holders are satisfied before water is delivered to junior water rights holders. This activity is overseen by the state engineer and his subordinate division engineers.

appropriation
The application of water from a stream, tributary, or aquifer for beneficial use at a specified rate of flow; appropriations can be for out-of-stream use, in-stream use, or storage; usually evidenced by a water court decree.

aquifer
An underground deposit of sand, gravel, or rock through which water can pass or is stored. Aquifers can be "confined" (trapped by nonporous layers of rock) or "unconfined" (seepage to adjoining layers is possible) and are often the source of water for wells and springs.

beneficial use
The application and use of an amount of water that is reasonable and appropriate (e.g., without waste) for human or natural benefit. Colorado's policy is to maximize beneficial use of all of the state's waters.

build-out
The estimated extent of residential, commercial, and industrial development in a given geographic area; usually related to upper limit of population to be served by water resource development.

call
In times of water shortage or scarcity, the exercise of senior water rights that forces curtailment of junior water rights.

Colorado River Compact
A contract between Upper Basin States (New Mexico, Colorado, Wyoming, and Utah) and Lower Basin States (Arizona, Nevada, and California) that apportions water from the Colorado River. The Upper Basin Compact is a contract that apportions Colorado River water among the Upper Basin States.

compact
A contract between states, tribes, or other governmental entities that apportions water from a river system crossing jurisdictional boundaries.

conditional water right
The legal preservation of a priority date that provides a water user time to develop his or her water right, but reserves a more senior date (the date upon which the holder first manifested an intent to appropriate). A conditional right becomes absolute when water is actually put to a beneficial use.

conjunctive use
The combined use of surface water and groundwater to achieve the optimal beneficial use; often used in areas where available water resources have been nearly fully developed and/or appropriated. Conjunctive use involves carefully coordinating the storage, timing, and delivery of both resources. Typically, surface water is used to the fullest extent possible when flows are available, while groundwater is retained to meet demands when surface flows are low. Benefits of conjunctive use may include better management capabilities with less waste; greater flood control capabilities; greater control over surface reservoir releases; and more efficient operation of pump plants and other facilities.

cubic feet per second (cfs)
A measurement of volume of water passing by a fixed point each second. One cfs is equal to 7.48 gallons per second, 448.8 gallons per minute, and 646,300 gallons per day (equal to 1.98 acre-feet per day).

decree
An official document issued by a water court that defines the amount, priority, use, and location of a water right. The document serves as a mandate to the state engineer to administer the water rights involved in accordance with the decree.

depletion
The amount of water lost to the river system by the exercise of a water right. Diversion of a particular water right is often many times greater than its depletion because much of the water diverted later returns to the river, either through surface run-off or underground seepage.

depletion allowance
In the Gunnison Basin, the additional amount of water that the Upper Gunnison River Water Conservancy District is entitled to deplete without being "called out" by the Aspinall Unit's 1957 water right.

diligence
See "due diligence."

ditch
A trench cut into the surface of the ground to transport water from a stream, canal, or storage facility to an actual point of use.

diversion
Removal of water from its natural course or location; or controlling water in its natural course or location by means of a ditch, canal, flume, reservoir, bypass, pipeline, conduit, well, pump, or other device.

division engineers
Subordinate officers under the state engineer; division engineers perform the functions of the state engineer — administering water rights — in each of Colorado's seven water divisions. The Gunnison watershed is in Division 4.

due diligence
The requirement for holders of conditional water rights to demonstrate to the water court that they are making good faith efforts toward constructing the facilities (e.g., ditch, reservoir) to apply the water right within a reasonable time. In Colorado, conditional water right holders must show due diligence to the water court every six years.

effluent
Liquid attributed to human waste (sewage), arising from various uses of water. Also often refers to water discharged after use, such as water leaving a wastewater treatment plant or industrial plant.

exchange
A process by which water rights in one part of a river (or other water supply) system are traded for the use of water rights in another part of the river system.

firm annual yield
The yearly amount of water that can be dependably supplied from the raw water sources of a water supply system.

fish ladder
An inclined water channel structure with a series of baffles or weirs that helps fish gain upstream passage around dams. These baffles interrupt and slow the flow of water, simulating pools and rapids. Fish swim up the ladder just as they would swim up natural rapids.

groundwater
Water found below the earth's surface.

headgate
A human-made structure on a stream, canal, or other water channel through which water is diverted into a ditch or canal.

instream flows
Water left in its natural stream channel to maintain the existing aquatic resources and associated wildlife and riparian habitat. In contrast to out-of-stream uses, this kind of water use does not require diversion.

junior rights
Water rights that were obtained more recently and therefore are junior in priority to older or more senior rights.

Lower Colorado River Basin
The Colorado River and its tributaries in Arizona, Nevada, and California. See also "Colorado River Compact."

perfection
The process of meeting all of the legal requirements for establishing a legal right to the use of water. Once perfected, a conditional water right becomes an absolute water right.

prior appropriation
Also called "first in time, first in right," a method (used in many western states) of allocating water between competing users. In times of water scarcity, senior water rights are satisfied ahead of junior water rights. A senior water user who wants to divert water from a surface or underground source of water may force the curtailment of upstream junior use. See also definitions for "call," "priority," and "priority date."

priority
The seniority of a water right as determined by its adjudication date and/or its appropriation date. The priority of a water right determines its ability to divert in relation to other rights in periods of limited supply, i.e., junior water rights defer to more senior water rights.

priority date
The date of establishment of a water right. A nontechnical term, a "priority date" can be the date of appropriation (when water is first put to use), the date of adjudication (when the court issues a water right decree), or the date when a user first intended to appropriate water (in the case of a conditional decree).

re-operation
An investigation of the additional water supply or water timing benefits that could result from the revised and more efficient usage of large water storage facilities, with an eye toward improv-

ing water supply reliability, environmental benefits, or both.

re-regulation
In a multi-dam system, regulating the dramatic peak flows generated by upstream dams through the measured release of water from the dam farthest downstream.

river basin
A physiographic region bounded by a drainage divide; consists of a drainage system comprised of stream and often natural or man-made lakes. See also "watershed."

second fill
A legal allowance for a reservoir or other storage right to be refilled.

senior rights
Water rights with a relatively early priority date. See also "priority date."

storage right
A water right defined in terms of the volume of water that may be stored in a reservoir or lake to be released and used at a later time, either within the same year or during a subsequent year.

subordinate
A process through which a senior water rights holder allows junior water rights holder(s) to be satisfied out of priority.

subordination agreement
A legal document by which a senior water rights holder agrees to subordinate his water use to a junior rights holder. See aslo "subordinate."

transmountain diversion
The conveyance of water from one drainage basin to another. In Colorado, the term often refers to water being transported over or through the Continental Divide. Sometimes called "transbasin diversion."

tributary
A stream that flows into another stream or body of water.

unappropriated water
Water in a river system for which no water rights have been claimed.

Upper Colorado River Basin
The Colorado River and its tributaries in New Mexico, Colorado, Wyoming, and Utah. See also "Colorado River Compact."

water court
A state district court that hears matters related to water. To obtain a judicially recognized water right, change in water right, or augmentation plan, persons or entities file applications with a water court to be issued a decree or order. There are seven water courts in the state, one for each water division, corresponding to each major drainage basin.

water right
A right to use, in accordance with its priority, a certain portion of the waters of the state for irrigation, power, domestic use, or another similar use. See also "absolute water right," "conditional water right," "appropriation," and "priority."

watershed
An area from which water drains to a single stream or river or river system or other body of water. See also "river basin."

END NOTES

[1] Bill Ritter, Jr., governor of Colorado, testimony before the Senate Committee on Energy and Natural Resources, Oversight Hearing: Oil Shale Resources, May 15, 2008.

[2] The Front Range Water Users Council members are the largest suppliers of municipal, commercial, industrial, and agricultural needs in the state of Colorado. Approximately one-half of the state's population receives water from council members.

[3] Colorado, Yampa, and White River Basin Roundtables Energy Subcommittee, *Energy Development Water Needs Assessment (Phase 1 Report)*, September 2008.

[4] *Id.*, p. 6-1.

[5] U.S. Department of the Interior, Bureau of Land Management, *Oil Shale and Tar Sands Programmatic Environmental Impact Statement (PEIS)*, pp. 4-144 to 4-145.

[6] Associated Governments Northwest Colorado, *Northwest Colorado Socioeconomic Analysis and Forecasts, Final Report*, April 4, 2008, p. 10.

[7] Colorado, Yampa, and White River Basin Roundtables Energy Subcommittee, *Energy Development Water Needs Assessment (Phase 1 Report)*, September 2008, p. 4-7.

[8] Jim Pokrandt, Colorado River Water Conservation District, Aspen Public Radio, broadcast September 18, 2008.

[9] U.S. Department of Energy, Office of Petroleum Reserves – Strategic Unconventional Fuels, *Fact Sheet: Carbon Management for Strategic Unconventional Resources*, available at www.unconventionalfuels.org/publications/factsheets/Carbon_Management_Fact.pdf, accessed December 4, 2008.

[10] Intergovernmental Panel on Climate Change, "Summary for Policymakers," in *Climate Change 2007: Fourth Assessment Report*, Synthesis Report, available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf, pp. 2 and 5.

[11] These ensemble runs were produced by 19 global circulation models.

[12] Western Water Assessment, *Colorado Climate Change: A Synthesis to Support Water Resource Management and Adaptation*, report done for the Colorado Water Conservation Board, 2008, p. 1.

[13] *Ibid.*

[14] Richard Seager, Mingfang Ting, Isaac Held, Yochanan Kushnir, Jian Lu, Gabriel Vecchi, Huei-Ping Huang, Nili Harnik, Ants Leetmaa, Ngar-Cheung Lau, Cuihua Li, Jennifer Velez, Naomi Naik, Model Projections of an Imminent Transition to a More Arid Climate in Southwestern North America, *Science* 25 May 2007: Vol. 316. no. 5828.

[15] From 1932 to 1939, the annual difference between evaporation and precipitation was 1.29 inches higher than average; during the 1950s Southwest drought (1948-1957), it was 1.87 inches higher than average.

[16] The University Corporation for Atmospheric Research, *Synthesis and Assessment Product 4.3 (SAP 4.3): The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, May 2008, available at http://www.sap43.ucar.edu/, accessed December 8, 2008.

[17] Intergovernmental Panel on Climate Change, "Summary for Policymakers," in *Climate*

Change 2007: Fourth Assessment Report, Synthesis Report, available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

[18] Bill Ritter, Jr., governor of Colorado, testimony before the Senate Committee on Energy and Natural Resources, Oversight Hearing: Oil Shale Resources, May 15, 2008.

[19] In-situ retorting involves heating the oil shale while it is still underground, and then pumping the resulting liquid to the surface.

[20] The shale is first mined and then heated to a high temperature.

[21] The Front Range Water Users Council members are the largest suppliers of municipal, commercial, industrial, and agricultural needs in the state of Colorado. Approximately one-half of the state's population receives water from council members.

[22] U.S. Department of the Interior, Bureau of Land Management, "Oil Shale Management — General; Final Rules," *Federal Register* 73, no. 223, November 18, 2008, p. 69450.

[23] Bill Ritter, Jr., governor of Colorado, testimony before the Senate Committee on Energy and Natural Resources, Oversight Hearing: Oil Shale Resources, May 15, 2008.

[24] Although there is no one measure of energy quality, *energy return on investment* (EROI) is a commonly used calculation of how much energy is needed to locate, extract, and refine an output of energy. An EROI of 1 would be breaking even. Reported oil shale EROIs are in the range of 1.5:1 to 4:1, with a few extreme values between 7:1 and 13:1. See, for example, Cutler Cleveland and C. Hall, Presented at ASPO -US conference Denver November 10, 2005, available at http://globalpublicmedia.com/events/564. See also "Unconventional Oil: Tar Sands and Shale Oil - EROI on the Web, Part 3 of 6," available on the The Oil Drum Web site at http://www.theoildrum.com/node/3839.

[25] Colorado, Yampa, and White River Basin Roundtables Energy Subcommittee, *Energy Development Water Needs Assessment (Phase 1 Report)*, September 2008, p. 5-9.

[26] U.S. Department of the Interior, Bureau of Land Management, "Oil Shale Management — General; Final Rules," *Federal Register* 73, no. 223, November 18, 2008, p. 69423.

[27] *Id.* p. 69449.

[28] James T. Bartis, et al., *Oil Shale Development in the United States: Prospects and Policy Issues*, RAND, 2005, p. 6.

[29] U.S. Department of the Interior, Bureau of Land Management, *Oil Shale and Tar Sands Programmatic Environmental Impact Statement (PEIS)*, p. 4-3.

[30] *Id.* at p. 4-3.

[31] J.A. Veil and M.G. Puder, *Potential Ground Water and Surface Water Impacts from Oil Shale and Tar Sands Energy-Production Operations*, Argonne National Laboratory, October 2006, p. 13.

[32] U.S. Department of the Interior, Bureau of Land Management, *Oil Shale and Tar Sands Programmatic Environmental Impact Statement (PEIS)*, p. 4-34.

[33] URS, Inc., *Energy Development Water Needs Assessment, Final Draft*, September 2008, p. 3-36.

[34] *Id.*, p. 4-7 and Table 4-6.

[35] *Id.*, p, 6-1 and Table 6-1.

[36] U.S. Department of the Interior, Bureau of Land Management, *Oil Shale and Tar Sands Programmatic Environmental Impact Statement (PEIS)*, Table 4.5.2-1, notes d & e, p. 4-44.

[37] Information regarding water rights in Colorado is available on the state's Decision Support System Web site, available at http://cdss.state.co.us/DNN/default.aspx. The research for this part of the report relied heavily on the information available in this source and was supplemented with a review of decrees obtained from the Division of Water Resources.

[38] Litigation in the 1990s challenged whether the diligence requirement for conditional water rights owned by three companies and intended for use in oil shale development had been met.

The Colorado Supreme Court found that the diligence standard had been satisfied in all cases despite the passage of as much as 45 years since the rights had been established. *Northern Colorado Water Conservancy Dist. v. Oxy USA, Inc.*, 990 P.2d 701 (Colo. 1999). See also *Municipal Subdistrict, Northern Colorado Water Conservancy Dist. v. Chevron Shale Oil Corp.*, 986 P.2d 918 (Colo. 1999); *Northern Colorado Water Conservancy Dist. v. Getty Oil Exploration Co.*, 997 P.2d 557 (Colo. 2000).

[39] Conditional and absolute decrees in the Yampa River Basin were also examined. While there are some large conditional storage decrees that include industrial uses, it does not appear these structures are expected to directly serve oil shale production. No decrees in the Yampa River Basin owned by the companies historically interested in oil shale production were found.

[40] Windy Gap Reservoir provides water to the Platte River Power Authority and to 13 water providers along Colorado's Front Range. The project diverts water on the Colorado River near the confluence with the Fraser River. However, because the rights are relatively junior to senior downstream rights, water availability is unreliable, so plans are in place to construct a new reservoir to allow for increased storage in wet years. Water rights associated with this "firming" project would have 1960s and 1970s priority rights.

[41] U.S. Department of the Interior, *Hydrologic Determination 1988: Water Availability from Navajo Reservoir and the Upper Colorado River Basin for Use in New Mexico*, April 1988; and *Hydrologic Determination 2007: Water Availability from Navajo Reservoir and the Upper Colorado River Basin for Use in New Mexico*, April 2007.

[42] Eric Kuhn, *The Colorado River: The Story of a Quest for Certainty on a Diminishing River* (Roundtable Edition), Colorado River Water Conservation District, May 8, 2007.

[43] Western Water Assessment, *Colorado Climate Change: A Synthesis to Support Water Resource Management and Adaptation*, report done for the Colorado Water Conservation Board, 2008.

[44] In addition, there is a proposal from a private developer to transport basin water from Flaming Gorge Reservoir on the Green River to the Front Range as well as a proposal by the Northern Colorado Water Conservancy District to bring water from the Yampa River to the Front Range.

[45] U.S. Fish and Wildlife Service, *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 Gunnison River*, Denver, Colorado, December 1999.

[46] A significant population decline could even prompt reinitiation of the PBO. Specifically, "a negative population response would trigger reinitiation if the population declined to 350 adults." *Id.* 71.

[47] One should not assume the "second increment" development will take place. The fish are not recovering according to plan, so additional depletions may be limited. In that case, the first increment will be the ceiling vis-à-vis depletions above the 15-Mile Reach.

[48] In 1979, Occidental Oil Shale, Inc. hired water engineers to develop a plan for water development in the White River Basin. See Clifford E. Jex Engineers and Tipton and Kalmbach, Inc., *Plan for the Water Supply for Development of Oil Shale Industry in White River Basin, Colorado*, November 1979. This report discussed the value of utilizing different existing conditional water rights best suited, in their view, for such development.

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DISTRICT COURT, WATER DIVISION NO. 5 **STATE OF COLORADO** Court Address: 109 Eighth Street, Suite 104 Glenwood Springs, CO 81601 (970) 928-3062 *telephone*	
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: **THE CITY OF GLENWOOD SPRINGS, COLORADO** **in Garfield County, Colorado.**	**▲ COURT USE ONLY ▲**
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APPLICANT'S PRE-MEETING REBUTTAL STATEMENT TO THE COLORADO WATER CONSERVATION BOARD

Applicant, the City of Glenwood Springs, Colorado ("Glenwood Springs" or the "City"), through its undersigned counsel Holland & Hart LLP, submits this Pre-Meeting Rebuttal Statement (the "Rebuttal") pursuant to the Notice of Pre-Meeting Conference and Deadlines for Submissions circulated by the Hearing Coordinator for the Colorado Water Conservation Board (the "CWCB") on May 6, 2015.

This Rebuttal responds to the pre-meeting statements of other parties, including the CWCB Staff's Recommended Comprehensive Findings of Fact ("Staff's Recommended

Findings"), and provides support for a determination by the CWCB pursuant to C.R.S. Section 37-92-102(6(b), that Glenwood Springs' proposed RICD Water Rights: (1) will not impair the ability of Colorado to develop its compact entitlements; (2) will not cause material injury to instream flow water rights; and (3) will promote maximum utilization of the waters of the State.

In support of Glenwood Springs' requested findings, in addition to the information below, the City offers the attached revised proposed decree dated June 30, 2015 as well as additional rebuttal reports prepared by S2o Design and Engineering, Inc. and Wright Water Engineers, Inc., both dated June 30, 2015 (these two rebuttal reports are referred to herein as the "S2o Rebuttal Report" and "WWE Rebuttal Report").[1]

ARGUMENT

1. Glenwood Springs' RICD Water Rights will not materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements.

As described in its May 21, 2015 Pre-Meeting Statement, at the request of CWCB staff, Glenwood Springs included the following provision in its proposed decree regarding compliance with any compact curtailment rules adopted by the State or the State Engineer pursuant to C.R.S. §§ 37-80-104 and 37-92-501:

> Compact Administration. During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the RICD Water Rights decreed herein will be administered in accordance with the compact curtailment rules adopted by the State Engineer or such other state agency as may, in the future, be empowered to adopt rules or otherwise act to assure compliance with interstate water compacts that are then in effect, if any, including any such rules intended to avoid, delay, or limit the severity of such a compact curtailment. If no such compact curtailment rules are then in effect, Glenwood Springs shall not place a call for the RICD Water Rights decreed herein during the period that implementation of an Article VIII(d)(8) curtailment order affects water diversions in Water Division No. 5, unless the State Engineer or Division Engineer determines that exercise of all or part of the RICD Water Rights will not affect Colorado's ability to comply with the Compact. Otherwise, the RICD Water Rights decreed herein shall be administered in accordance with this Decree and Colorado law.

Prior to issuance of the Staff's Recommended Findings, no other requests were made by CWCB staff of Glenwood Springs with respect to compact considerations. Nonetheless, although the Staff's Recommended Findings (in section I.A.vii) indicate that this requested decree provision

[1] At request of the CWCB, Glenwood Springs is also providing courtesy copies of a supplemental memo from Wright Water Engineers to CWCB staff dated June 15, 2015. The material in this memo is reiterated in Wright Water's June 30, 2015 Rebuttal Report.

is "acceptable," and this was the only request made of the City with regard to compact issues, staff nonetheless has proceeded to recommend that the Board find that "in light of other concerns, the proposed RICD application significantly impacts Colorado's ability to develop its compact entitlements." In particular, Staff's Recommended Findings raise the following possible additional concerns: (iii, vii & ix) potential material impairment of upstream consumptive use; (v) potential impacts to exchange opportunities; (vi) potential that the proposed RICD will "exacerbate" water shortages; and (x) the lack of cancellation or reduction provisions. *See* Staff's Recommended Findings on pp. 3-4, Section I. Despite these suggested findings to the contrary, Glenwood Springs' claims will not materially impair development of Colorado's compact entitlements.

First, as to compact administration, the above Compact Administration Provision will serve to protect the viability of exchanges through the RICD reach during and prior to the implementation of curtailment rules, and the rule making process up to that point will be in full view of the state's needs thereafter.

Second, as to claims that Glenwood Springs' rights will inhibit additional water right development prior to a compact call, the applicable standard is "material" impairment, not "no effect." As discussed in the WWE Rebuttal Report, while Glenwood Springs' claims could have some effect on river administration, that effect is not significant, as Glenwood Springs' junior water rights claims will operate in the shadow of significant, senior, upstream non-consumptive water rights call regimes, including, in particular longstanding historical calls by the existing non-consumptive Shoshone power rights and future calls from upstream RICDs, including the Grand County RICD. Glenwood Springs' claims in excess of the historical 1,250 c.f.s. senior Shoshone call can only potentially extend up to a 46-day period during on the receding limb of the hydrograph after peak run-off, and WWE has opined that, on average, there are only 17 days of these 46 days when the RICD could place a call but Shoshone could not. Additionally, as noted in its Pre-Meeting Statement, the City is also proposing not to oppose certain water rights applications on the basis of claimed injury to the RICD Water Rights, including applications to implement the CRCA and the Eagle River Memorandum of Understanding up to the contemplated drafts and yields described in these agreements. *See* paragraph 11.d of attached proposed decree. This serves as further indication that Glenwood Springs does not intend to utilize its claimed RICD water rights as a basis to inhibit further development of upstream consumptive uses.

Likewise, given that (1) the existing Shoshone rights already limit potential for exchanges through Glenwood Springs and (2) there is significant present and likely additional future reservoir storage above Glenwood Springs for purposes of augmenting any periods during the receding limb of the hydrograph when Glenwood Springs may place a call under its RICD water rights when there otherwise could have been free river conditions, any effect upon future exchange potential in the RICD reach clearly does not rise to the level of material impairment of the development of the state's compact entitlements. There is also no evidence that the operation of Glenwood Springs' RICD water rights will exacerbate future water shortages. Among other things, the maximum additional volume commanded by calls in excess of 1,250 c.f.s. would be 129,000 acre-feet, and WWE has determined that undeveloped storage rights below Glaneood Springs total over 270,000 acre-feet. Finally, with regard to the Staff's Recommended Findings concerning the absence of cancellation or curtailment provisions, while the proposed decree

submitted with Glenwood Springs' Pre-Meeting Statement did not contain such provisions, in coordination with the Colorado River Water Conservation District ("CRWCD") the City has since developed a call reduction provision which has been included in the attached proposed decree as a new paragraph 11.g in order to protect new water projects upstream of the RICD locations. This provision includes protection of such projects that may be supplied by firm yield junior to the RICD water rights claimed in this case up to a potential maximum of 20,000 acre-feet. However, in order to avoid a windfall to upstream appropriators who are already required to augment to the Shoshone and/or Cameo calls throughout the RICD season, this provision provides for potential relaxation of calls in excess of 1,250 c.f.s. needed to achieve additional firm yield of benefited projects, not for the complete relaxation of any RICD call or the subordination of the RICD water rights generally to future appropriations. The full text of this proposed call reduction provision reads as follows:

> Protection of New Water Project Yield.
>
> For purposes of this Section 11.g., the following determinations shall apply:
>
> i. The term "New Water Project" shall mean any single water project (which may include storage projects or storage projects with direct flow components) or combination of multiple water projects that: (a) was not constructed or otherwise in operation as of December 31, 2013; (b) diverts or stores water from points that are located upstream of the RICD Water Rights; and (c) is decreed and used for beneficial use within Water Division 5. New Water Projects may include water projects that utilize decreed water rights that are either senior or junior in administrative priority to the RICD Water Rights.
>
> ii. The term "Firm Yield" shall mean the average annual yield of a New Water Project (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.
>
> iii. The term "Cumulative Firm Yield" shall mean the combined average annual yield of all New Water Projects (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.
>
> iv. The term "Junior Protected Yield" shall mean the portion of the Cumulative Firm Yield supplied by water rights junior to the RICD Water Rights, up to a maximum of 20,000 acre-feet minus the Cumulative Firm Yield of New Water Projects supplied by water rights senior to the RICD Water Rights.
>
> Glenwood Springs shall consult with the River District on or prior to May 20th of each year regarding the implementation of this Section 11.i. If this consultation process determines that, during the period from June 8 to July 23 of that year, Glenwood Springs' placement of a call on the Colorado River for the RICD Water Rights in excess of 1,250 c.f.s. would likely impair the Junior Protected Yield, then the RICD Water Rights shall be deemed satisfied by calling, in order of priority, only those water rights necessary to produce an administrative flow rate of 1,250 c.f.s. (as measured at the single measurement point described below

in Section 23) from June 8 to July 23 of that year, or such portion of that period that is determined necessary to satisfy the Junior Protected Yield. This Section is intended to alleviate potential conflicts between the future operation of the RICD Water Rights and New Water Projects, but shall not be construed to require Glenwood Springs to reduce a call in the event that the Junior Protected Yield can be achieved by: (1) diverting water outside of the June 8 to July 23 time period each year; or (2) exercising water rights that are senior to the RICD Water Rights.

With the addition of this provision, as well as the other information presented above and in the attached Rebuttal Reports, the City respectfully requests the CWCB to reject Staff's Recommended Findings and to instead enter findings of fact and a recommendation to the water court that Glenwood Springs' RICD claims will not materially impair the full development of the state's compact entitlements.

2. The exercise of Glenwood Springs' RICD Water Rights will not cause material injury to instream flow water rights.

The Board is required to make written findings only as to whether the "exercise of the recreational in-channel diversion would cause material injury to instream flow water rights." C.R.S. Section 37-92-102(6)(b). There are no decreed instream flow water rights ("ISF") in the reach of the Colorado River where Glenwood Springs' proposed whitewater parks are located. For this reason, and the additional reasons set forth in the Staff's Recommended Findings, the CWCB Staff has recommended that the CWCB make a finding that "the proposed RICD will not cause material injury to existing ISF water rights." Staff's Recommended Findings on p. 4, Section II, sub-section II.i.

Several opponents claim that Glenwood Springs' claimed RICD will "injure environments the CWCB seeks to protect through ISFs,"[2] (emphasis added), however the CWCB Staff has recommended the CWCB make findings that the RICD water rights claimed by Glenwood Springs "will not negatively impact the natural environment . . . and thereby cause material injury to existing [downstream] ISF water rights." *See* Staff's Recommended Findings on p. 4, Section II, including sub-sections II.i through II.iv, inclusive. Because there are no instream flow water rights adjudicated in the reach of the Colorado River where Glenwood Springs' proposed whitewater parks are located, the City concurs with CWCB staff's determination that there will not be material injury to any existing instream flow water rights.

3. Glenwood Springs' RICD Water Rights will promote maximum utilization of the waters of the state.

Staff's Recommended Findings include a variety of conclusions why the Board should issue a finding that Glenwood Springs' claims do not promote maximum utilization, including: (i) possible impact to upstream junior appropriations; (ii) possible inhibition of future changes or exchanges; (iv) "by claiming flow rates that are not consistent with flow rates appropriated by nearby water rights the Applicant has not attempted to minimize its call upon the river and avoid waste;" (v) there is not a reasonable demand for portions of the time periods claimed; (vii) the

[2] Party Statement of City of Aurora et al. dated June 4, 2015, on p. 8, Section 2.B.

flow rates claimed might exacerbate the call on the Colorado River and "pull down water through the RICD reaches;" (viii) the frequency and duration of the requested amounts do not promote maximum utilization; (x) there may be "detrimental effects on several environmental aspects;" (xi) the "relationship of the individual RICD flow rates to the historic and unappropriated flow rates for each time period requested will exacerbate the call on upstream juniors;" (xii) possible detrimental effects on other potential uses of water upstream; (xiii) the No Name site is outside of Glenwood Springs' city limits; (xiv) the proposed RICDs do not conserve or efficiently use available stream flow; (xv) the RICD will "exacerbate water shortages;" (xvi) the Applicant has not shown how the RICDs work with existing or future uses to promote maximum utilization; (xvii) the Applicant has not included provisions for reduction or cancellation; (xviii) the Applicant has not demonstrated that the flows sought are the minimum amounts necessary to provide to reasonable recreational experiences; (xix) historical reservoir releases will not help meet flow rates above 1,250 c.f.s.; and (xx) the volume of unappropriated flow claims is excessive. *See* Staff's Recommended Findings on pp. 4-7, Section III. No technical support has been provided with the Staff's Recommended Findings for these various conclusions to allow Glenwood Springs to further address Staff's Recommended Findings.

In assessing whether an RICD water rights claim "promotes maximum utilization," it is important consider that maximum utilization serves to balance resources to achieve multiple goals. Maximum utilization is not an absolute prioritization or preference of one use over another, and Glenwood Springs' claimed recreational waters are not required to have absolutely no effect upon present or future river administration. While the doctrine of maximum utilization requires reasonable efficiency, without waste, of each appropriator to allow for the greatest benefit from a limited resource, it does not require appropriators to seek a water rights for less water than intended beneficial uses reasonably require.

Glenwood Springs is seeking to confirm conditional water rights to support specific recreational experiences at a variety of levels of difficulty. The 1,250 c.f.s flow rate, which is available over 90% of the time during the RICD season, will provide a beginner experience. The 2500 c.f.s. flow rate , which is claimed for up to 46 days, generally after peak runoff, will provide an intermediate boating experience. The 4,000 c.f.s. flow rate, which is claimed for only five days surrounding the July 4 holiday weekend, and is intended to support a destination event after flows in the majority of rivers in Colorado have dropped to lower levels, will provide a competitive level boating experience. The doctrine of maximum utilization does not limit Glenwood Springs to merely protecting recreational experiences for novice level boaters. The attached S2o Rebuttal Report addresses the design-related portions of CWCB RICD Rule 7.c, and confirms that Glenwood Springs is only seeking minimum amounts necessary to efficiently provide flows for three targeted recreational experiences, on the state's largest river with available flows often significantly higher than the rates Glenwood Springs seeks to protect.

With regard to water rights and hydrologic issues, the great majority of the Staff's Recommended Findings relate to perceived changes to the river regime from exercise of Glenwood Springs' proposed RICD water rights. As noted above in the section regarding compact impairment, where, as here, there are existing potential calls throughout the summer boating season, it is very important to remember that upstream appropriators already face the need to augment any out-of-priority water use throughout the claimed RICD season. Whether a call is placed on the Colorado River during this time for a rate of 1,250 c.f.s or for 2,500 c.f.s.,

augmentation requirements do not change. Additionally, even absent the RICD water rights, developers of junior water rights in the upper-Colorado basin typically include storage components in their projects, since storage can take advantage of flows and volumes available earlier in the season, often prior to June 8 when Glenwood Springs' potential call is no greater than the existing senior Shoshone call. The attached WWE Rebuttal Report addresses these in turn, including the following important points:

- The RICD flows claimed by Glenwood Springs only exceed the Shoshone senior right of 1,250 c.f.s. for a maximum of 46 days each year, and the total volume associated with these 46 days is only 128,700 acre feet.

- New development upstream of the proposed RICD water rights already needs to account for the Shoshone and Cameo calls by securing new storage or relying on existing water in reservoirs to augment the Colorado River. Most days when the proposed RICD water could reduce free river conditions are also days when upstream junior water rights would need to rely on storage to satisfy the Shoshone or Cameo calls.

- The average number of additional days the proposed RICD water rights could place a call on the Colorado River is only 17 days, and subject to potential further reduction pursuant to the call reduction provision discussed above in Section 1.

- Even though it is Glenwood Springs' position that the flow claims and time periods promote maximum utilization, the City has agreed to include provisions in the proposed ruling to address concerns that have been expressed by opposers and the CWCB to reduce the impact of the RICD water rights on the river and other appropriators, including but not limited to language to address administration during a Colorado River Compact call and limit the ability of the Glenwood Springs' RICD water rights to call in certain circumstances, as well as a non-opposition provision, as further discussed in Glenwood Springs' initial Pre-Meeting Statement to the CWCB.

Finally, CWCB staff's recommendation also questions the location of the No Name site outside of Glenwood's present city limits and mentions unspecified "potential detrimental effects on several environmental aspects." These are addressed as follows:

a. *Glenwood has authority to plan and develop parks and recreational water rights a short distance outside of its corporate limits.*

CWCB staff's recommendations include that the "application does not entirely meet the definition of a RICD, as defined in Section 37-92-103(10.3)," in part since the "Applicant has filed for an RICD outside of its city limits" with regard to the proposed No Name Whitewater Park location. *See* Recommended Findings on p. 6, at Section III.xviii. Neither this statutory section nor any other statute, case law, or regulation support a proposing finding in this regard.

C.R.S. Section 37-92-103(10.3) defines "Recreational in-channel diversion" to mean "the minimum stream flow as it is diverted, captured, controlled, and placed to beneficial use between

specific points defined by physical control structures pursuant to an application filed by a [governmental entity] for a reasonable recreation experience in and on the water." Importantly, this statute does expressly limit municipal filings to within existing corporate boundaries. In contrast, for more than a century, Colorado statutes have authorized municipalities to construct waterworks beyond their corporate limits. *See e.g.* C.R.S. § 31-15-707(1)(b). And, home rule cities like Glenwood Springs possess extra-territorial condemnation authority. *See generally* Article XX of Colorado Constitution; *Town of Telluride v. San Miguel Valley Corporation*, 185 P.3d 161 (Colo. 2008). Many cities, including Glenwood Springs and Denver, have invoked these various authorities to secure water rights and infrastructure, or develop park facilities, outside of their corporate boundaries. In 1987, the legislature made changes to annexation laws such that Colorado municipalities are now required to prepare and adopt three-mile plans for lands outside of their territorial boundaries. In particular, prior to any annexation, C.R.S. § 31-12-105(1)(e) requires Glenwood to have a such a plan in place for a variety of public infrastructure and services, including "waterways," "waterfronts," "parks," and/or "open spaces." It should also be noted that the most recent RICD adjudication by Grand County included RICD structures within the Town of Hot Sulphur Springs. *See* Final Decree in Case No. 2010CW298, Water Division 5, at ¶ 22.

The No Name site is only about one-half mile outside of Glenwood's present city limits. The development of a RICD a slight distance outside of Glenwood's present boundaries is entirely consistent with the foregoing authority, particularly given the glaring absence of any contrary statutory directives. As a practical matter, many boaters who entire the river above the No Name site will float on down to the City and egress at Two Rivers Park, as has occurred for decades, and the No Name site clearly will function as part of the Glenwood Springs For the foregoing reasons, there is no legal or policy reason to deny Glenwood's claim for conditional water rights at the No Name location.

b. *Potential environmental effects will be addressed and mitigated.*

The Staff's Recommended Findings state that Glenwood Springs' claimed RICD water rights may have "potential detrimental effects on several environmental aspects." Though the CWCB Staff did not provide supporting information for this claim, it is Glenwood Springs' assumption that this conclusion relates to pre-meeting comments filed by Colorado Parks & Wildlife ("CPW"). In coordination with CPW staff, Glenwood Springs has developed the following additional proposed decree paragraph 11.i, to address CPW's concerns:

CPW Coordination. Prior to initiation of a Section 404 permit application to the U.S. Army Corps of Engineers, Glenwood Springs shall consult with Colorado Parks & Wildlife (CPW) with regard to RICD structure siting, design and contemplated future maintenance. CPW may participate in the Section 404 permitting process to ensure that terms are included in the Section 404 permit(s) to protect aquatic resource values. Glenwood Springs also agrees to consult with CPW as to (1) the timing of construction and (2) the timing of any future reservoir releases for the benefit of the RICD Water Rights.

4. Additions to List of Exhibits

In addition to the exhibits set forth in Glenwood Springs' initial pre-meeting statement, the S2o Rebuttal Report, the WWE Rebuttal Report, the June 30, 2015 proposed ruling, and any additional demonstrative exhibits or presentation materials developed, Glenwood Springs may use the following additional exhibits at the public meeting regarding Glenwood Springs' RICD Water Rights:

a. WWE Tables 1-3 and Figures 1A, 1B, and 1C, all contained in attached Rebuttal Report.

b. S2o Exhibits A, B and C, included in attached Rebuttal Report, as well as attached Autocad cross-section showing Primary Channel and Bypass Channel.

5. Conclusion.

Glenwood Springs respectfully requests that, regarding Glenwood Spring's application for the RICD Water Rights in Case No. 13CW3109, the CWCB reject Staff's Recommended Findings, and find, pursuant to C.R.S. § 37-92-102(6), that Glenwood Springs' proposed RICD Water Rights: (1) will not impair the ability of Colorado to develop its compact entitlements; (2) will not cause material injury to instream flow water rights; and (3) will promote maximum utilization of the waters of the State. At the July 15-16, 2015 CWCB meeting in Ignacio, Colorado, Glenwood Springs intends to present information, as outlined in this pre-meeting statement and the rebuttal engineering reports, to demonstrate that the CWCB should make such favorable findings.

Dated: June 30, 2015

Mark E. Hamilton
Kylie J. Crandall
Christopher L. Thorne
HOLLAND & HART LLP
ATTORNEYS FOR THE CITY OF GLENWOOD SPRINGS, COLORADO

CERTIFICATE OF SERVICE

I hereby certify that on this 30th day of June, 2015, a true and correct copy of the foregoing document was served upon the following by via email:

Party Name	Party Type	Email Address	Attorney Name
American Whitewater	Opposer	rob.harris@westernresources.org bart.miller@westernresources.org	Bartlett Phillip Miller Robert Kortum Harris
Aurora, City of	Opposer	jdingess@hrodlaw.com poolteri@hrodlaw.com	John Marshall Dingess Ryan P. McLane Teri L Petitt
Colorado Department of Transportation	Opposer	jennifer.mele@state.co.us	Jennifer Lyn Mele
Colorado River Water Conservation District	Opposer	pfleming@crwcd.org jturner@crwcd.org	Jason Victor Turner Peter Cheney Fleming
Colorado Springs, City of	Opposer	mgustafson@springsgov.com	Michael John Gustafson
Colorado Water Conservation Board	Opposer	Susan.schneider@state.co.us	Susan J Schneider
Division 5 Engineer	Division Engineer	alan.martellaro@state.co.us	Division 5 Water Engineer
Glenwood Hot Springs Lodge And Pool Inc	Opposer	scott@balcombgreen.com dhallford@balcombgreen.com	David Carl Hallford Scott M Balcomb
City and County of Denver	Opposer	Casey.funk@denverwater.com	Casey S. Funk
Grand County Board of Commissioners	Opposer	davet@white-Jankowski.com mitrap@white-jankowski.com adamd@white-jankowski.com	David C Taussig Mitra Marie Pemberton
Grand Valley Water Users Association	Opposer	mhcrm@Jwth-law.com kmkurath@Jwth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad
Gypsum, Town of	Opposer	kropf@waterlaw.com groves@waterlaw.com	Jason M. Groves Kevin Land Patrick
Homestake Steering Committee	Opposer	mhammond@chp-law.com mbrown@chp-law.com	Mary Mead Hammond Mason Hamill Brown William Arthur Paddock
Orchard Mesa Irrigation District	Opposer	mhcrm@wth-law.com kmkurath@wth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad
State Engineer	State Engineer	dick.wolf@state.co.us	Colorado Division Of Water Resources
United States of America	Opposer	kristen.guerriero@sol.doi.gov	Kristen C Guerriero
Ute Water Conservancy District	Opposer	mhcrm@wth-law.com kmkurath@wth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad
West Divide Water Conservancy District	Opposer	ed@ommpc.com	Edward Bryan Olszewski
Western Resource Advocates	Opposer	rob.harris@westernresources.org bart.miller@westernresources.org	Bartlett Phillip Miller Robert Kortum Harris

Colorado Parks and Wildlife		Jay.skinner@state.co.us	Jay W. Skinner
Colorado Attorney General	Coordinator	Casey.shpall@state.co.us	Casey Shpall
Colorado Water Conservation Board	Board and Board Staff	Suzanne.sellers@state.co.us	Suzanne Sellers

/s/ Kylie J. Crandall

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~~MAY 21,~~JUNE 30, 2015 - PROPOSED RULING
SETTLEMENT DOCUMENT PURSUANT TO CRE 408

DISTRICT COURT, WATER DIVISION NO. 5, COLORADO Court Address: 109 Eighth Street, Suite 104 Glenwood Springs, CO 81601 (970) 928-3062 *telephone*	
CONCERNING THE APPLICATION OF: **The CITY OF GLENWOOD SPRINGS, a Colorado home rule city,** **in Garfield County, Colorado**	▲ **COURT USE ONLY** ▲ **Case Number:** **13CW3109** **Water Division: 5**
FINDINGS OF FACT, CONCLUSIONS OF LAW, RULING OF THE REFEREE, JUDGMENT AND DECREE	

This matter comes before the Court on the Application for Surface Water rights for Recreational In-Channel Uses of the City of Glenwood Springs, Colorado ("Glenwood Springs" or "Applicant") filed on December 31, 2013. The Water Judge referred the Application to the Water Referee for Water Division 5, in accordance with C.R.S. § 37-92-101, *et seq.*, known as the Water Right Determination and Administration Act of 1969.

The Court, having considered the matters raised by the Application, including the findings and recommendations of the Colorado Water Conservation Board ("CWCB"), and having made such investigations as are necessary to become fully advised with respect to the subject matter of the Application, hereby makes the following Findings of Fact, Conclusions of Law, and Ruling and Decree in this matter.

FINDINGS OF FACT

1. The name and address of the Applicant are:

City of Glenwood Springs
101 West 8th Street
Glenwood Springs, CO 81601

With copy to:

Mark E. Hamilton, Esq.
Christopher L. Thorne, Esq.
Holland & Hart LLP
600 E. Main St., Suite 104
Aspen, CO 81611

2. Timely and adequate notice of the Application were given as required by statute, and the Court has jurisdiction over the subject matter of this proceeding and over all parties affected hereby, whether they have appeared or not. None of the land or water involved in the Application are within the boundaries of a designated groundwater basin.

3. Timely statements of opposition were filed by: the City and County of Denver by and through its Board of Water Commissioners, the Town of Gypsum, the U.S. Bureau of Land Management, the Glenwood Hot Springs Lodge & Pool, Inc., the Ute Water Conservancy District, Grand Valley Water Users Association, Orchard Mesa Irrigation District, the Colorado River Water Conservation District, the Colorado Department of Transportation, the Homestake Steering Committee, the Grand County Board of County Commissioners, the City of Aurora, the Colorado Water Conservation Board, the City of Colorado Springs, and the West Divide Water Conservancy District. Additionally, two other Objectors, American Whitewater and Western Resource Advocates, were permitted to intervene in this matter by order of the court dated _____. No other statements of opposition were received. The time for filing statements of opposition has expired.

4. Glenwood Springs has entered into stipulations with the U.S. Bureau of Land Management; and _____. The Court has reviewed these stipulations and entered orders approving them. The Court finds that this Judgment and Decree is consistent with the terms of the stipulations.

5. Glenwood Springs seeks confirmation of conditional surface water rights for recreational in-channel diversions (each a "RICD Water Right") located in the Colorado River, for three proposed boating parks to be known as the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park, all as more fully described below.

6. *RICD Water Right:* No Name Whitewater Park.

a. Location:

The diversion structures comprising the No Name Whitewater Park will be located in the channel of the Colorado River between the following two points on the centerline of the river:

i. No Name Whitewater Park Upstream Extent:

PLSS: NW¼ of the SW¼ of Section 1, Township 6 South, Range 89 West of the 6th P.M., at a point 1880 feet from the north section line and 85 feet from the west section line of said Section 1, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,478 m, easting 303,685 m

ii. No Name Whitewater Park Downstream Extent:

PLSS: NW¼ of the SE¼ of Section 2, Township 6 South, Range 89 West of the 6th P.M., at a point 1475 feet from the south section line and 1290 feet from the east section line of said Section 1, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,237 m, easting 303,246 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute. Although the location for the No Name Park Whitewater Park location is not presently within the city limits of Glenwood Springs, it is only approximately one-half mile east of the present city limits of Glenwood Springs. Colorado law empowers municipalities to plan for access, utilities, waterways, waterfronts and parks within three miles of municipal boundaries. *See* C.R.S. 31-12-105(1)(e) (2015).

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	Flow Rate	Days
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

7. *RICD Water Right:* Horseshoe Bend Whitewater Park.

a. Location:

The diversion structures comprising the Horseshoe Bend Whitewater Park will be located within the channel of the Colorado River between the following two points on the centerline of the river:

i. Horseshoe Bend Whitewater Park Upstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1,386 feet from the south section line and 1916 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,318.52 m, easting 301,605.95 m

ii. Horseshoe Bend Whitewater Park Downstream Extent:

PLSS: NW¼ of the SE¼ of Section 3, Township 6 South, Range 89 West of the 6th P.M., at a point 1920 feet from the north section line and 2250 feet from the east section line of said Section 3, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,381,513 m, easting 301,551 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: by formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

8. *RICD Water Right:* Two Rivers Whitewater Park.

a. Location:

The diversion structures comprising the Two Rivers Whitewater Park will be located within the channel of the Colorado River, above its confluence with the

Roaring Fork River, between the following two points on the centerline of the river:

i. Two Rivers Whitewater Park Upstream Extent:

PLSS: SW¼ of the NE¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2394 feet from the north section line and 1975 feet from the east section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,248m, easting 300,033 m

ii. Two Rivers Whitewater Park Downstream Extent:

PLSS: SE¼ of the NW¼ of Section 9, Township 6 South, Range 89 West of the 6th P.M., at a point 2075 feet from the north section line and 2330 feet from the west section line of said Section 9, Garfield County, CO.

UTM: NAD 83 Zone 13S: northing 4,380,353 m, easting 299,772 m

The precise locations of the structures within this reach of the Colorado River will be confirmed upon making this conditional water right absolute.

b. Source: Colorado River

c. Appropriation date: December 19, 2013

d. How appropriation was initiated: By formation of the requisite intent to appropriate coupled with actions manifesting such intent, including but not limited to discussions in public meetings, engineering and planning studies, preliminary design, and passage of Resolution 2013-38 by the City authorizing the filing of the Application.

e. Date water applied to beneficial use: N/A (this claim is for a conditional water right)

f. Amounts:

Time Period	**Flow Rate**	**Days**
April 1 through June 7	1250 c.f.s.	68 days
June 8 through July 23	2500 c.f.s 4000 c.f.s.	41 days 5 days
July 24 through Sept 30	1250 c.f.s.	69 days

All of the above amounts are limited to the period between 6:00 a.m. and 9:00 p.m. each day, except during competitive events when these hours may be extended to between 6:00 a.m. and 12:00 midnight each day. The 4000 c.f.s. event flow rate is further limited to no more than 5 continuous days between June 30 and July 6. The specific event flow dates will be as follows: (1) if July 4th falls on a Sunday, Monday, Tuesday or Wednesday, the event flow rate will be in effect June 30-July 4; (2) if July 4th falls on a Saturday, the event flow rate will be in effect July 1-5; and (3) if July 4th falls on a Thursday or Friday, the event flow rate will be in effect July 2-July 6.

g. Uses: all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses.

9. Findings to Support the RICD Water Rights:

a. Appropriate Entity. Glenwood Springs is a municipality incorporated within the State of Colorado and is entitled to appropriate surface water rights for recreational in-channel diversion water rights as defined in C.R.S. § 37-92-103(10.3) (2013).

b. Specific Plan and Intent. Glenwood Springs has a specific plan and intent to divert or otherwise capture, possess and control a specific quantity of water for specific beneficial uses authorized by statute.

c. Available Water. Glenwood Springs has demonstrated that unappropriated water is available in the amounts set forth in this Decree from the source claimed.

d. Can and Will. Glenwood Springs has sufficiently demonstrated that the water can and will be diverted and beneficially used, and that the project can and will be completed with diligence and within a reasonable time.

e. Appropriate Stream Reaches. The reaches of the Colorado River in which the Glenwood Springs recreational in-channel diversions will be located are appropriate reaches of the stream for the intended RICD Water Rights.

f. Control Structures. The amounts of water claimed and decreed herein will be controlled in the water's natural course in the Colorado River during the claimed time periods by means of the RICD structures identified above. The design capacities of these structures will capture, control, and divert the flows of the Colorado River up to 4000 c.f.s., which allow flows of that amount to be fully captured by the high flow channel constructed into each structure. The structures will be designed such that the Colorado River is usable at a variety of water

levels. The low flow channel constructed into each structure will provide passage for boats and a usable hydraulic feature for inner tubes and other recreational water craft or include safety bypass channels for downstream users. During run-off, the high flow channel constructed into each structure will provide a larger, more usable hydraulic feature in the form of a hydraulic jump or wave train that kayakers and other boaters may use for the intended recreational purposes. In view of the foregoing, the structures are capable of efficiently diverting and controlling the water flows without waste for the claimed conditional amounts as identified above and in a manner that constitutes a diversion under C.R.S. § 37-92-103(7) (2013), at all flow rates up to the maximum claimed above.

g. Reasonable Recreational Experience. The claimed uses (all recreational uses in and on the Colorado River including without limitation, boating, rafting, kayaking, tubing, floating, canoeing, paddling, and all other non-motorized recreational uses) are reasonable and the proposed amounts of water that the Applicant desires to appropriate are reasonable and appropriate, under reasonably efficient practices, to accomplish without waste the purpose for which the appropriations are lawfully made. Likewise, Applicant has demonstrated that there is reasonable demand for these recreational experiences throughout the season claimed. *See generally* C.R.S. § 37-92-103(10.3) (2013).

h. Minimum Stream Flow. The claimed flow amounts represent the minimum amount of stream flow to serve Applicant's intended and specified reasonable recreation experiences. C.R.S. § 37-92-305(13)(d) (2013).

i. Amount Below Which There Is No Beneficial Use. The flow rate below which there is no longer any beneficial use of water at the control structures for the decreed purposes is 500 c.f.s. C.R.S. § 37-92-305(13)(d) (2013).

j. Stream Flow Volume. During the RICD season claimed, the total average historical volume of water for the stream segments where the diversion structures will be located has been calculated to be 1,190,499 acre-feet. Fifty percent of this total average historical volume is 595,250 acre-feet. The total volume of water represented by the flow rates decreed for the claimed recreational in-channel diversions of 581,625 acre-feet is no greater than 50% of the sum of the total average historical volume of water for the stream segments where the diversion structures will be located. Therefore, this Decree and the RICD Water Rights granted herein are not limited by sub-sections I, II or III of C.R.S. § 37-92-305(13)(f) (2013). Except as otherwise limited by this decree or in stipulations or agreements related thereto, Glenwood Springs may initiate a call for any amount of water between 500 c.f.s. and the maximum decreed rate within each applicable time period specified in Sections 6.f, 7.f and 8.f, above.

k. Extended RICD Season. The Applicant has demonstrated a need for the reasonable recreational experience from Labor Day to September 30 each year, as required by C.R.S. § 37-92-103 (10.3). The Court finds that there is demand for a reasonable recreation experience at the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park between Labor Day and September 30 each year. Without limiting the foregoing, the Court finds that non-motorized boating already occurs in these areas between Labor Day and September 30 each year, and that there is present and future demand for a reasonable recreation experience on the Colorado at these locations during the period from Labor Day to September 30 each year.

l. Event Flows. The Applicant has demonstrated a need for an event-flow period that shall be shorter than fourteen days, as required by C.R.S. § 37-92-103 (10.3). The Court finds that there is a need for event flows at 4000 c.f.s. for a total of five continuous days from June 30 to July 6 each year, as more specifically set forth in Sections 6.f, 7.f and 8.f, above.

10. Findings Regarding Compliance with the CWCB Review Process Pursuant to C.R.S. § 37-92-102(6) (2013) and Additional Statutory Factors Pursuant to C.R.S. § 37-92-113 (2013):

a. CWCB Review Process. Pursuant to C.R.S. § 37-92-102(6) (2013), after deliberation at a public meeting on July 16, 2015, CWCB made written findings as to: (1) whether the adjudication and administration of the claimed recreational in-channel diversions would materially impair the ability of Colorado to fully develop and place to beneficial use its compact entitlements; (2) whether the adjudication and administration of the claimed recreational in-channel diversions would cause material injury to an instream flow; and (3) whether adjudication and administration of the claimed recreational in channel diversions would promote maximum utilization of the waters of the state. In making the following additional determinations, the Court has considered the CWCB's findings as required by C.R.S. § 35-92-305(13)(a) (2013).

b. Compact Entitlements. The Court finds that the adjudication and administration of the RICD Water Rights, under the conditions contained in this Decree, will not impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. C.R.S. § 37-92-305(13)(a)(I) (2013).

c. Maximum Utilization. The RICD Water Rights will support a new, valuable, beneficial use on the water of a seasonally over-appropriated stream, while allowing for continued utilization and development of the waters of the State for both consumptive and non-consumptive uses, without causing any reduction in flow, injury to downstream water rights, or injury to upstream senior water rights. The RICD Water Rights promote maximum utilization of Colorado's water

resources because Glenwood Springs has used a reasonable means to use, divert, capture, and control the water for RICD purposes so as to minimize its call upon the river and avoid waste. Based upon the evidence, the Court finds that the adjudication and administration of the RICD Water Rights, subject to the terms of this Decree, will promote maximum utilization of the waters of the State.

d. Stream Reach Appropriateness. The Court finds that the proposed whitewater parks are located in appropriate reaches of the stream required for the intended uses. C.R.S. § 37-92-305(13)(a)(III) (2013). The locations of the whitewater parks are appropriate for many reasons. These parks are all located in an already popular and active recreational use corridor accessible from I-70 and near downtown Glenwood Springs. In addition, the physical locations of the parks are appropriate due to favorable stream gradients and the adequacy of the existing river flows.

e. Access for Recreational Use. The nature and extent of the access required for the activities sought is proper. The City of Glenwood Springs and/or other public agencies own and/or control access to the recreational in-channel use, and there are no irresolvable impediments preventing the City of Glenwood Springs obtaining adequate access. In particular, there is existing public access to the ~~river~~Colorado River above and below these parks, and additional site-specific public access can be developed at each park location. The Court therefore finds, for the reasons stated above, that there is sufficient access for the contemplated recreational uses. C.R.S. § 37-92-305(13)(a)(IV)(2013).

f. Instream Flow Rights Injury. There are no instream flow water rights within these reaches of the Colorado River. As a result, the Court finds that the RICD Water Rights will not cause material injury to instream flow water rights. C.R.S. § 37-92-305(13)(a)(V) (2013).

11. Additional Terms and Conditions.

a. Compact Administration. During any period identified by the Upper Colorado River Commission in a finding issued pursuant to Article VIII(d)(8) of the Upper Colorado River Basin Compact of 1948 for curtailment of Colorado River basin water uses within Colorado, which the State of Colorado has agreed to implement in a manner that impacts water diversions within Water Division 5, the RICD Water Rights decreed herein will be administered in accordance with the compact curtailment rules adopted by the State Engineer or such other state agency as may, in the future, be empowered to adopt rules or otherwise act to assure compliance with interstate water compacts that are then in effect, if any, including any such rules intended to avoid, delay, or limit the severity of such a compact curtailment. If no such compact curtailment rules are then in effect, Glenwood Springs shall

not place a call for the RICD Water Rights decreed herein during the period that implementation of an Article VIII(d)(8) curtailment order affects water diversions in Water Division No. 5, unless the State Engineer or Division Engineer determines that exercise of all or part of the RICD Water Rights will not affect Colorado's ability to comply with the Compact. Otherwise, the RICD Water Rights decreed herein shall be administered in accordance with this Decree and Colorado law.

b. Floodplain Regulations. Glenwood Springs will ensure that the design of the control structures complies with applicable floodplain management requirements.

c. Direct Flow Water Rights—No Claim to Stored Water. The RICD Water Rights provide appropriative rights only to direct flows of the Colorado River at the boating parks specified herein. Although storage releases may flow through and be put to use in the boating parks to help satisfy the RICD Water Rights, this decree shall not give Glenwood Springs any rights to stored water, limit in any way either the amount or timing of releases of stored water, or provide any basis for Glenwood Springs to request or demand releases of such water; provided, that stored water may be delivered for beneficial use by the RICD structures described herein consistent with the terms of water court decrees or other authorizations for upstream storage rights and the consent of the owner(s) of said water rights.

d. Non-Opposition. Glenwood Springs shall not use the RICD Water Rights as a basis to oppose any future application in the Water Court for Water Division 5 that proposes future development of the waters of the Colorado River or its tributaries upstream of the RICD Water Rights (including applications to confirm new water rights, changes of water rights, and/or for approval of plans for augmentation) where the proposed diversion is less than 1,000 acre-feet per year. Glenwood Springs also shall not use the RICD Water Rights as a basis to oppose any water rights applications filed to implement the Colorado River Cooperative Agreement effective September 26, 2013 ("CRCA"), or the 1998 Memorandum of Understanding Between the Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium ("Eagle River MOU"), provided that the contemplated drafts and yields of such water rights filings do not exceed the contemplated drafts or yields specified in these agreements. However, unless contrary to other provisions of this decree or related stipulations or agreements, or out-of-priority diversions are replaced in time and amount through an exchange, plan for augmentation or substitute water supply plan approved in the future, all water rights junior in priority to the RICD Water Rights may be subject to curtailment by a call for water under the RICD Water Rights, and nothing herein shall prohibit Glenwood Springs from requesting water rights administration by the State or Division

Engineers or from filing statements of opposition for the purpose of protecting water rights other than the RICD Water Rights.

e. CRCA. Glenwood Springs and the CWCB agree to cooperate and coordinate in good faith concerning the future operation of the RICD Water Rights and future water rights appropriated for the "Upper Colorado Cooperative Project", which is defined by the CRCA as "a water supply project located on the West Slope, agreed to by Denver Water and the signatories to this Agreement, and designed to produce water for use on the East and West Slopes, including at least 20,000 acre-feet of average annual diversions for use on the East Slope."

f. River Administration. In operating the RICD Water Rights, Glenwood Springs will regularly communicate with the Colorado River Water Conservation District (the "River District") concerning river conditions and water rights administration within Water Division No. 5, and will make reasonable efforts to operate the RICD Water Rights with due consideration of the water supply, water exchange, and augmentation needs of the River District, and its constituents, in a manner consistent with the River District's statutory obligations regarding the development and protection of water resources for the benefit of its constituents. Glenwood Springs will at all times operate the RICD Water Rights in recognition of prior decrees and agreements.

g. ~~*Additional Upstream Water Rights Development. [TBD – As of the date of submittal of this revised proposed decree, Glenwood Springs is in active discussions with the Colorado River Water Conservation District and other parties concerning possible additional carve-outs and/or no-call agreements for the purpose of allowing continued development of an additional amount of junior water rights free from any call from the RICD Water Rights in excess of 1,250 c.f.s. (the amount of the senior historical call from the Shoshone power plant). Glenwood Springs intends to supplement this proposed decree with additional proposed language when available].*~~ Protection of New Water Project Yield.

For purposes of this Section 11.g., the following determinations shall apply:

i. The term "New Water Project" shall mean any single water project (which may include storage projects or storage projects with direct flow components) or combination of multiple water projects that: (a) was not constructed or otherwise in operation as of December 31, 2013; (b) diverts or stores water from points that are located upstream of the RICD Water Rights; and (c) is decreed and used for beneficial use within Water Division 5. New Water Projects may include water projects that utilize decreed water rights that are either senior or junior in administrative priority to the RICD Water Rights.

ii. The term "Firm Yield" shall mean the average annual yield of a New Water Project (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.

iii. The term "Cumulative Firm Yield" shall mean the combined average annual yield of all New Water Projects (based on a 3-year running average basis), as determined by the River District in consultation with Glenwood Springs.

iv. The term "Junior Protected Yield" shall mean the portion of the Cumulative Firm Yield supplied by water rights junior to the RICD Water Rights, up to a maximum of 20,000 acre-feet minus the Cumulative Firm Yield of New Water Projects supplied by water rights senior to the RICD Water Rights.

Glenwood Springs shall consult with the River District on or prior to May 20th of each year regarding the implementation of this Section 11.i. If this consultation process determines that, during the period from June 8 to July 23 of that year, Glenwood Springs' placement of a call on the Colorado River for the RICD Water Rights in excess of 1,250 c.f.s. would likely impair the Junior Protected Yield, then the RICD Water Rights shall be deemed satisfied by calling, in order of priority, only those water rights necessary to produce an administrative flow rate of 1250 c.f.s. (as measured at the single measurement point described below in Section 23) from June 8 to July 23 of that year, or such portion of that period that is determined necessary to satisfy the Junior Protected Yield. This Section is intended to alleviate potential conflicts between the future operation of the RICD Water Rights and New Water Projects, but shall not be construed to require Glenwood Springs to reduce a call in the event that the Junior Protected Yield can be achieved by: (1) diverting water outside of the June 8 to July 23 time period each year; or (2) exercising water rights that are senior to the RICD Water Rights.

h. CPW Coordination. Prior to initiation of a Section 404 permit application to the U.S. Army Corps of Engineers, Glenwood Springs shall consult with Colorado Parks & Wildlife (CPW) with regard to RICD structure siting, design and contemplated future maintenance. CPW may participate in the Section 404 permitting process to ensure that terms are included in the Section 404 permit(s) to protect aquatic resource values. Glenwood Springs also agrees to consult with CPW as to (1) the timing of construction and (2) the timing of any future reservoir releases for the benefit of the RICD Water Rights.

CONCLUSIONS OF LAW

12. The Application filed herein was complete, covering all applicable matters required under C.R.S. § 37-92-302 (2013).

13. All notices required by law have been given, and no further notice need be given.

14. The Court has jurisdiction of this matter and of all persons, whether they have appeared or not. C.R.S. §§ 37-92-301(2) and -303(1) (2013).

15. The Court has authority to confirm the conditional surface water rights for recreational in-channel diversion as requested by the Applicant. C.R.S. §§ 37-92-103(4) and (10.3) (2013).

16. The Court concludes that the Applicant is an entity entitled to obtain a water right for a recreational in-channel diversion pursuant to C.R.S. §§ 37-92-103(4) and (10.3) (2013).

17. The Applicant has complied with all requirements and met all standards and burdens of proof; therefore it is entitled to a decree confirming and approving the conditional RICD Water Rights described herein.

RULING OF THE REFEREE

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

19. The Court GRANTS the Application and hereby confirms conditional RICD Water Rights for the No Name Whitewater Park, the Horseshoe Bend Whitewater Park, and the Two Rivers Whitewater Park. The RICD Water Rights are decreed for the amounts as set forth above for the above-described recreational in-channel uses, subject to the terms and conditions set forth herein.

20. The City Council of Glenwood Springs shall determine, by resolution, up to three employees or agents of the Glenwood Springs who shall be authorized to place a call for the RICD Water Rights approved herein. Glenwood Springs shall provide the Division Engineer with a copy of the initial resolution designated the authorized individuals and each subsequent resolution changing the authorized individuals. This resolution shall be passed prior to use of the RICD Water Rights decreed herein.

21. The Application herein was filed in 2013 and the water rights herein confirmed shall be administered as filed in 2013, and shall be junior to all water rights for which applications were filed in prior years. As between water rights filed in 2013, priorities shall be determined by historical dates of appropriation and shall not be affected by the date of entry of this Decree.

22. The Applicant may seek curtailment of water rights junior to the RICD Water Rights, diverting upstream of the RICD structures, only at times when beneficial use of the RICD Water Rights for non-motorized boating is occurring.

23. As part of compromise negotiations, Glenwood Springs has agreed to install, operate and maintain a single point gage for measurement and recording of administration for the RICD Water Rights granted in this Decree. This device will be acceptable to the Division engineer for water rights administration purposes. The gage shall be installed at the location of the first RICD structure to be constructed and shall be used for measurement at all of the RICD structures granted in this Decree. Only this device will be used for administrative purposes. Applicant shall provide accounting relating to the RICD Water Rights, as required by the Division Engineer.

It is ORDERED that a copy of this Decree shall be filed with the Division Engineer for Water Division No. 5 and with the State Engineer.

It is further ORDERED that this Ruling shall be filed with the Water Clerk, subject to judicial review.

DATED this ____ day of _____, 20___.

BY THE REFEREE:

_____
Holly Strablizky, Water Referee
Water Division No. 5, State of Colorado

JUDGMENT AND DECREE

No protest having been filed to the foregoing Ruling of the Referee and the time for filing such protest having now expired, the foregoing Ruling of the Referee is confirmed and approved and is hereby made the judgment and decree of this Court. An Application for Finding of Reasonable Diligence shall be filed on or before the end of the month, six years from the date of the Water Judge's Order, and thereafter in accordance with the provisions of Article 92 of Chapter 37, Colorado Revised Statutes, so long as Glenwood Springs desires to maintain the conditional surface water rights decreed herein, or until such rights are made absolute.

DATED this ____ day of _____, 20____.

BY THE COURT:

Hon. James Boyd, Water Judge
Water Division No. 5, State of Colorado

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June 30, 2015

Via Email: mehamilton@hollandhart.com

Mark Hamilton, Esq.
Holland & Hart LLP
600 E. Main St., Suite 104
Aspen, CO 81611

Re: Rebuttal Report
City of Glenwood Springs RICD Water Rights—Case No. 13CW3109

Dear Mark:

Wright Water Engineers, Inc. has prepared this rebuttal report to respond to various technical reports submitted by objectors and to the Colorado Water Conservation Board's (CWCB) Staff's Recommended Comprehensive Findings of Fact (Staff's Recommended Findings). The CWCB is required to make affirmative findings that the Recreational In-Channel Diversion (RICD) will: (1) not materially impair the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements; (2) promote maximum utilization of water of the state; and (3) not cause material injury to instream flow water rights. The CWCB provided the Staff's Recommended Findings on June 18, 2015. While the document does not provide the justification behind many of the recommended findings, WWE has prepared this report to rebut staff's conclusions regarding the compact entitlement and maximum utilization issues.

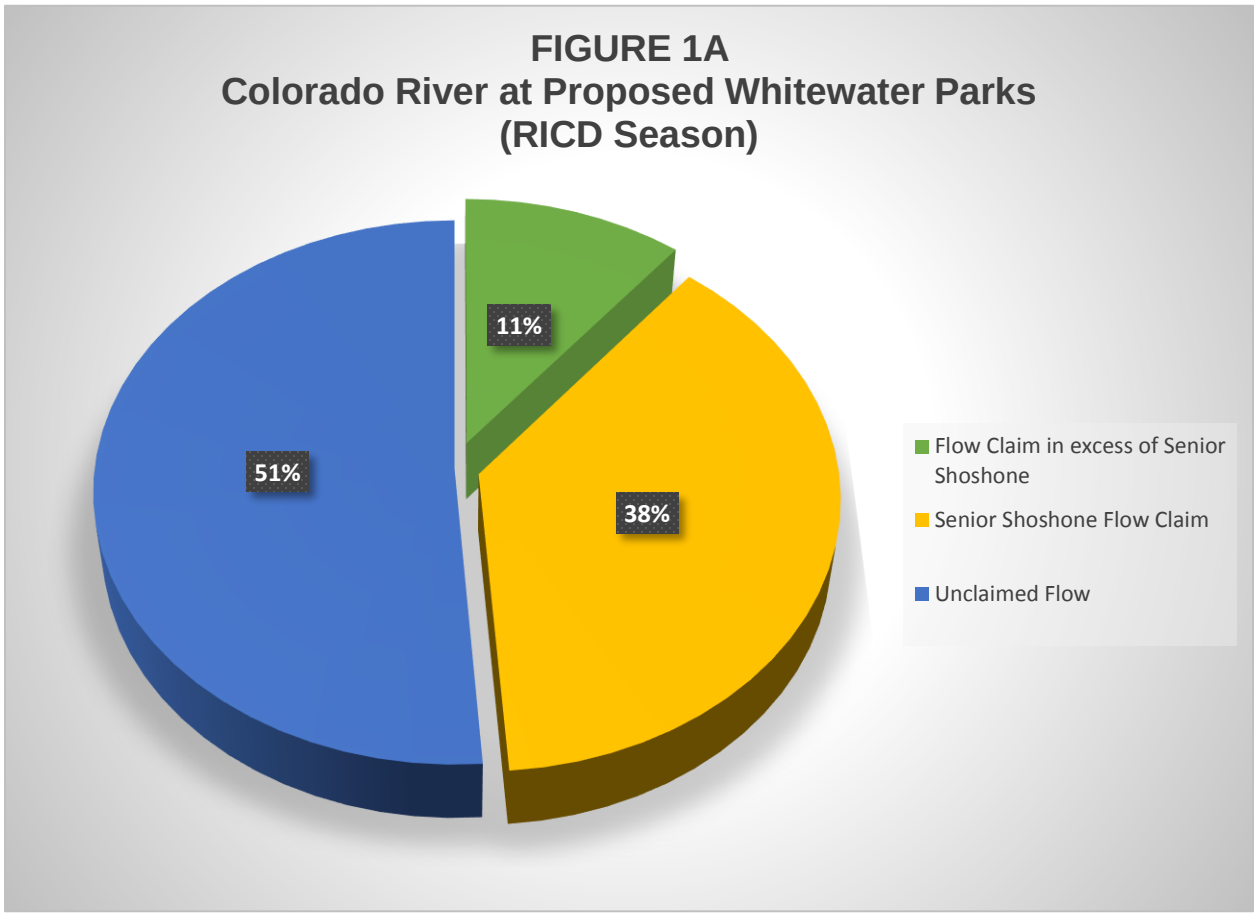
MAGNITUDE OF FLOW CLAIMS

The total volume of Glenwood's flow claims are small with respect to the overall basin yield, especially when considering the existing calls on the river.

As discussed in previous reports, the total volume of Glenwood's proposed RICD claim is 581,625 acre-feet. This total volume of the flow claims is less than 50 percent of the historically available flow at the whitewater park locations during the RICD period. Of the 183 days in the RICD claim, the flow claim exceeds the Shoshone Powerplant senior right in the amount of 1,250 cfs for only 46 days. The flow volume above the Shoshone right for those 46 days is 128,700 acre-feet. The following **Table 1** and pie charts shown as **Figures 1A, 1B, and 1C** below show this volume relative to the flow volumes associated with the Colorado River at the RICD during the RICD season, the Colorado River at the RICD year-round, and the Colorado River and its tributaries at the state line.

TABLE 1
Flow Volumes

	Flow Claim in excess of Senior Shoshone	Senior Shoshone Flow Claim	Total	%
Colorado River at Proposed Whitewater Parks (RICD Season)	128,700	452,925	1,190,499	11%
Colorado River at Proposed Whitewater Parks (Full Year)	128,700	452,925	1,586,762	8%
Colorado River Tributaries at Stateline (Full Year)	128,700	452,925	4,536,316	3%



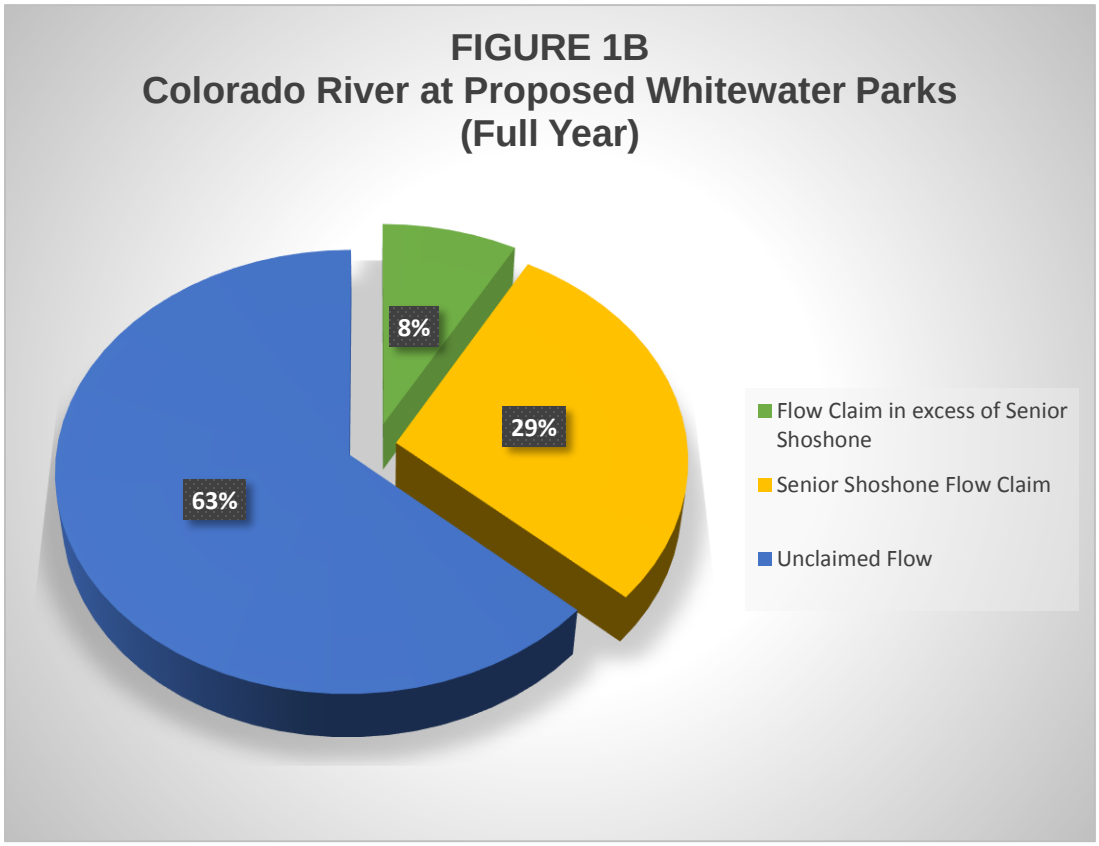


FIGURE 1B
Colorado River at Proposed Whitewater Parks
(Full Year)
8%
29%
63%
Flow Claim in excess of Senior Shoshone
Senior Shoshone Flow Claim
Unclaimed Flow

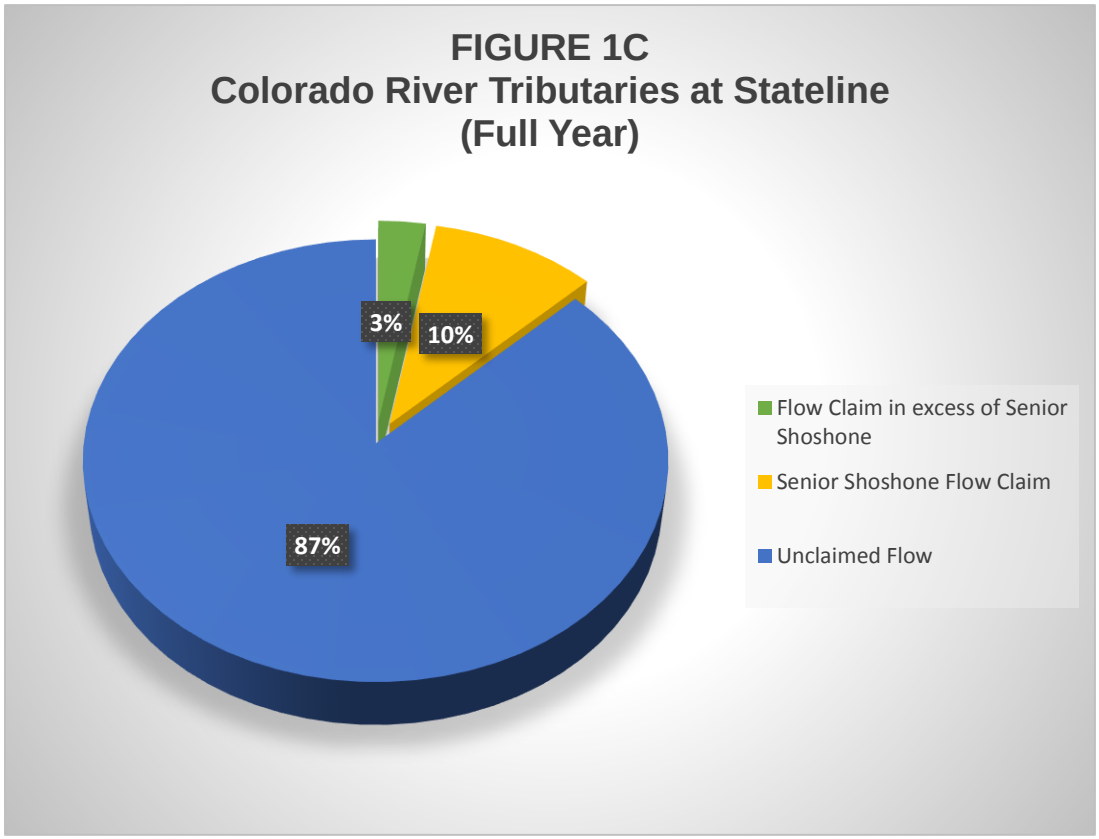


FIGURE 1C
Colorado River Tributaries at Stateline
(Full Year)
3%
10%
87%
Flow Claim in excess of Senior Shoshone
Senior Shoshone Flow Claim
Unclaimed Flow

These charts demonstrate the small percentage of the available flow that is being claimed by Glenwood's RICD. All of the remaining flow is unencumbered by the RICD and is available to be developed in order to fully utilize the state's compact entitlements. This information in combination with the non-consumptive nature of the RICD water rights ensures maximum utilization, especially when there are ample downstream potential development of that water supply as discussed below. In the Staff's Recommended Findings, the staff acknowledges that (1) "suitable downstream points of diversion or storage for 'consumptive' beneficial use exist before the water leaves the State", and (2) the distance of the proposed RICDs to the State Line is considerable".

FLOWS RELATIVE TO EXISTING RICDS

The flow rates claimed in Glenwood RICD are conservative when compared to other decreed RICDs, especially the Grand County RICD given the respective channel geometries and historical flow volumes.

While Glenwood's proposed flow amounts exceed those of existing decreed RICDs in absolute terms, the flows are consistent, if not conservative, when compared with the channel geometry and the historically available flow. As shown in Wilson Water Group's Figure 3 of their June 4, 2015 report (**Attachment 1**), while Glenwood's flow volume claim is higher than existing RICDs, the Colorado River is the largest in the state, and the proportion of the historically available flow claimed is therefore among the lowest.

The closest upstream RICD on the mainstem of the Colorado River is Grand County's Gore Canyon Whitewater Park. Grand County's decreed flow rates are 860 cfs for April 5 through April 28 and July 23 through October 15, and 1,500 cfs for April 29 through July 22. The historically available flow to Grand County's RICD during the claimed time periods is 543,178 acre feet, which is only 45.6 percent of volume available at Glenwood's proposed RICD.

During that same 41-day period from April 28 through June 7, the Gore Canyon RICD has a higher decree flow rate (1,500 cfs) than the Glenwood's proposed RICD flow rate (1,250 cfs). As such, Grand County's approved RICD is at a location with less than half of the historically available flow and with higher flow rates during the rising limb of the hydrograph when storage is typically accomplished. **Figure 2** attached shows a comparison of the flows and flow claims for the Glenwood and Grand County RICDs.

The Gore Canyon RICD has a peak rate of 1,500 cfs for a duration of 85 days; whereas, the proposed RICD has a rate of 2,500 cfs for a duration of 46 days (with the potential for events flows of 4,000 cfs for 5 of those days). In addition, the duration of the higher flow rates at the Gore Canyon RICD is 39 days longer than Glenwood's proposed RICD.

FLOWS AT NO NAME WHITEWATER PARK

The total volume of Glenwood's RICD when applied to the No Name Whitewater Park is still below 50 percent of the historical flow adjusted to the site.

WWE has further evaluated whether the hydrology at the No Name Whitewater Park needs to be evaluated based on different hydrologic data due to the inflow of No Name Creek below the uppermost site. No Name Creek has a drainage basin area of 20.7 square miles and enters the Colorado River between the No Name and Horseshoe Bend Whitewater Parks. WWE used the USGS StreamStats method to estimate the average monthly flows during the RICD season. The results are summarized in **Table 2**.

TABLE 2
USGS StreamStats Results for No Name Creek

Month	Mean Flow (cfs)	Mean Flow (AF)
April	17.1	1,016
May	86.7	5,322
June	76.8	4,562
July	28.9	1,774
August	13	798
September	9.3	552

WWE considered a second approach using a USGS streamflow gage (Colorado River near Glenwood Springs ID 09071100) that was operated above the No Name site for 7 years. As, expected, the daily flow data had a strong correlation with the Dotsero gage. Unfortunately, the former gage site was located above Grizzly Creek, the largest tributary within Glenwood Canyon. WWE attempted to adjust the gage data to account for Grizzly Creek using the StreamStats approach; however, the method produced flow volumes that exceeded those determined for the Colorado River above the confluence with the Roaring Fork River.

Ultimately, WWE determined that the most accurate method for estimating flows at the No Name Whitewater Park was to use the flow records developed for the Two Rivers site and subtract out the estimated monthly flow volumes. The primary criteria for selecting this approach were the longer period of overlapping flow records and estimating flows for the smaller drainage basin. Applying this methodology, WWE estimated a flow volume at the No Name site of 1,172,000 acre-feet during the RICD period. Therefore, the RICD flow claims are still below 50 percent of the average historical flow volume at the No Name Whitewater Park (581,625 acre-feet compared to 586,000 acre-feet).

NEED FOR PERIOD LESS THAN 14 DAYS

To promote maximum utilization, the Glenwood event flows are limited to the minimum needed for the desired recreational experience.

Section 37-92-103 states that "[i]ndividual time periods shall not be shorter than fourteen days unless the applicant can demonstrate a need for a shorter time period." The proposed ruling in Case No. 13CW3109 claims event flows for a 5-day period between June 30 and July 6. This 5-day period is centered on Independence Day and is intended to provide higher flows for a special event. The flow claim period of five days is the minimum needed to achieve the desired recreational experience and is therefore consistent with the statutory requirements for maximum utilization by the efficient use of the available flows to meet the need.

It is assumed that part of the rationale for the minimum 14-day period is to avoid creating an undue burden on those tasked with administration of the river. Since the 5-day period of the RICD is for a special event, the planning will begin months prior to such an event. Therefore, the Division Engineer and his water commissioners will know about the exact timing of the flow claims well in advance of having to administer the water rights. This advance notice would also facilitate the opportunity for coordinated reservoir operations that could help satisfy the non-consumptive RICD since upstream reservoir releases en route to users downstream of Glenwood Springs will count against the RICD water right pursuant to the terms of the Glenwood's proposed decree in this matter.

FUTURE DEVELOPMENT POTENTIAL

Future upstream development potential is protected by limiting the duration of flow claims in excess of the Shoshone call to 46 days, mostly during the falling limb of the hydrograph. There is adequate downstream development potential to consumptively use the flows that satisfy Glenwood's RICD.

When considering the effect of the RICD on future development potential, there are a couple of key aspects. The first is the volume of the RICD relative to the volume of the historically available flow. The second is the timing of the RICD relative to the historically available flow.

Whether future development of additional water demands occurs upstream or downstream of the proposed RICD, storage will be required in order to augment with respect to the existing calling rights (i.e., Shoshone and Cameo). The junior storage rights will rely on free river conditions to fill during the rising limb of the hydrograph. The timing of the RICD flow claims to meet the desired recreational experiences is centered on the falling limb of the hydrograph, which protects the early season free river conditions unless affected by other rights, such as the Grand County RICD. In addition, existing reservoirs with senior storage rights (i.e., Wolford Mountain Reservoir, Green Mountain Reservoir, and Eagle Park Reservoir) have remaining contract water available for new augmentation plans.

In addition, the upstream development potential is largely in the headwater tributaries of the Fraser, Blue, and Eagle Rivers. As shown in Wilson Water Group's Figure 2 of their June 4, 2015 report (**Attachment 2**), future development in these headwater tributaries is already encumbered by existing RICDs.

With regard to future development potential downstream of the RICD, there are numerous conditional water rights already decreed for oil shale development. In the Energy Development

Water Needs Assessment (Phase 1 Report) prepared for the Colorado, Yampa, and White River Basin Roundtables, URS provided the table below:

TABLE 3[1]
Summary of Conditional Water Rights

Water District	Number of Direct Flow Water Rights	Total Conditional Direct Flow Rate (cfs)	Number of Conditional Storage Water Rights	Total Conditional Storage Volume (acre-feet)
Division 5, District 39	47	888	18	104,664
Division 5, District 45	8	118	1	2,000
Division 5, District 70	56	469	13	166,930
Division 5, District 72	8	513	3	176
Division 6, District 43	83	2,344	25	333,717
Totals	**202**	**4,332**	**60**	**607,486**

As shown in the table, there are undeveloped storage rights downstream of the RICD along the Colorado River totaling over 270,000 acre-feet, with an additional 330,000 in conditional storage rights in the White River basin. The location of the oil shale development is within the Piceance geologic basin, and extends between the White and Colorado Rivers beginning at Meeker and Rifle, respectively. Therefore, all of the potential oil shale projects will be located either downstream of the proposed RICD or on tributaries not affected by the proposed RICD. In addition, at least one energy company has applied for the right to deliver Colorado River water into the White River basin.

WWE analyzed the 30 years of historical flow data for the study period to evaluate the potential volume that could be called down through the RICD reach above what the Shoshone senior water right could place a call for. The annual period for potential new calls is limited to the 46 days when flow claims exceed 1,250 cfs. WWE's analysis showed that the volume of potential new calls averaged only 60,000 acre-feet per year, 19,000 acre-feet per year in excess of the senior Shoshone right. As discussed above, since the RICD is non-consumptive and there are numerous existing water rights downstream, there will be no material injury to the state's ability to develop its compact entitlements. This conclusion is strengthened when considering the call reduction and compact administration provisions in the proposed decree.

PROVISIONS IN PROPOSED DECREE

When added to the other aspects of the proposed ruling, these provisions further ensure that Glenwood's proposed RICD promotes maximum utilization and does not materially impair the ability to develop the state's compact entitlements.

[1] Table 7-1 from "Energy Development Water Needs Assessment (Phase 1 Report)" by URS, dated September 2008, prepared for, Colorado, Yampa, and White River Basin Roundtables Energy Subcommittee.

In response to requests from objectors including the CWCB, Glenwood has agreed to include a provision in the proposed decree that would subject the administration of the RICD water rights to compact curtailment rules adopted by the State Engineer.

In cooperation with the CRWCD, Glenwood Springs has developed a customized call reduction provision that is intended to provide an opportunity for further development of junior water rights upstream without providing a windfall that might be realized if a carve-out or no-call provision served to subordinate or alleviate a call from the portion of the claimed RICD that is consistent with the existing senior Shoshone call (i.e., upstream junior appropriators already augment to the Shoshone call throughout the claimed RICD season).

POTENTIAL FOR REDUCED FREE RIVER CONDITIONS

Over the 30-year study period, Glenwood RICD's averaged only 14 days of potential call in excess of the existing Shoshone senior call.

When evaluating whether the RICD has the potential to reduce the free river conditions, it is important to note that Glenwood's flow claims only exceed Shoshone calls for a total of 46 days. Outside of those 46 days, the potential for a call is unchanged from the potential for a Shoshone call. It should also be noted that other decreed water rights that are senior to Glenwood's claimed RICD water rights, including the Grand County RICD, already have the potential to place a call during these 46 days.

WWE evaluated the 30 years of historical flow data for the study period to evaluate the potential for a reduction in free river conditions due to the RICD water rights. Since this analysis was based on potential calls, it was assumed that the Shoshone senior water right was also calling when possible. As a result, the only time the RICD could potentially add a new call would be during the 46-day period when Glenwood's flow claims are above 1,250 cfs. WWE's evaluation showed that in more than 25 percent of the years, there would be no reduction in free river conditions. Overall, WWE found that, on average, the RICD could potentially call during an additional 15 days per year when Shoshone could not place a call. This does not necessarily mean that there would have been free river conditions during those 15 days since other water rights (e.g., the Grand County RICD) could place a call with flows above 1,250 cfs. Glenwood's RICD water rights promote maximum utilization by limiting the claims above the senior Shoshone right to a maximum of 46 days; thereby, potentially adding only up to 15 days per year of new calls on the river.

The later season timing of a potential RICD call is significant to upstream development since any new development will secure augmentation supplies to replace out-of-priority depletions during periods when the Shoshone and/or the Cameo calls may call during dry years. These sources will likely consist of either contract storage water or new onsite storage. In either case, the storage is going to rely upon filling in the during the spring runoff in May and June since there is no firm yield during the later season. In drier years, the runoff will occur earlier with storage opportunities often limited to late-April to early-June. Since the claimed flows above 1,250 cfs do not begin until June 8, the rising limb of the hydrograph is not affected, especially in drier years. Of course, the contract water from existing reservoirs will be stored under rights senior to the RICD, and will therefore not be affected.

CONCLUSIONS

Compact Entitlements & Maximum Utilization

When evaluating the effect of RICD water rights, the issues of potential impairment of the compact entitlements and maximum utilization have significant overlap as evidenced by the CWCB's Findings of Fact. WWE has therefore set forth below the key points that demonstrate that the RICD claims both promote maximum utilization and do not materially impair the state's ability to develop its compact entitlements.

1. The RICD flow claims only exceed the Shoshone senior right of 1,250 cfs for a maximum of 46 days. The volume claimed above the Shoshone call is only 128,700 acre-feet during this period. Use of flows levels equal to Shoshone for most of the season promotes maximum utilization, as does limiting the period when different recreational experiences are sought to 46 days. The downstream development potential far exceeds the additional 128,700 acre-feet that could be shepherded down through the RICD reach, therefore not materially impairing the ability of to develop the state's compact entitlements.

2. New upstream development already needs to account for the Shoshone and Cameo calls and either develop new storage or rely on existing reservoirs for augmentation supplies. The timing of the 46 days (June 8 through July 23) does not affect the ability for junior storage rights to fill during free river conditions during the rising limb of the hydrograph. Times when the RICD could reduce free river conditions are mostly limited to periods when upstream junior water rights would already be operating under a plan for augmentation relying on stored water due to potential Shoshone calls.

3. Even though the flow claims and periods already promote maximum utilization and do not materially impair the ability to develop the state's compact entitlements, Glenwood has agreed to include provisions in the proposed decree that enhance these characteristics. The first provision states that Glenwood would abide by rules developed by the State Engineer to administration during a Colorado River Compact call. This language echoes that found in other recent decrees. The second provision allows for a call reduction during the 46-day period down to 1,250 cfs under certain conditions to allow for future upstream development.

4. Water Rights <u>not</u> affected by Glenwood's RICD include:

    a. all rights in Divisions 1, 2, 3, 4, 6, and 7;

    b. all rights downstream of the RICD;

    c. senior rights upstream of the RICD;

    d. junior rights, including exchanges, upstream of the RICD operating outside the RICD season (practically speaking, this window is only 46 days);

    e. all rights, including exchanges, operating when river flow exceed the RICD claims

Instream Flow Water Rights

There are no instream flow rights in the reach containing Glenwood's proposed whitewater parks. Since the RICD water rights are non-consumptive, there will be no adverse effects on downstream instream flow rights.

Very truly yours,

WRIGHT WATER ENGINEERS, INC.

By _____
Jonathan M. Kelly, P.E.
Senior Water Resources Engineer

Attachments: Figure 2
Attachment 1 – Figure 3 from Wilson Water Group June 4, 2015 Report
Attachment 2 – Figure 2 from Wilson Water Group June 4, 2015 Report

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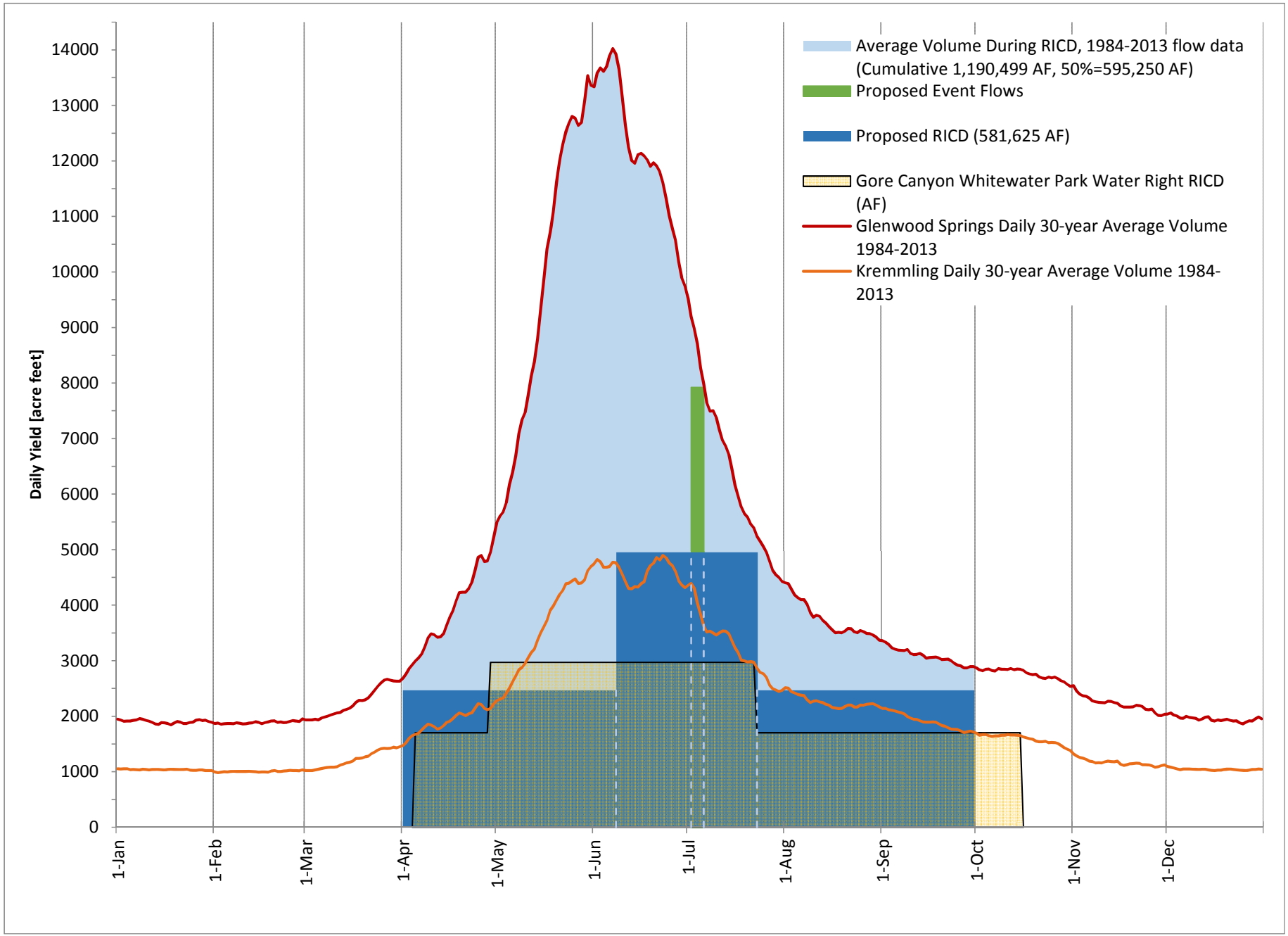
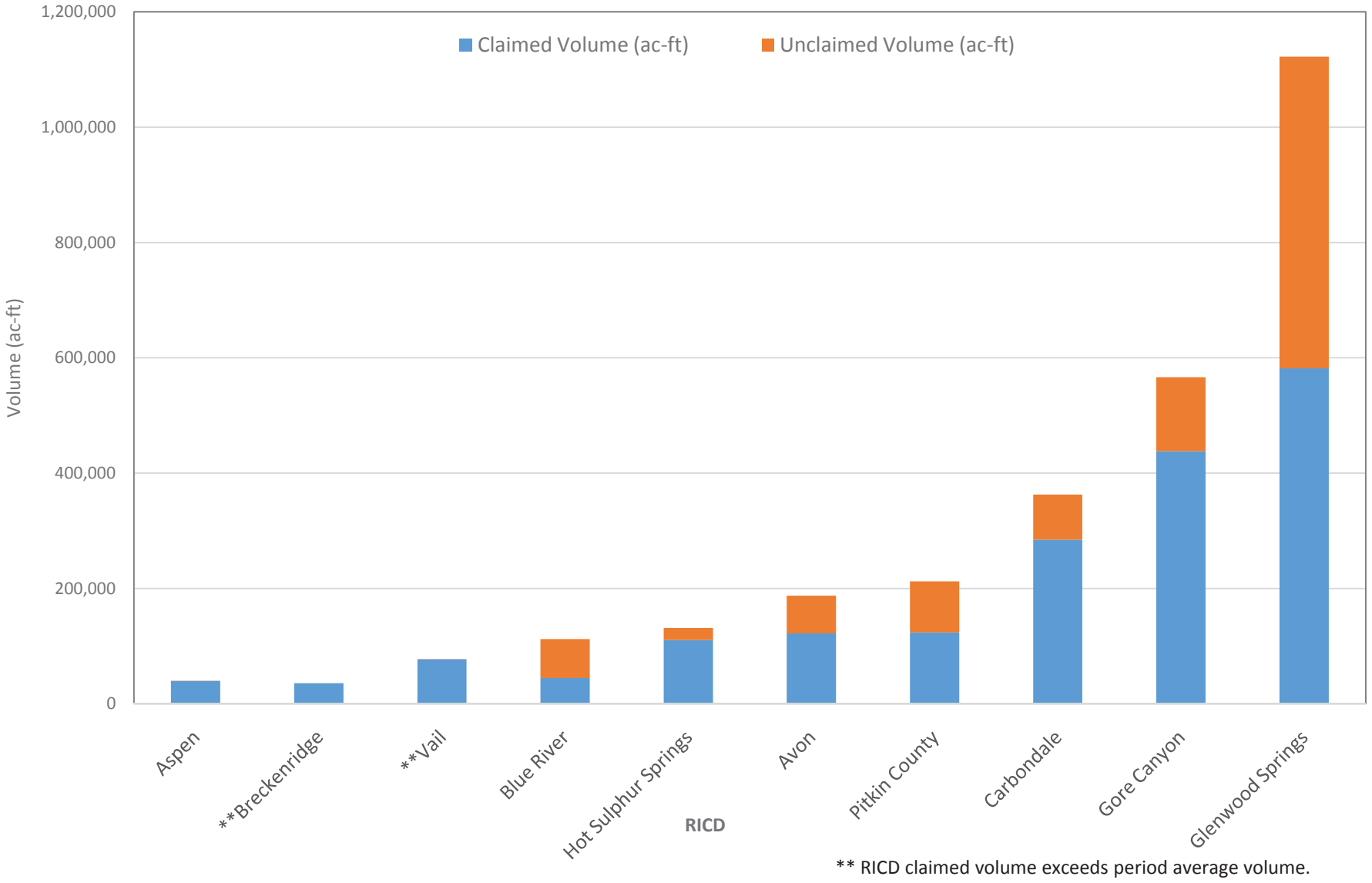
FIGURE 2
Comparison of Glenwood Springs and Grand County RICD Flow Claims



ATTACHMENT 1

FIGURE 3
Overview of RICD Water Rights
Total Flow Volume Claimed



** RICD claimed volume exceeds period average volume.

ATTACHMENT 2

FIGURE 2

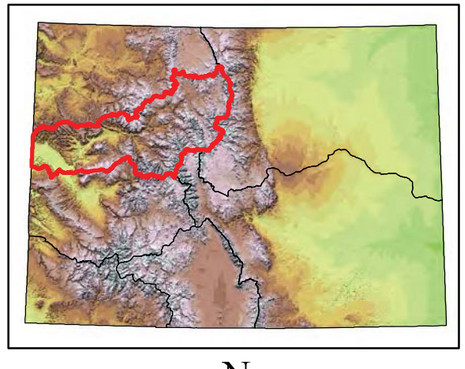
Vicinity Map of Watershed Areas Affected by Colorado Water Conservation Board (CWCB) Decreed and Pending Recreational In-Channel Diversions (RICD)

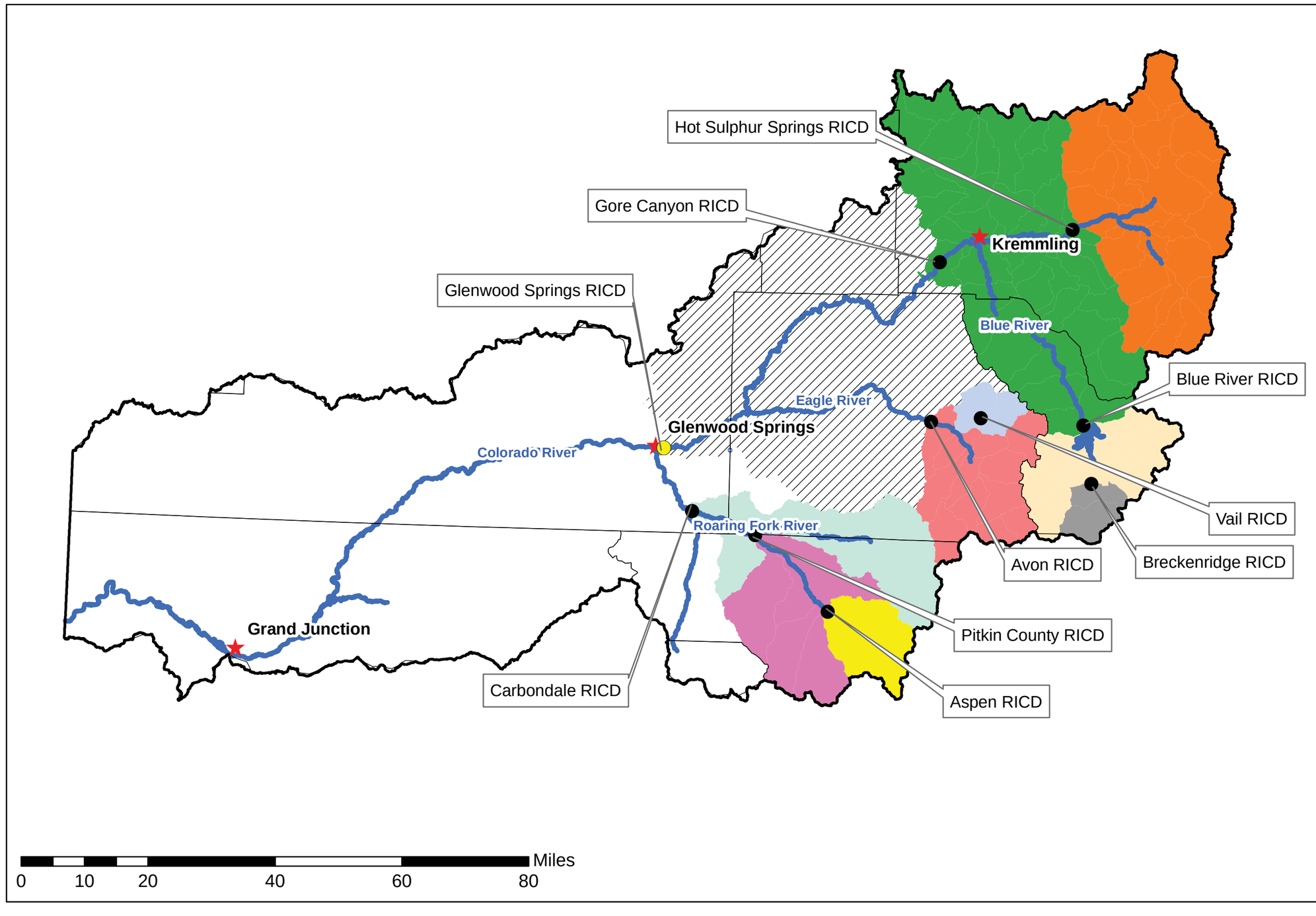
wilsonwater group

Date: 2 June 2015
Filename: Glenwood_RICD_mainstem.pdf
Created by: W.R.

Watershed Contributing Areas

- Pending RICD
- Decreed RICD
- Cities
- Counties
- Water Division 5
- Rivers
- Glenwood Springs Area
- Blue River Area
- Breckenridge Area
- Avon Area
- Vail Area
- Pitkin County Area
- Carbondale Area
- Aspen Area
- Gore Canyon Area
- Hot Sulphur Springs Area





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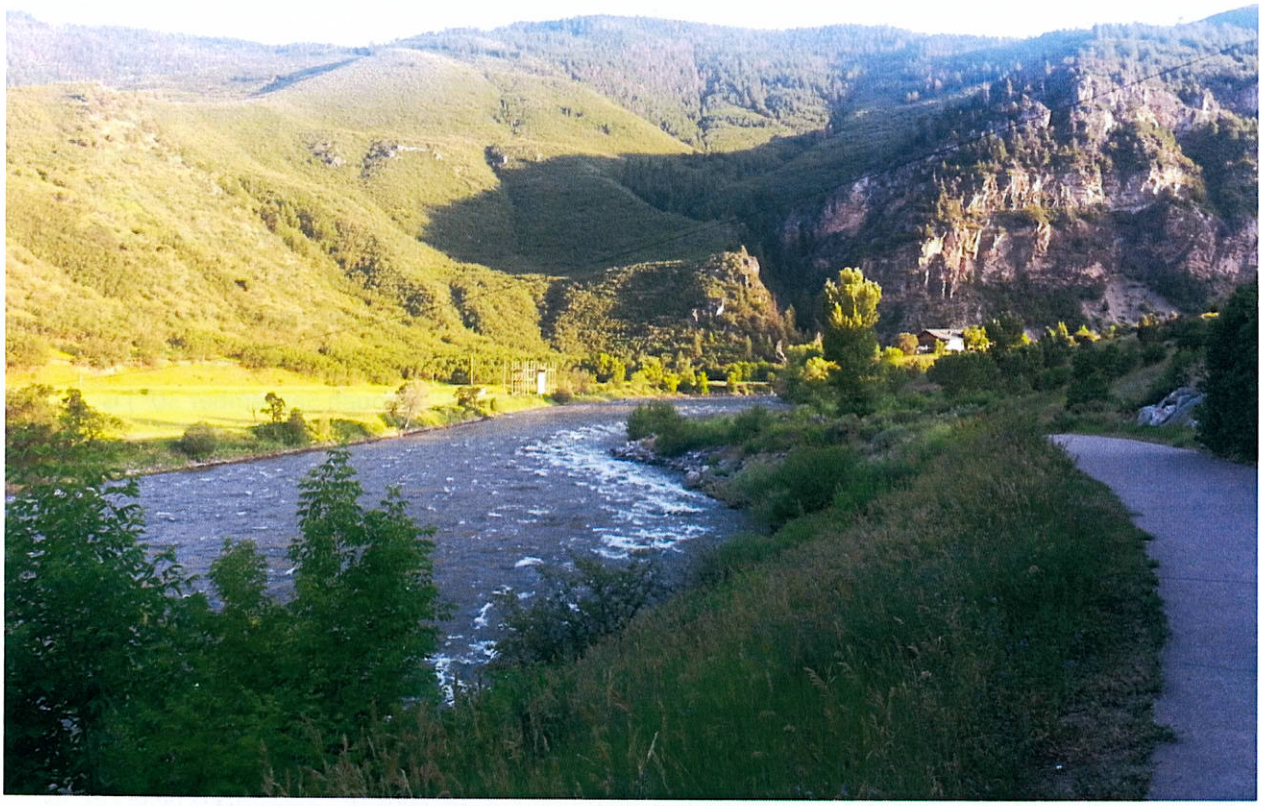
S2o Supplemental Engineering Rebuttal Report

June 30, 2015



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SCOTT SHIPLEY, P.E.

1. Introduction

This report is supplementary to S2o Design and Engineering's Preliminary Engineering Design Report (Preliminary Report), dated May 30th, 2014, and the Supplement to Preliminary Report (Supplementary Report), dated December 5th, 2014, both prepared in support of the City of Glenwood Springs' Recreational In-Channel Diversion water rights application Case No. 13CW1309, Water Division No. 5. This supplement to the Engineering Reports (Rebuttal Report) is intended to address additional comments received from various objectors and CWCB staff in anticipation of the CWCB's board meeting on July 16 2015.

As stated herein, the RICD control structures have been designed as commonly used types of U-structures that have been shown to efficiently provide recreation in other locations that have decreed water rights in Colorado. The U-Structures will provide recreational opportunities at all reasonable flows above 500 Cubic Feet per Second (cfs) and are designed specifically to capture, control, and place to beneficial use the flow rates claimed, inclusive of 1,250, 2,500, and 4,000 cfs, for the purposes of beginner, intermediate, and event recreational experiences. It is S2o's opinion that all three flow rates claimed are the minimum amounts of water necessary to provide for the reasonable recreational experiences sought. Furthermore, the season of use claimed (April 1st through September 30th) is appropriate for the recreational experiences sought by the City of Glenwood Springs.

The RICD control structures have been designed to provide for specific recreational experiences in the Colorado River and the design and water usage calculations, as shown within this document, include water allocated to the safe boater bypass channel, which S2o believes to be a necessary part of the proposed design. S2o designed the bypass channel to provide for an alternative recreational experience for boaters, fish passage, and safe boater bypass to the main hydraulic. As S2o has done with its previous whitewater parks, the Glenwood Springs RICD control structures have been preliminarily designed in a manner to comply with floodplain development requirements in Glenwood Springs and Garfield County. S2o has worked to ensure that the geometry of the control structures is balanced by impacts to the regulatory floodplain thereby providing the most efficient whitewater structure possible in the proposed locations. These assertions are supported by the calculations shown in S2o's Preliminary and Supplemental Reports as well as the information contained herein.

As described in S2o's Supplementary Report, the proposed RICD control structures must be designed to match the existing hydrology of the river reach, to prevent impacts to the sediment transport capacity, fluvial geomorphology, aesthetic and recreational quality, aquatic ecology, and flood conveyance capacity of the Colorado River through the RICD reaches. The Colorado River watershed is the largest in the State of Colorado. The 100 year flood event (1% annual probability of occurrence), upstream of the Colorado's confluence with the Roaring Fork River, is 32,500 cfs. By comparison, the lowest flow rate claimed of 1250 cfs is a flow that is present in the in the RICD reaches 92% of the time during the claimed RICD season. Given the breadth of the Colorado River, in RICD reaches, 1250 cfs produces a much shallower flow depth that that typically seen in other rivers in Colorado. There are many aspects to the design of a whitewater park for an RICD, one of them is the requirement to efficiently divert, capture, control, and place to beneficial use the flows of the Colorado River, the other is that the design

and flows must be appropriate, based on a reasonable analysis, for the Colorado River. The selection of 1250 cfs as the lowest claimed flow rate is based on the analysis described in S2o's Preliminary and Supplementary Reports as well as the fundamental design requirement that flows claimed should be typical of those regularly occurring within the reach.

In the same way the RICD control structures must be designed to provide for the recreational experiences at regularly occurring flows, they must also be designed to provide for flood conveyance during low probability flood events. Aspects such as the degree of constriction, the elevations chosen, and the geometry of the structures must not cumulatively effect conveyance of the 100 year flood event (32,500 cfs), thereby impacting the regulatory floodplain, designed to safeguard loss of life and property. This constraint limits the amount that the RICD control structures can constrict or impound the flows at all flow rates up to the 100 year flood event. It is S2o's opinion that the proposed structures are appropriate for the Colorado River at these locations and are being designed in a manner that will efficiently divert, capture, controls and place to beneficial use the flows of the Colorado River, without waste, in a manner that is reasonable given the floodplain and habitat constraints for this reach.

2. Demonstration of the Efficiency of S2o's RICD Control Structures

It is S2o's opinion that the proposed Glenwood Springs whitewater structures are reasonably efficient and will provide for, without waste, all three recreational experiences claimed. The 1250 cfs flow rate, which is a common flow rate during the season of use claimed, will provide for a beginner experience that will be attractive to boaters of all levels for both local and visiting users. The 2500 cfs flow rate is claimed during periods of more significant flows and will provide an intermediate experience that will be more powerful and will create a greater attraction during time periods when desirable recreational experiences, in other smaller rivers in the State, are typically unavailable. The 4,000 cfs flow rate, which is significantly more powerful than the 2500 cfs flow rate, is claimed for a competitive event near the July 4 weekend which is a period of time when S2o believes a significant number of competitors and spectators can be reasonably expected to visit Glenwood to take part in, or watch, a competition.

The Broad-Crested Weir Equation (Weir Equation), to size and scale the project, and the Freestyle Surface Index (FSI), to relate recreational experiences between existing and proposed control structures for the purpose of identifying the minimum flows necessary to achieve the desired recreational experiences, are both valid and accepted methods.

For the Glenwood Springs RICD water rights application, similar to the Steamboat Springs and Durango RICD cases, the Weir Equation has been used to demonstrate the control structure's ability to divert, capture, and control the stream flows claimed. A fundamental tenet of the Weir Equation is that critical flow must occur at some point along the crest. If a drop structure is designed to create a hydraulic jump, as is the case for the proposed whitewater structures, then the water that pours over the drop structure will necessarily pass through critical depth thereby making this Equation appropriate to be used as a guideline for the design of these structures.

The design of the U-structure can be manipulated to change the shape and energy state of a hydraulic jump to create desirable recreational experiences as seen at other, similarly designed drop structures, in

the State of Colorado. By designing the U-Structure to be functionally similar to a compound broad-crested weir, we can predict certain hydraulic conditions of the flow such as discharge calculated as a function of the channel geometry and an appropriate coefficient. In this way, the discharge calculated is fundamentally tied to the creation of critical flow conditions and as such is the minimum necessary to produce critical depth and subsequently the desired recreational experiences.

The FSI was used to calculate the power available for recreational experiences associated with the flow rates claimed in order to demonstrate that they are in fact the minimum amounts necessary to provide for all three recreational experiences sought. Recreational experience is not a hydraulic parameter that can be measured and therefore an analog must be used, such as the FSI, to relate the power between known and proposed control structures. In this way, analogs such as the FSI provide one of the best means available to predict recreational experiences at proposed structures. Ultimately recreational experience must be felt by the user of the feature and the only way to predict recreational experience is by relating experiences associated with known and proposed control structures.

One characteristic of the use of similarly designed U-Structures in one location, such as Durango, and another location, such as Glenwood Springs, is that the client and engineer can understand and relate to each other the experience sought in order to achieve specific goals for the park during specific periods of time. Based on this understanding, Glenwood Springs has claimed the minimum flows necessary to produce the desired recreational experiences, which must be inclusive of both the primary whitewater channel (Primary Channel) and the safe boater bypass channel (Bypass Channel). Glenwood's Claims for all three flow rates are valid for the following reasons:

- The Bypass Channel is a requirement of the design for this reach of the Colorado River to provide for existing pass-through downriver boating traffic, the Primary and Bypass Channels are inseparable in these reaches. Therefore the flows required to allow safe navigation down the bypass channel are necessarily flows required to create whitewater recreation at the RICD control structures and are therefore part of the total flows claimed. The flows contained within the primary and bypass channels work in concert with one another and as such are inseparable.

- The flows in the Bypass Channel will be utilized for all three claimed recreational experiences. Additionally, float through use, as documented in the Upper Gunnison RICD water rights case, is a recognized beneficial use of Waters of the State of Colorado. Preliminary design of the bypass channel has been conducted to ensure that depths and widths will be the minimum necessary to provide for the reasonable recreational experiences sought. S2o has designed the bypass channel to create recreation in a manner similar to the existing Glenwood Springs Whitewater Recreational Area and the Grand County Whitewater Park, where existing bypass channels produce waves desired by Stand Up Paddle boarders (SUP) and river surfers. Not all downriver or freestyle users will seek to use the Primary Channel and some will choose to utilize the more novice experience of the Bypass Channel. In S2o's experience there have been boaters using the Bypass Channel for surfing or downriver passage 100 percent of the time that S2o has visited the Glenwood Springs Whitewater Recreational Area.

- In discussions with Colorado Parks and Wildlife (CPW) the conversation has focused on providing fish passage at the structures via a low-slope Bypass Channel. Similar in intent to the Grand County RICD[1] control structure, the geometry and roughness of this Bypass Channel will be further refined with CPW to provide for this functionality. Construction of any of the RICD control structures will fundamentally need to satisfy both recreational demand as well as be able to maintain the fish passage of the Colorado River at these locations and provide for a healthy, connected, river corridor.

3. S2o's Design for the RICD Achieves Maximum Utilization

Maximum utilization is achieved through the satisfaction of requirements set forth in the CWCB's rule 7 (c). S2o's director, Scott Shipley, has reviewed all requirements, to the extent that they pertain to structure related design aspects, and it is S2o's opinion that these requirements have been satisfied.

S2o also asserts that an appropriate level of engineering and hydraulic design has been conducted to date sufficient to determine the minimum amounts of stream flow necessary to achieve all three claimed recreational experiences.

S2o has reviewed the *Hydrotechnical Assessment of Proposed Whitewater Park Development Summary of Testimony*, dated June 4th, 2015, prepared by SG1 for Wilson Water. In this report, SG1 makes numerous claims regarding the design and subsequently the minimum flows necessary to achieve the desired recreational experiences. It is S2o's opinion that the factors identified in support of these claims suggest a possible misunderstanding of the design and design intent or are not related to the statutory RICD requirements. This response is intended to clarify only those issues pertinent to the RICD process.

It is S2o's position that the design thus far has been conducted, to a reasonable degree of scientific certainty, to demonstrate the RICD control structure's abilities to: capture and control all three claimed flow rates; provide for the desired recreational experiences at the minimum flows necessary; generate a range of freestyle whitewater recreational experiences for beginner, intermediate, and advanced users as well as provide for existing float-through traffic; take advantage of reasonable technologies available for construction to minimize the flow rates claimed; extend the season of use on the Colorado River through Glenwood Canyon; and promote maximum utilization of Colorado's water resources.

S2o's typical design process is based on extensive experience and is significantly different from that of SG1's. S2o's process involves multiple stages of design, which become incrementally more specific as information is gathered and conclusions are made. SG1 claims that a two dimensional and/or physical scale model of the proposed whitewater parks must be created to meet the standard of a "reasonable amount of design" in order to understand the minimum flows for the claimed RICD water rights. However, this is not consistent with S2o's experience or any of the other decreed water rights in the State of Colorado.

[1] The flows claimed in the Grand County Case, at the Gore Canyon Structure, included flows that pass through the bypass channel at this structure.

S2o principal Scott Shipley has been involved in the following six separate RICD cases: Pueblo (office support); Gunnison (office support); Steamboat Springs (testimony); Salida and Buena Vista (testimony at hearing); Durango (lead engineer); and Glenwood Springs (current) and has reviewed the work done for Golden and discussed work done for Grand County with one of the project engineers. All of these projects except Glenwood Springs have decreed RICD water rights and have been shown to provide for the recreational experiences sought by their clients. None of these projects, during any stage of design, utilized two dimensional or physical scale modeling. To that end, S2o is not aware of any prior RICD water rights cases that relied upon multi-dimensional or physical scale modeling to either qualify or quantify the minimum flows necessary to achieve the recreational experiences sought. The type of modeling design process that SG1 proposes, at a scale that would provide additional meaningful design input, would be prohibitively expensive in Glenwood's case and could easily surpass $600,000, far exceeding the bounds of reasonableness or any other known requirements for previously decreed RICD water rights. And, even if this level of modeling were undertaken, it is unlikely that the results would materially change S2o's opinions as to the minimum flows necessary to create all three desired recreational experiences.

Although SG1 claims that the survey coverage is inadequate for structure design and modeling purposes, this is also inconsistent with S2o's experience. Hydrographic survey data were collected using echo sounding SONAR coupled with survey grade GPS mounted to a raft frame. The hydrographic survey extended from approximately 600 feet upstream of the proposed location for the No Name Structure #1, downstream through Glenwood Canyon, ending approximately 1,200 feet downstream of the Two Rivers Structure #2, at the Two Rivers boat launch. Hydrographic survey data collected over the course of several passes through the reach were aggregated to create a point cloud describing the bathymetry of the river bottom. Topographic survey at each site included the collection of spot elevations and water surface elevations. In areas above the water's edge, outside the site boundaries, topography was described using one foot resolution contour data, provided by the City of Glenwood Springs, obtained from recent photogrammetric surveys of the town and surrounding areas. All hydrographic and topographic survey was conducted by a licensed professional surveyor in the State of Colorado.

Survey data provided to S2o were thoroughly reviewed to assess their accuracy and subsequently the representativeness of the Digital Terrain Model. It is S2o's position that the survey provided meets the standard of care for design and modeling of whitewater parks in the State of Colorado and exceeds the level of survey for all other whitewater park projects that S2o has been either directly or indirectly involved in, including those that claimed and currently possess RICD water rights.

SG1 claims that all three flow rates claimed can be reduced by 20-35 percent, if the Bypass Channel is accounted for in the computation of the FSI values. It is S2o's position that the flows claimed in their entirety are the minimums necessary to achieve the three desired recreational experiences. SG1 states, "The most significant issue with the preliminary engineering design work is that S2o failed to account for the Bypass Channel in computing the FSI values for all six of the RICD structures. Had S2o correctly used the primary channel width in the equation instead of the total channel width, the FSI value would have increased by an additional 20-35 percent…Assuming a reduction in channel width , the FSI value would have increased by an additional 20-35%" (Shepherd, 2015). It is S2o's opinion that the methodology

used by SG1 to recalculate the FSI values for the reduced channel widths, does not match our calculations using the same data. In fact any recalculation of the FSI to account for a reduced bottom width must in turn take into account the associated reduction in flow in the primary channel. Therefore, the FSI values are similar whether the bypass channels are included or not.

For the Glenwood Springs RICD control structures, the Weir Equation was used to calculate discharge (Q) as a function of crest width (b), a Weir Coefficient (C), and total head (h), which in this application is interchangeable for flow depth upstream of the control structure. As shown in Exhibit A, the bottom width can be broken into two separate channels, such that their sums combine to produce the total bottom width presented in S2o's Preliminary Report. As a result, total discharge must also be separated into the two channels, and can be calculated as a function of the separated bottom widths for each channel, using the Weir Equation.

Exhibit B contains tables describing example flow separations for the Two Rivers Structure #1, based on the cross sectional geometry shown in Exhibit A. Using this methodology, the portion of the flow associated with the RICD control structures Primary Channel and the Bypass Channel were calculated. It can be seen that the summation of the Base Flow, Low Flow, Medium Flow, and High Flow values presented in Exhibit B produce the total flow rates claimed for each recreational experience sought (500 cfs, 1,250 cfs, 2,500 cfs, and 4,000 cfs).

The FSI can then be recalculated using the reduced bottom width and discharge of the Primary Channel, shown in Exhibit B, while holding all other variables constant. The results of this analysis, presented in Exhibit C, show nearly identical FSI values for the narrower primary channel as compared to the wider channel described in S2o's Supplementary Report. These results are due to the fact that discharge calculated using the Weir Equation is a function of bottom width and the FSI is a function of both width and discharge, therefore similar FSI values are calculated assuming discharge has been scaled as a function of bottom width.

The FSI values support the claimed flow rates regardless of whether they are applied to only the Primary Channel or in a combination of the Bypass and the Primary channel. This analysis demonstrates that each of the three claimed flow rates are the minimum amounts necessary, to achieve the desired recreational experiences.

4. RICD Control Structures Shall meet all Regulatory Floodplain Requirements

The appropriate level of floodplain analysis has been performed to date to inform S2o's opinion that all three of the proposed Glenwood Springs Whitewater Parks can be constructed to meet all regulatory floodplain requirements. Although SG1 asserts that, "SG1 anticipates that a net increase in water levels will inevitably occur upstream of the RICD structures relative to flood flows (up to and including the 100-year design flood event) given the restrictive nature of their geometry" (Shepherd, 2015), this is inconsistent with S2o's body of experience. In fact, every whitewater park within a mapped floodplain, which S2o has either been directly or indirectly involved in, including those that claimed and currently possess RICD water rights, was completed utilizing a No-Rise certification.

The typical timing for obtaining a No-Rise certification occurs during the application process for a floodplain development permit from either the City or County, depending on the site in question. For a No-Rise to be issued, it must be determined that the proposed development will not impact the pre-project base flood elevations, regulatory floodway elevations, or regulatory floodway widths.

The engineering supporting the No-Rise certification must be supported by technical data obtained from the standard step-backwater hydraulic model utilized to develop the regulatory floodway shown on the community's effective Flood Insurance Rate Map (FIRM) and the results tabulated in the community's Flood Insurance Study (FIS). As stated in S2o's Supplementary Report, the most recent Garfield County FIS, is still preliminary and has yet to be adopted by the County, therefore, the Currently Effective Model, required to perform these analyses, is not presently available. Given this information, S2o has performed an appropriate level of floodplain analysis to date, and it is our opinion that all three of the proposed Glenwood Springs Whitewater Parks can be constructed to meet all local and federal floodplain standards.

5. Appropriateness of the Proposed Season of Use for the RICD Control Structures

The season of use, from April 1st through September 30th, claimed by Glenwood Springs is appropriate for the recreational experiences sought. Due to the unusually high stream flows observed on the Colorado River through Glenwood Canyon, in early spring and late summer, Glenwood Springs enjoys a significantly longer non-motorized boating season as compared to almost all other communities in Colorado. S2o's design will protect and preserve existing recreational opportunities while simultaneously providing for new opportunities, which are not currently available in the area.

6. No Significant Environmental Impacts

No lasting environmental impacts will result from the proposed Glenwood Springs Whitewater Parks. Though some temporary environmental impacts may occur during construction, these effects are short lived and will not produce lasting consequences. Moreover, incidental protections of the existing magnitude and timing of flows within the Colorado River will produce significantly greater environmental benefits as compared to any short term effects that may occur. Continued hydro-modification of the river channel through expanded upstream diversions will result in significant impacts to the aquatic ecology, fluvial geomorphology, aesthetic and recreational quality, and ultimately the economic benefit of the Colorado River to Glenwood Springs. Adjudication of the claimed flow rates will incidentally protect river function and biotic processes, which are intrinsically dependent upon them. Environmental concerns expressed thus far primarily hinge upon: scour; erosion; bighorn sheep; and fisheries.

Scour within the riverine environment typically occurs as a result of rapid contractions, localized hydraulic conditions occurring as water flows around an obstruction, or as channel degradation. All RICD control structures create these effects, to varying degrees depending on design methodologies, and therefore scour protections should be included for all proposed control structures sufficient to mitigate uncontrolled scour effects. Utilizing appropriate engineering techniques, scour is predictable

within given hydraulic conditions. Countermeasures to mitigate scour, including riprap revetments, should be implemented both upstream and downstream of a control structure to create predictable and stable bed elevations within the modified reach.

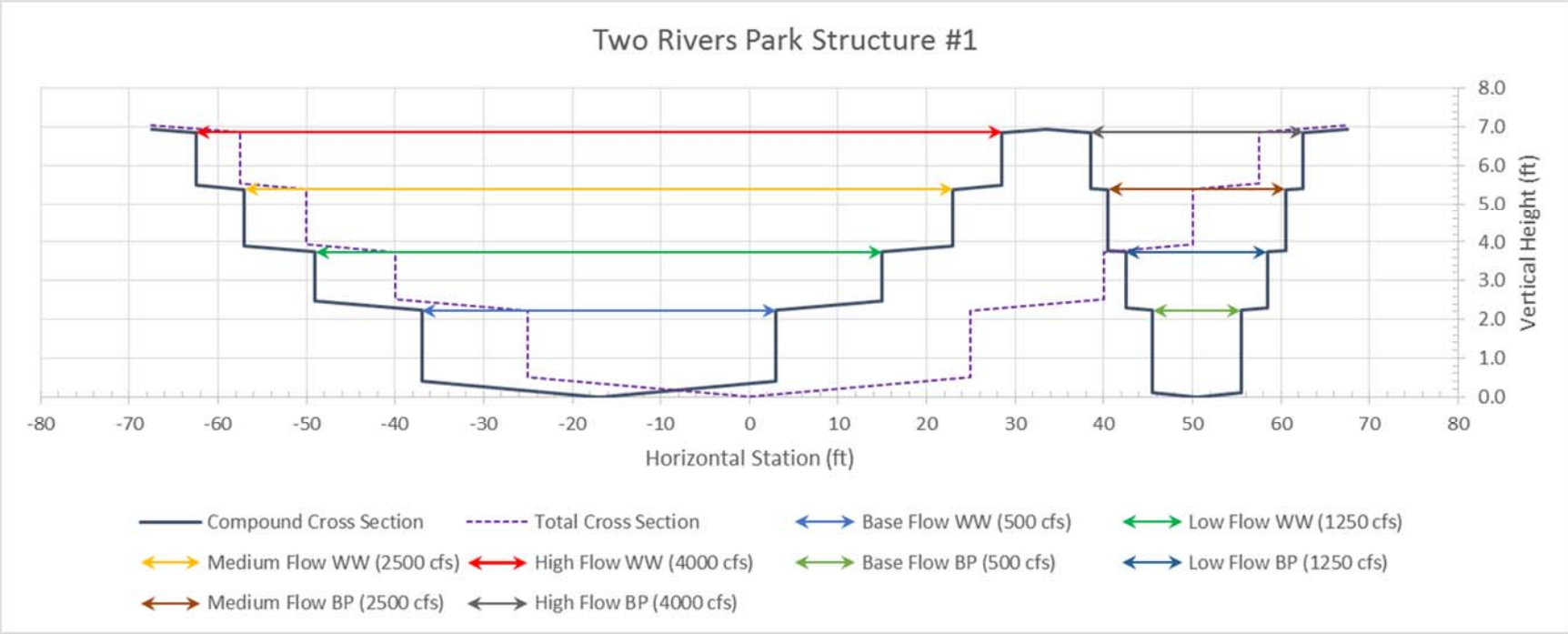
The ultimate geometry of the scour pads for the Glenwood Springs Whitewater Parks will be determined during final design and based on generally accepted scour and revetment countermeasure design methods. Furthermore, the structures will be monitored yearly at first then once every three years if no issues are identified.

Erosion, particularly along the river bank, can also occur in whitewater parks. Mitigation of these effects, much like scour, requires the installation of countermeasures. S2o includes bank stabilization as part of all whitewater park structures we design. Typical methods include riprap, boulder armoring, boulder terracing, and bio-stabilization when feasible. These erosion control measures will be implemented at all of the proposed Glenwood Springs Whitewater Parks, with the development of more detailed designs occurring in later stages of the project.

The Glenwood Canyon Trail is listed by CPW as a bighorn sheep viewing site. In particular Horseshoe Bend is a common seasonal viewing area for bighorn sheep, where herds can be regularly seen along the bike path and Interstate 70. The City of Glenwood Springs is committed to working with CPW to resolve any potential conflicts that may arise between the proposed use of the RICD whitewater parks and the migratory routes used by the bighorn sheep.

Fish passage and aquatic habitat concerns related to the proposed RICD whitewater parks are primarily based on recent studies overseen by CPW at the Meadow Park Whitewater Park in Lyons, CO. S2o in cooperation with CPW has also recently authored a study on the subject of redesign efforts at Meadow Park that are targeted to mitigate recognized impacts. It is S2o's opinion that applicable methods identified in this study along with the inclusion of a fish bypass channel can be used to mitigate impacts to fish passage and aquatic habitat. Additionally, the City of Glenwood Springs remains committed to working with CPW to minimize environmental impacts at all three RICD sites, and anticipates continued coordination with CPW throughout the 404 permitting process. Terms and condition incorporating CPW's involvement have been including in the proposed ruling at paragraph 11.i.

7. Exhibit A



Example Compound Cross Sectional Geometries Developed for the Primary and Bypass Channels at Two River Structure #1 Compared to the Total Cross Sectional Geometry Presented in S2o's Preliminary Engineering Design Report

8. Exhibit B

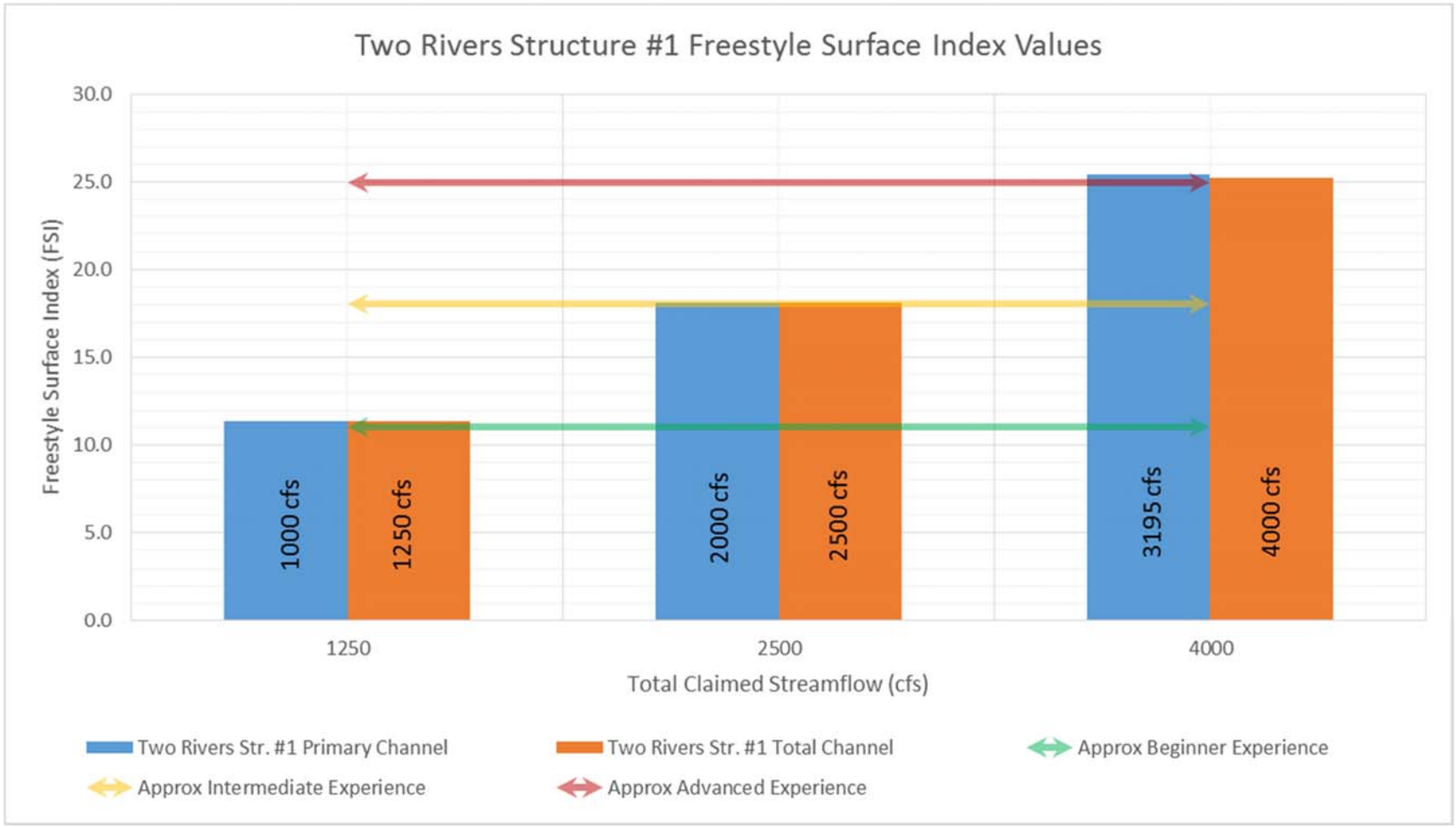
Calculated Flow Rates for the Two Rivers RICD Control Structure #1 Primary Channel

	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base Flow$_{middle}$	400	3	40.0	2.23	1.5
Base Flow$_{total}$	400		40.0	2.2	
Low Flow$_{middle}$	867	3	40.0	3.7	1.5
Low Flow$_{step1}$	133	3	24.0	1.51	1.5
Low Flow$_{total}$	1000		64.0	3.7	
Medium Flow$_{midd}$	1497	3	40.0	5.4	1.5
Medium Flow$_{step1}$	402	3	24.0	3.1	1.5
Medium Flow$_{step2}$	101	3	16.0	1.64	1.5
Medium Flow$_{total}$	2000		80.0	5.4	
High Flow$_{middle}$	2155	3	40.0	6.9	1.5
High Flow$_{step1}$	716	3	24.0	4.6	1.5
High Flow$_{step2}$	264	3	16.0	3.1	1.5
High Flow$_{step3}$	59	3	11.0	1.48	1.5
High Flow$_{total}$	3195		91.0	6.9	

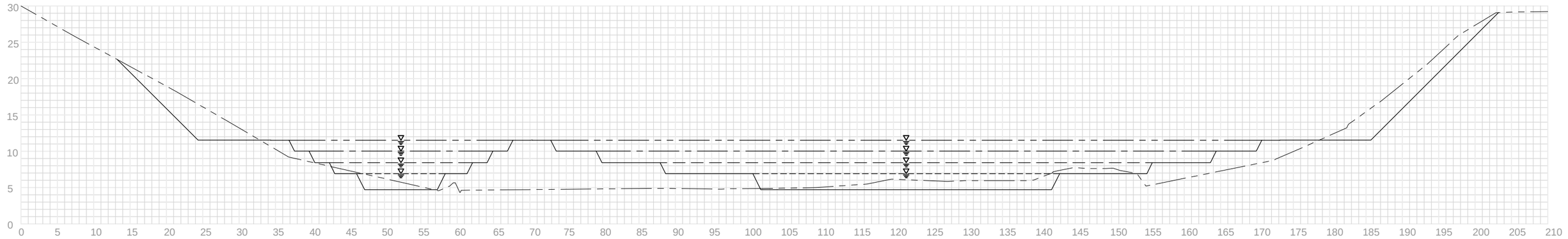
Calculated Flow Rates for the Two Rivers RICD Control Structure #1 Bypass Channel

	Discharge, Q	Coefficient, C	Bottom Width, b	Flow Depth, h	Exponent
	cfs		ft	ft	
Base Flow$_{middle}$	100	3	10.0	2.23	1.5
Base Flow$_{total}$	100		10.0	2.2	
Low Flow$_{middle}$	217	3	10.0	3.7	1.5
Low Flow$_{step1}$	33	3	6.0	1.51	1.5
Low Flow$_{total}$	250		16.0	3.7	
Medium Flow$_{midd}$	374	3	10.0	5.4	1.5
Medium Flow$_{step1}$	101	3	6.0	3.1	1.5
Medium Flow$_{step2}$	25	3	4.0	1.64	1.5
Medium Flow$_{total}$	500		20.0	5.4	
High Flow$_{middle}$	539	3	10.0	6.9	1.5
High Flow$_{step1}$	179	3	6.0	4.6	1.5
High Flow$_{step2}$	66	3	4.0	3.1	1.5
High Flow$_{step3}$	22	3	4.0	1.48	1.5
High Flow$_{total}$	805		24.0	6.9	

9. Exhibit C



The Freestyle Surface Index as Calculated for the Primary Channel and Associated Flows in Comparison to the Freestyle Surface Index When Calculated for the Entire Structure and total Claimed Flows


30
25
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0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210
Existing Channel Geometry
Proposed Channel Geometry
Claimed Beginner Flow (1,250 cfs)
Claimed Base Flow (500 cfs)
Claimed Event Flow (4,000 cfs)
Claimed Intermediate Flow (2,500 cfs)

COLORADO WATER CONSERVATION BOARD, STATE OF COLORADO

STATEMENT OF COLORADO PARKS AND WILDLIFE

IN THE MATTER OF THE RECREATIONAL IN-CHANNEL DIVERSION PROPOSED BY THE CITY OF GLENWOOD SPRINGS ON THE COLORADO RIVER

Colorado Parks and Wildlife (CPW) requested Party Status in the above captioned matter before the Colorado Water Conservation Board (CWCB or Board) on April 17, 2015. In 2013, the City of Glenwood Springs (City) filed an application in the Water Division 5 Water Court for three Recreational In-Channel Diversions (RICD) on the Colorado River in Garfield County, Colorado (Case Number 13CW3109). The three conditional water rights sought in this application are for three separate sites where the City may construct whitewater parks. The three sites are the No Name site, the Horseshoe Bend site, and the Two Rivers site; the flow amounts that are being requested in the application are identical for each site. State statute requires the Board to schedule a hearing and provide for public deliberation on all RICD applications

CPW does not have a position or opinion on the statutory factors identified in 37-92-102 (5); however, we have concerns about these proposals from an environmental perspective that fall within the scope of the Board's RICD Rules (2 CCR 408-3) - specifically the factors enumerated in section 7.c. of the rules. CPW has been working with the Applicant (City staff, design and construction consultants, and the City's legal team) on an infrequent basis for a number of years on the environmental issues associated with this project proposal.

While CPW supports many forms of outdoor and whitewater recreation, our mission and mandate also includes the protection of the State's aquatic resources, aquatic habitat, and recreational angling opportunities. As a result, CPW staff has identified a number of issues and concerns that relate to aspects of this project that we would like the Board to consider in its public deliberations at the July, 2015 meeting. CPW staff will be available to provide testimony at the hearing scheduled for this matter and will be available to answer any questions that the Board might have relating to our issues and concerns. Further, CPW staff stands ready to participate in any negotiation sessions with the applicant in order to reach resolution regarding our issues and concerns.

In general, CPW's issues and concerns fall into three categories - (1) the proposed sites, (2) aquatic biology and water supply, and (3) design and construction. Specifically, our issues and concerns are as follows:

1. **Site Selection and Preferences:**

- CPW has met with City representatives on a number of occasions and provided detailed evaluation and input specific to each location.
- Of the three sites, CPW, prefers the *Two Rivers* site over the other two. The *Horseshoe Bend* site is the least preferred by CPW staff.
- CPW prefers the *Two Rivers* site for the following reasons: (1) there is currently a considerable amount of whitewater boating-related activity that occurs at that site, (2) this site has the least potential for conflicts between anglers and whitewater boaters, (3) access, facilities, and parking considerations are most easily addressed or already occur at this site, and (4) we are also of the opinion that this site is presently the most "urban" site and any increase in human activity resulting from the whitewater park would have the least amount of impact to the riverine environment. This opinion is further supported by American Whitewater, an organization promoting whitewater recreation and representing over 100 local paddling groups nationwide. American Whitewaters policy is that: "natural un-modified river channels should not be modified for the creation of whitewater parks."
- CPW acknowledges that the Two Rivers site may have its own set of issues that come from other participants in this hearing; CPW commits to assisting the City, wherever possible, to resolve these difficulties.
- The *Horseshoe Bend* site is the least preferred site from an environmental standpoint. This section of the Colorado River has a significant resident bighorn sheep herd that is already impacted by human activities such as highway development and boat traffic. Further, from a fishery perspective, this section of the river is quite unique from a habitat standpoint. The river in the section is somewhat isolated, the channel is quite deep and confined and as a result provides fish with refuge habitat (refuge from high velocities, high water temperatures, and lowered dissolved oxygen) during times of both high and low flows. City staff has, at times during our consultations, stated that it is likely that this site will be removed from consideration for the whitewater park.
- As for the *No Name* site, this location has many of the qualities of the Horseshoe Bend site that make it less compatible with the proposed whitewater park use while not possessing as many of the positive benefits that the Two Rivers site has. As a result, it would be accurate to state that the No Name site is our second preference for a whitewater park.
- Furthermore, the development of the *Two Rivers* site, since it is the downstream-most site, has the added benefit of "pulling water" downstream to that site. The effect of the RICD water right at this downstream location serves to protect the upstream habitats from future junior depletions of flow. Protecting water at this location also insulates impacts to the coldwater fishery from the naturally occurring hot water seeps that have impacts when flows in this reach are diminished.
- Over the past several years, CPW has observed the development of whitewater parks throughout the state and we have seen small whitewater parks consisting of one or two structures grow into larger parks with more

structures in the river. These parks have an impact on fisheries and aquatic habitat, upstream fish passage, natural river functions, sediment transport, bank erosion, and recreational angling opportunities. The current proposal (as evidenced by the applicant's engineering reports) for each site is for only two structures; CPW is of the opinion that the Glenwood Springs whitewater park when ultimately developed should be limited to the two structures and that only one of the three sites be developed.

RECOMMENDATIONS:

a. CPW has stated our preference for the Two Rivers site in all of the discussions leading up to this point in time. We will continue to work with the City on the development of this site for the whitewater park.
b. We would also like to see the Horseshoe Bend site removed from the RICD application.
c. We also recommend that only one of the three sites is developed and that the number of structures be limited to the two contemplated in the preliminary engineering reports provided by the applicant.

2. **Aquatic Biology and Water Supply Issues:**

- Our review of the materials provided by the applicant in this case lead us to the following conclusions relating to hydrology. It appears that the amounts of water being claimed in the RICD application fall within the range of normal flows for the Colorado River near Glenwood Springs from April 1 through September 30. The application claims a 5 day peak "event flow" of 4000 cfs that can occur sometime during the June 8 through July 23 timeframe. It appears from the hydrologic record that even this flow is frequently met at the RICD points of diversion.
- We are concerned that in an effort to meet this "event flow," it is possible that the City might arrange for a release of stored water from upstream or some other arrangement with water users elsewhere in the system. We realize that this situation might be remote, but it could happen. There are potential impacts of such a release upstream of the RICD that go all the way to the source of water. The potential impacts to fisheries are related to timing, amounts, ramping rates, and source(s) of the water.
- RICDs and whitewater parks, in general, have the potential to adversely affect aquatic resource values if not designed and constructed in a manner sensitive to upstream fish passage (in particular, depths and velocities associated with structures), scour and erosion of bed and bank habitat features, and stream hydraulics (in particular, depths, velocity distributions, turbulence, flow vortices, and the "surging effects" that are often associated with RICD structures in downstream pools).
- RIDC construction with excessive use of steel and grout can pose hazards for recreational boaters, anglers, and fish. CPW encourages minimal use of these materials.

RECCOMMENDATIONS:

a. If the City contemplates a release of water from somewhere upstream of

the RICD or any other agreement with other water users, even as a contingency plan for an organized whitewater event, CPW would request that we be consulted prior to and during such an occurrence. During this consultation it can be expected that CPW will seek limitations and protective terms relating to water sources, timing of releases, and ramping rates.

b. CPW may also seek mitigation for such a release of water or other hydrologic alteration.

3. Design and Construction Issues:

- As previously stated, CPW prefers the Two Rivers site for the whitewater park. The City has regularly stated to CPW that it intends to develop only one site. CPW has clearly stated in our meetings with City officials that we prefer only one site; we have also stated that we prefer that the physical size of the park remain limited to two structures.
- Also stated above, we prefer a minimal use of steel and grout in the structures.
- The actual hydraulics of each structure (depths and velocities) needs to ensure the upstream passage of fish (all species and life stages currently found throughout the annual hydrological cycle), sediment and water without causing undo erosion or scour to the bed and banks of the river.
- CPW's experience with some whitewater parks in the state have led us to the conclusion that our involvement before the project gains momentum, during the design process, and at several key point in the construction process are critical to avoiding, minimizing, and/or mitigating impacts to the riverine environment. Therefore, we believe that the City has done an adequate job of engaging CPW staff during the pre-project planning process and that the discussions have led to a common understanding of the CPW issues outlined in this statement.

RECCOMMENDATIONS:

a. Prior to the initiation of the design process on any particular site, CPW would like to conduct site visits with the City, its consultants and engineers to identify any on-the-ground issues of concern.

b. CPW will require hydraulic modeling of each structure to address fish passage issues, fish habitat issues, sediment transport, and scour of the bed and banks.

c. During the design process, CPW requests consultation with the design engineers at the 30%, 60%, and preliminary final design stages.

d. Prior to construction, the City and their construction contractors will need to meet to discuss the timing and duration of construction activities in the river, potential start date, and to review and discuss plans for minimizing and mitigating surface disturbance impacts at the site.

e. CPW will require a one week notice prior to the actual construction start date to prepare public information materials, public safety information,

boater and angler safety considerations, etc.

f. The City should work with CPW staff to develop a plan for monitoring unintended structure impacts and addressing any necessary maintenance or changes to the structures (once in place) to address these issues or concerns.
g. It is CPW's intent to address as many of these design and construction issues in advance of the City's US Army Corps of Engineers' Section 404 Permit application submittal. CPW will participate in the Section 404 permitting process to ensure that adequate terms and conditions are included in the permit to protect aquatic resource values.

WITTNESSES:

Jay W. Skinner, PSR/S III - Instream Flow Program Coordinator, will testify and/or provide public comments to the Board relating to the content of this written statement and to address any questions that the Board has regarding CPW's concerns relating to this matter.

EXHIBITS:

None

Respectfully Submitted on the 4th day of June, 2015

Chad Bishop
Assistant Director for Wildlife and Natural Resources
Colorado Parks and Wildlife

Colorado Parks and Wildlife -- Certificate of Service
CWCB Public Meeting on City of Glenwood Springs RICD Application

American Whitewater	rob.harris@westernresources.org bart.miller@westernresources.org
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City and County of Denver and Denver Water	casey.funk@denverwater.org
Colorado Department of Transportation	jennifer.mele@state.co.us
Colorado River Water Conservation District	pfleming@crwcd.org jturner@crwcd.org
City of Colorado Springs	mgustafson@springsgov.com
Division 5 Engineer	alan.martellaro@state.co.us
Glenwood Hot Springs Lodge And Pool Inc	scott@balcombgreen.com dhallford@balcombgreen.com
City of Glenwood Springs	CThorne@hollandhart.com KJCrandall@hollandhart.com
Grand County Board of Commissioners	davet@white-jankowski.com mitrap@white-jankowski.com adamd@white-jankowski.com
Grand Valley Water Users Association	mhcrm@Jwth-law.com kmkurath@Jwth-law.com
Town of Gypsum	kropf@waterlaw.com groves@waterlaw.com
Homestake Steering Committee	mhammond@chp-law.com mbrown@chp-law.com
Orchard Mesa Irrigation District	mhcrm@wth-law.com kmkurath@wth-law.com
State Engineer	dick.wolfe@state.co.us

United States of America	kristen.guerriero@sol.doi.gov
Ute Water Conservancy District	mhcrm@Jwth-law.com kmkurath@Jwth-law.com
West Divide Water Conservancy District	ed@ommpc.com
Western Resource Advocates	rob.harris@westernresources.org bart.miller@westernresources.org

DISTRICT COURT, WATER DIVISION 5 GARFIELD COUNTY, COLORADO Garfield County Courthouse 109 Eighth Street, Rm. 104 Glenwood Springs, CO 81601 **Concerning the Application for Water Rights of:** THE CITY OF GLENWOOD SPRINGS, COLORADO IN GARFIELD COUNTY, COLORADO	▲ COURT USE ONLY ▲
Attorneys for the Colorado Department of Transportation: CYNTHIA H. COFFMAN, Attorney General JENNIFER MELE Senior Assistant Attorney General Attorney Reg. #30720* Natural Resources & Environment Section Office of the Colorado Attorney General 1300 Broadway, 7th Floor Denver, CO 80203 Telephone: (720) 508-6282 Email: jennifer.mele@state.co.us *Counsel of Record	Case No. 13CW3109

CDOT'S STATEMENT REGARDING RICD APPLICATION

The Colorado Department of Transportation, by and through undersigned counsel, and pursuant to the Notice of Pre-Meeting Conference and Deadlines for Submissions circulated by the Hearing Coordinator on May 6, 2015, hereby submits this Statement regarding its position on the subject RICD application.

The Colorado Department of Transportation (CDOT) owns and maintains the right of way for Interstate 70. The proposed boating park will exist within CDOT right of way in some locations and will require use of CODT right of way for access to the structures in some locations. Since the design of the boating parks is not finalized, the applicant at this stage cannot represent with certainty to CDOT what sort of access they seek, and the applicant has not made any specific proposals to CDOT. CDOT and the applicant have met to discuss CDOT's concerns and the

applicant has expressed a willingness to work with CDOT. However the draft decree does not adequately address that CDOT does have access concerns that will need to be addressed prior to construction and use of the claimed boating park.

List of all Disputed Factual and Legal Issues and CDOT's positon regarding the factual and legal issues:

CDOT has access concerns at all three sites. With respect to the No Name site, in addition to addressing CDOT's access concerns, the applicant will need to develop access amenities that separate the RICD users from bicyclists and pedestrians and also from travelers who are using the No Name rest area as a safety rest area.

The proposed ruling does not address access to or though CDOT property in any manner. In fact, Section 10.e. states "The City of Glenwood Springs and/or other public agencies own and/or control access to the recreational in-channel use, and there are no irresolvable impediments preventing the City of Glenwood Springs obtaining [sic] adequate access." This is misleading, and that provision should be revised and the decree needs to reflect that the applicant will need to obtain authorizations for access and/or land use from CDOT and the FHWA, especially at the No Name Safety Rest Area or any other location involving the use or crossing of Interstate highway right-of-way or access control lines, before construction of the boating park can occur.

In addition to adding language as suggested above, language must also be added to paragraph 10.e stating that "*at this point there appear to be*" no irresolvable impediments. CDOT proposes that the following or similar language be included in the decree:

"Applicant shall continue to work with objector Colorado Department of Transportation regarding access and construction on CDOT owned land. Applicant shall not access or use any lands owned by CDOT without first obtaining any necessary permits and/or entering into any agreements regarding such access or use with CDOT."

It is CDOT's understanding that the applicant does not oppose putting this language or similar language in the decree, but has not done so yet.

Witness List: CDOT does not intend to call witnesses at the public meeting before the CWCB pertaining to this RICD application and submits this Statement to the Board as the statement of CDOT's position on the application.

Exhibits List: This Statement.

DATED this 4th day of June, 2015.

CYNTHIA H. COFFMAN
Attorney General

JENNIFER MELE, #30720 *
Senior Assistant Attorney General
Natural Resources and Environment Section
Attorneys for the Department of
Transportation, State of Colorado
*Counsel of Record

CERTIFICATE OF SERVICE

I hereby certify that on the 4th day of June, 2015, I served **CDOT'S STATEMENT REGARDING RICD APPLICATION** via ICCES serve only, e-mail, and by U.S. Mail, first-class postage prepaid and via hand delivery as designated below to each of the following:

Party Name	Party Type	Attorney Name
American Whitewater	Opposer	Bartlett Phillip Miller (Western Resource Advocates) Robert Kortum Harris (Western Resource Advocates)
Aurora, City	Opposer	John Marshall Dingess (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC) Ryan P. McLane (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC) Teri L Petitt (HAMRE RODRIGUEZ OSTRANDER AND DINGESS PC)
Colorado River Water Conservation District	Opposer	Jason Victor Turner (Colorado River Water Conservation District) Peter Cheney Fleming (Colorado River Water Conservation District)
City and County of Denver Acting By and	Opposer	Casey S. Funk (Denver Water)
Colorado Springs, City Of	Opposer	Michael Gustafson
Colorado Water Conservation Board	Opposer	Susan Schneider

Party Name	Party Type	Attorney Name
Division 5 Engineer	Division Engineer	Division 5 Water Engineer
Glenwood Hot Springs Lodge and Pool	Opposer	David Carl Hallford (Balcomb and Green PC) Scott M Balcomb (Balcomb and Green PC)
Glenwood Springs, City Of	Applicant	Christopher Thorne Mark Hamilton
Grand County Board of Commissioner	Opposer	David C Taussig (White & Jankowski, LLP) Mitra Marie Pemberton (White & Jankowski, LLP)
Grand Valley Water Users Association	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC) Mark Allen Hermundstad (Williams Turner and Holmes PC)
Gypsum, Town of	Opposer	Jason M. Groves (Patrick, Miller & Kropf, P.C.) Kevin Land Patrick (Patrick, Miller & Kropf, P.C.)
Homestake Steering Committee	Opposer	Mary Mead Hammond (Carlson, Hammond & Paddock, L.L.C.) Mason Hamill Brown (Carlson, Hammond & Paddock, L.L.C.) William Arthur Paddock (Carlson, Hammond & Paddock, L.L.C.)
Orchard Mesa Irrigation District	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC)

Party Name	Party Type	Attorney Name
		Mark Allen Hermundstad (Williams Turner and Holmes PC)
State Engineer	State Engineer	Colorado Division Of Water Resources
United States of America	Opposer	Kristen C Guerriero (US Attorneys Office)
Ute Water Conservancy District	Opposer	Kirsten Marie Kurath (Williams Turner and Holmes PC) Mark Allen Hermundstad (Williams Turner and Holmes PC)
Western Resource Advocates	Opposer	Bartlett Phillip Miller (Western Resource Advocates) Robert Kortum Harris (Western Resource Advocates)
West Divide Water Conservancy District	Opposer	Edward Olszewski
Coordinator Office of the Attorney General, Natural Resources & Environment Section VIA HAND DELIVERY		Casey Shpall
Colorado Parks and Wildlife VIA e-mail: Jay.skinner@state.co.us		Jay W. Skinner (CPW - Water Resources Section)

Service of five (5) paper copies of **CDOT'S STATEMENT REGARDING RICD APPLICATION** were personally served by hand delivery on Suzanne Sellers,

Project Manager, Colorado Water Conservation Board, 1313 Sherman Street, Room 718, Denver, CO 80203 and one copy by e-mail to suzanne.sellers@state.co.us.

E-served pursuant to C.R.C.P. Rule 121 § 1-26.
A duly signed original is on file with the Office of the Attorney General for the State of Colorado.

Pauline Wilber

WATERLAW
PATRICK | MILLER | NOTO

Jason Groves*
Associate
groves@waterlaw.com

* Licensed CO, MT
reply to Basalt office

June 3, 2015

Office of the Colorado Attorney General
c/o Susan J. Schneider, Esq.
First Assistant Attorney General
1300 Broadway, 7th Floor
Denver, CO 80203
Via E-mail

Colorado Water Conservation Board
c/o Suzanne Sellers
1313 Sherman Street, Suite 718
Denver, CO 80203
Via E-mail

RE: Comments on behalf of the Town of Gypsum regarding the Glenwood Springs RICD Application, Case No. 13CW3109 (our file #37 H48)

Dear CWCB Members and Staff:

For your consideration at the upcoming Board Meeting on the City of Glenwood Springs' RICD ("Glenwood RICD"), we provide the following comments and recommendations on behalf of the Town of Gypsum, Colorado ("Gypsum"):

Gypsum is a growing municipality in the upper Colorado River Basin. As a municipal water provider with increasing demands, Gypsum's water rights are upstream from the Glenwood RICD. In addition, Gypsum owns multiple water supply contracts with the Colorado River Water Conservation District ("River District").

Under the River District contracts, Gypsum may utilize Ruedi Reservoir a source of supply. Gypsum is concerned about the impact the Glenwood RICD will have on exchange opportunities in the upper Colorado River Basin, as well as whether future upstream beneficial consumptive uses will be impaired by the amount of flows requested for the Glenwood RICD, particularly in dry years.

With the dry year of 2002 as an example, Gypsum's consulting engineer concluded that the Glenwood RICD will only leave approximately 16,000 acre-feet for future development on the upper Colorado River. For the sake of comparison, this equivalent to 25 percent of capacity in the Wolford Mountain Reservoir. We have raised these concerns to the Applicant and continue to work with their counsel to develop an agreeable "carve out" or subordination provision in the proposed ruling. We understand that the River District and other objectors in Case No. 13CW3109 have made similar requests. Gypsum joins the River District and other objectors in this regard.

We note for the Board and Staff's reference that similar terms have been incorporated into other recent RICD decrees. *See, e.g.*, Case Nos. 10CW305,

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Professional Corp.

Water Division 5 (Pitkin County RICD) and 10CW298, Water Division 5 (Grand County RICD). Incorporating terms and conditions in the proposed ruling that allow for a carve out or subordination of the Glenwood RICD priority in favor of a certain amount of future upstream depletions should mitigate the Glenwood RICD's impairment to further development of Colorado's compact entitlements. C.R.S. § 37-92-102(6)(b)(I) (2015). Similarly, such a provision will help promote the maximum utilization of the waters of the state. *Id.* at § 102(6)(b)(V). We remain open to working with the Applicant to determine what amounts might be considered reasonable and appropriate in this case. However, until this provision is fully developed and incorporated into the proposed ruling, the CWCB should not recommend that the Glenwood RICD be confirmed by the Water Court as currently proposed.

Please let this letter serve as our official Party Statement during the upcoming Board Meeting on July 15-16, 2015. Gypsum will not be making an oral presentation at the meeting. Thank you for considering our comments and recommendations. Please contact Kevin Patrick or me if you have any questions.

Very truly yours,

Patrick | Miller | Noto
A Professional Corporation

By: _____

Jason M. Groves
groves@waterlaw.com

By: _____

Kevin L. Patrick
patrick@waterlaw.com

JMG
cc: Jeff Shroll, Town Manager
Tom Zancanella, P.E.

BEFORE THE COLORADO WATER CONSERVATION BOARD

STATE OF COLORADO

CONCERNING THE APPLICATION FOR WATER RIGHTS OF THE CITY OF GLENWOOD SPRINGS

IN GARFIELD COUNTY, COLORADO

PARTY STATEMENT OF AMERICAN WHITEWATER AND WESTERN RESOURCE ADVOCATES

Pursuant to the May 6, 2015, Notice of Pre-Board Meeting Conference and Deadlines for Submissions, and the Colorado Water Conservation Board's ("CWCB" or "Board") Recreational In-Channel Diversion Rules, 2 CCR 408-3 ("RICD Rules"), American Whitewater and Western Resource Advocates (collectively, "Conservation Groups"), by and through the undersigned counsel, submit the following Party Statement in support of the City of Glenwood Springs' ("Glenwood Springs" or "City") proposed decree in Case No. 13CW3109, Water Division No. 5 ("Proposed Decree"). Glenwood Springs submitted a timely Pre-Meeting Statement on May 21, 2015.

The Conservation Groups support Glenwood Springs' Application for Recreational In-Channel Diversions to protect and enhance a reasonable recreation experience in and on the Colorado River as described in the Proposed Decree[1]. We urge the Board to make findings consistent with the Glenwood Springs' Pre-Meeting Statement and with this Party Statement filed on behalf of the Conservation Groups.

I. Potentially Disputed Factual and Legal Issues

To the Conservation Groups' best knowledge, some or all of the determinations and factors listed at RICD Rule 7 may be contested by the opposers to the instant proposed RICD water rights. Because this Party Statement is submitted without the benefit of the other opposers' statements in the agency record, the Conservation Groups reserve the right to respond to any and all disputed factual and legal issues raised by the other parties at the Board's July 2015 meeting.

[1] Glenwood Springs' Pre-Meeting Statement Exh. 1.

II) Conservation Groups' Position on Potentially Disputed Factual and Legal Issues

a) Adjudication and administration of the proposed RICD is consistent with Colorado's full development and beneficial use of its compact entitlements.

The following subheadings track some of the non-exclusive factors listed at RICD Rule 7.a:

i. The Board should affirm its recent holding that there remains Colorado River apportionment available for consumptive use within Colorado.

On January 27, 2014, this Board held that "there remains unallocated Colorado River apportionment available for consumptive beneficial use within Colorado."[2] In the absence of compelling new factual evidence to the contrary, the Board should affirm this recent finding.

ii. The proposed RICD is far from the state line and upstream of one of the state's major urban and agricultural centers.

As noted by the City of Glenwood Springs' engineering firm, the proposed RICD structures would be over 130 stream miles upstream from the Utah state line.[3] These 130 miles cover most of the length of Garfield and Mesa counties including the communities of Grand Junction, Fruita, Palisade, Battlement Mesa, New Castle, and Rifle, and a significant amount of irrigable land.

iii. The proposed water right is consistent with additional depletions upstream of the proposed whitewater parks.

As shown by Glenwood Springs' experts, using either a 70-year or a 30-year period of record shows that the flow rates sought are less than 50% of the total average historical volume of stream flows.[4] In its Pre-Meeting Statement, Glenwood Springs notes that it revised its study period to reflect the most recent 30-year historical period of record. We agree with this approach because it properly accounts for the effect of trans-mountain diversions that did not exist seventy years ago, while avoiding an overly constrained view of the historical record. As stated in the attached memorandum by Laura Belanger, P.E., there is water available for the proposed RICD.[5]

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[2] CWCB's Amended Comprehensive Findings of Fact, Board of County Commissioners of Pitkin County at 1, Case No. 5-10CW305.
[3] Glenwood Springs' Pre-Meeting Statement Exh. 2 at 8.
[4] *Id.* at 7; Glenwood Springs' Pre-Meeting Statement Exh. 3 at 18 (Figure 7).
[5] *See* Memorandum by Laura Belanger, P.E., Re: City of Glenwood Springs' Application for Water Rights in Garfield County: Case No. 13CW3109 at 1-4 (June 3, 2014) ("Belanger Memo"), *attached as* Exh. 1.

Some opposers may be tempted to examine only a limited period of hydrological record to argue that the proposed RICD takes more than 50% the total average historical volume of water. These arguments should be rejected.

First, by definition, the full 70-year record of the USGS' Dotsero streamflow gage (ID 09070500), or a representative sampling thereof, is part of the "historical" record and is properly included in the water availability analysis. The unpredictable nature of precipitation patterns requires a look at a broad array of year-types (wet, average, and dry) to reach the "***total*** average historical volume of water" as required by the RICD statute.[6] A focus only on dry years does not look at the "total" historical record, or any fair representation of it.

Second, predictions of future precipitation are not relevant under the RICD statute which states that the "total average ***historical*** volume of water" forms the proper data set for water availability analysis.[7] Opposers focused on uncertain predictions of future precipitation would seek to write the word "historical" out of the statute.

Finally, the impact of climate change to future river flows is an undeniably important component of statewide water management and planning for coming years. However, any blanket assertion that climate change will cause average annual flows to decrease at the location of the proposed RICD water rights does not appear to be supported by the latest scientific analysis available this time[8] and should not form the basis of a finding regarding water availability for this RICD.

iv. There are many potential downstream diverters and users of water on the Colorado River and its major tributaries before it leaves the state.

The U.S. Census Bureau estimates that in 2014 Garfield and Mesa counties had a combined population of over 205,000 residents.[9] Both counties' populations have grown by over 25% since the year 2000 census.[10] In Mesa County, the land in farms grew by 4% between the years 2007 and 2012 to a total of 386,932 acres, while Garfield County had 310,854 acres in farms in 2012.[11] These statistics do not necessarily indicate the

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[6] C.R.S. § 37-92-305(13)(f) (emphasis added).
[7] *Id.* (emphasis added).
[8] *See* Jeff Lukas, et al., Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation, A Report for the Colorado Water Conservation Board at ES-4 (2d Ed., 2014) ("Climate model projections show less agreement regarding future precipitation change for Colorado."), *attached as* Exh. 2.
[9] U.S. Census Bureau, State & County QuickFacts, http://quickfacts.census.gov/qfd/index.html (last visited May 14, 2015).
[10] *Id.*
[11] U.S. Dept. of Ag., Census of Agriculture, County Profiles, *available at* http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Colorado/index.asp.

myriad of other industrial and energy-related uses to which water downstream of the proposed RICDs might be put within Colorado.

In addition, the state's other Colorado River tributaries (e.g., the Dolores, Gunnison, San Juan, White, and Yampa rivers) are entirely unaffected by the proposed RICD.[12] In sum, there is ample opportunity to develop Colorado's unallocated Colorado River apportionment in the growing communities downstream of the RICDs and elsewhere in the state.

v. All water rights have the potential to adversely affect future undecreed exchanges.

To the extent that the opposers assert harm to potential exchanges, the Board should require the opposers to identify specific and concrete impacts and not merely a generalized allegation that exchanges could be harmed. The mere fact that the RICD could complicate future exchanges on the river is not sufficient to show that the RICD will "materially impair" Colorado's ability to develop its compact entitlements.

As the Colorado Supreme Court recently stated of this Board's instream flow water rights, "though instream flows may affect development in the form of changes, augmentation plans, and future appropriative rights, ***all water rights complicate the efforts of new or existing users to develop sources of supply***."[13] Because impacts to future exchanges are common to all water rights, the Board should require proof of a specific injury to a specific concrete interest to merit any consideration under this factor.

vii. The proposed RICD appears to be consistent with other decreed, existing undecreed, and reasonably foreseeable uses of water.

Senior decreed water rights, both conditional and absolute, are adequately protected from any adverse impacts of this RICD through simple application of the priority system.[14] In general, this principle also protects nearby senior water users. Any hypothetical injury to nearby senior water rights by the *construction* of the diversion structures themselves,[15] is outside this Board's duty to consider development of Colorado's compact entitlements as a whole.[16]

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[12] *See, e.g.*, Glenwood Springs' Pre-Meeting Statement Exh. 2 at 8.

[13] *Farmers Water Development Co. v. CWCB*, 346 P.3d 52, 61 (2015) (emphasis added; internal quotations omitted).

[14] *Cf. id.* ("Because instream flows are administered within the priority system, the instream flow cannot take water away from existing uses and the senior water rights holder will always be able to make its diversion for its decreed beneficial uses." (internal quotation omitted)).

[15] *See, e.g.*, Glenwood Hot Springs Lodge & Pool Inc.'s Statement of Opposition at ¶ 3.b (alleging that construction of the Two Rivers Whitewater Park facilities may inundate and otherwise damage their real estate, facilities, and other improvements).

[16] C.R.S. 37-92-102(6)(b)(I).

viii. The proposed RICD appears to be consistent with all types of potential consumptive uses that are allowed under the Colorado River Compact.

To the Conservation Groups' knowledge, the proposed RICD does not prevent any particular decreed or undecreed future planned development of Colorado River water. The Conservation Groups anticipate that further depletions will occur in Colorado both upstream and downstream of the proposed RICD water rights if the City of Glenwood Springs is granted a decree consistent with its Application.[17]

ix. There does not appear to be any evidence that the proposed RICD will materially impair upstream development of Colorado's compact share.

For all of the above-stated reasons, it appears that the proposed RICD is consistent with upstream consumptive development of the state's Colorado River Compact entitlements.

x. The City proposes substantial adjustments to minimize the proposed RICD's potential effect upon future consumptive uses.

Part I.e of Glenwood Springs' Pre-Meeting Statement lists several significant proposed adjustments to its proposed RICD water rights. Among the most significant of these proposed concessions is Glenwood Springs' plan to not use the instant RICD as a basis for opposing upstream water rights applications involving less than 1,000 acre feet of annual diversions, and a proposal to operate and maintain a costly gage for the specific purpose of administering the RICD water rights.[18] In addition, the City is proposing to not use the instant RICD as a basis for opposing water rights applications implementing the Colorado River Cooperative Agreement and the Eagle River Memorandum of Understanding.[19]

Nothing in the RICD statutes or Rules requires the City to subordinate its proposed RICD water rights to future, undecreed uses of water. If the Shoshone Call is reduced or discontinued in the future, subordination below the amounts that would otherwise be required for the Shoshone Call could result in a windfall for upstream diverters. Therefore the Conservation Groups object to potential arguments that the City should have to subordinate its water rights in a manner that would result in lower flows than the Shoshone Call currently provides.

The proposed RICD is a legitimate interest in water, and should be subject to the standard application of the prior appropriation system. To the extent there are proponents of additional water development above the RICD reaches sometime in the future, the hydrologic record reflects that there is adequate opportunity to divert and consume

[17] *See, e.g.*, Glenwood Springs' Pre-Meeting Statement Exh. 3 at 22.
[18] We do not believe that such a gage is necessary for proper administration of the proposed RICD water rights. Belanger Memo at 4-6.
[19] Glenwood Springs' Pre-Meeting Statement at 7.

additional water outside of the late spring and early summer season when the City claims higher recreational flows, such that the City and such development proponents should be able to coordinate to meet both needs.

b) Whether the exercise of the RICD would cause material injury to existing ISF water rights.

Although the Conservation Groups are not aware of any potential injury to an existing ISF water right, we reserve the right to comment further on this required finding after the CWCB Staff's and Colorado Parks & Wildlife's party statements are entered into the record.

c) Adjudication and administration of the proposed RICD would promote maximum utilization of the waters of the State.

The following subheadings track some of the non-exclusive factors listing at RICD Rule 7.c:

i. There are no known significant "probable" future upstream junior appropriations.

There exist several decreed conditional water rights upstream of the proposed RICD that will likely help meet statewide water needs for the foreseeable future.[20] It is true that indefinite population growth on the Front Range and elsewhere in the state may prompt water developers to consider pursuing a future new trans-mountain project from the upper Colorado River basin as one possible action alternative for meeting future water needs. However, given the abundance of alternatives to such projects, existing law and policy makes alternatives more attractive for the foreseeable future.[21]

Instead future upstream junior appropriations are likely to meet local needs and perhaps limited out-of-basin needs.[22] As thoroughly discussed in the City's engineering

[20] *See, e.g.*, Glenwood Springs' Pre-Meeting Statement Exh. 3 at 22.

[21] *See, e.g.*, Western Resource Advocates, Trout Unlimited, and Colorado Environmental Coalition, Filling the Gap: Commonsense Solutions for Colorado's Front Range; Joint Executive Summary of the South Platte and Arkansas Basin Reports (2012) (showing how the Front Range can use select existing state Identified Projects and Processes in combination with robust urban conservation, reuse, and strategic agricultural and urban water sharing to meet water needs through 2050), *attached as* Exh. 3.

[22] For example, the "15-Mile Reach" Programmatic Biological Opinion covers only 120,000 acre-feet per year of new depletions in the Upper Colorado River Basin above the confluence with the Gunnison River. U.S. FISH & WILDLIFE SERVICE, 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 GUNNISON RIVER at 2

reports,[23] the proposed RICD will not materially impair development of these junior water rights. Finally, as discussed above, any new junior water rights development would be in addition to development of some or all of the significant already-decreed senior conditional water rights that are upstream of the proposed RICD.

ii. There are no known significant "probable" future changes, transfers, or exchanges of water rights that would be materially impaired by the proposed RICD.

The Conservation Groups are not aware of any specific potential change, transfer, or exchange of water rights that might be materially impacted by the proposed RICD. For largely the same reasons stated in Part I.c.i., immediately above, we do not have reason to believe that such a change is "probable" in the foreseeable future.

We note that the existing rate of "buy and dry" of agricultural water rights for change, transfer, or exchange for other uses and points of diversion is strongly disfavored under current state policy. As Governor Hickenlooper stated in his Executive Order directing the CWCB to develop the Colorado Water Plan, "Coloradans find that the current rate of purchase and transfer of water rights from irrigated agriculture (also known as "buy-and-dry") is ***unacceptable***."[24] To the extent that some interests may seek substantial allowances from this proposed RICD water right for significant future "buy and dry", these efforts should not be advanced in this proceeding.

iv. The proposed RICD utilizes a reasonable and efficient means to use, capture, and control water for the recreational experience that the City seeks.

The City of Glenwood Springs has established that its proposed control structures are appropriate for the type of whitewater boating recreation experiences that it seeks.[25]

Only the City of Glenwood Springs – and not the opposers – may define its goals for the proposed recreational water right. According to the Colorado Supreme Court, the Board's statutory role in the instant proceeding is:

> to analyze the [RICD] application ***purely as submitted by the applicant*** rather than to objectively determine what recreation experience would be reasonable, and what minimum stream flow would meet that recreational need. . . . the General Assembly intended for the CWCB to function as a narrowly constrained fact-finding advisory body when it reviews RICD

(1999), *available at* http://www.coloradoriverrecovery.org. New depletions above this amount will require additional federal Endangered Species Act consultation.

[23] Glenwood Springs' Pre-Meeting Statement Exh. 3 at 18 (Figure 7), 18-23; Glenwood Springs' Pre-Meeting Statement Exh. 2 at 5-10.

[24] Exec. Order No. D 2013-005 at ¶ II.C, *attached as* Exh. 4.

[25] Glenwood Springs' Pre-Meeting Statement Exhs. 4 & 5.

> applications, rather than in an unrestricted adjudicatory role. . . . [N]othing . . . allows the CWCB to look beyond the stream flow claimed or the recreation experience intended by an applicant when reviewing a RICD application.[26,27]

The RICD statute provides that the City may seek to create a "reasonable recreation experience in and on the water." This phrase "does not have a common usage" and is relative to the applicant's specific recreational goals.[28,29] Therefore, the sort of recreational experience that others would like the City to seek is not relevant in the instant proceeding. The City may appropriate the minimum amount of flow necessary to support the "full gamut" of beginner, intermediate, and advanced experiences that it seeks, including event flows.[30]

v. Glenwood Springs has demonstrated a reasonable demand for the City's proposed recreational experiences.

The City of Glenwood Springs has established that there is a reasonable demand for the recreational experiences that it seeks.[31] This proof includes meeting its statutory burden of establishing a demand for the reasonable recreation experience between Labor Day and September 30th.[32,33]

vi. The proposed RICD appropriately limits the times when the RICD right may be exercised.

The Proposed Decree limits its right to daytime and evening hours during the tourist season. In addition, the event flow is now limited to the 4th of July weekend. This

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[26] *Colo. Water Conservation Bd. v. Upper Gunnison River Water Conservancy Dist.*, 109 P.3d 585, 593 (2005) (emphasis added); *see also id.* at 594 (the Board may not substitute its perception of the appropriate recreation experience and flow for the applicant's).

[27] Although the RICD statutes were subsequently amended by S.B. 06-037, the amendment does not change the Board's duty to review the application purely as submitted by the applicant. *See* C.R.S. § 37-92-102(6).

[28] *Upper Gunnison River W.C.D.*, 109 P.3d at 599 (noting that a casual kayaker may be satisfied with low to moderate flows, while an expert may demand high flows).

[29] C.R.S. 37-92-103(10.1), as amended by S.B. 06-037, defines the phrase "reasonable recreation experience" to exclude recreational activities besides non-motorized boating. However the type of non-motorized boating experience that an applicant may seek remains within the applicant's discretion.

[30] Glenwood Springs' Pre-Meeting Statement Exh. 5 at 2.

[31] *Id.* at 4.

[32] *See* C.R.S. § 37-92-103(10.3).

[33] Glenwood Springs' Pre-Meeting Statement Exh. 5.a (letters of support substantiating demand for both the existing and proposed non-motorized boating season).

change will make the flow easier to anticipate and will minimize its impact on other potential uses of water.[34]

ix. The proposed RICD will protect and enhance the significant economic benefits that non-motorized boating provides to the City of Glenwood Springs.

Water recreation in the Colorado River Basin contributes hundreds of millions of dollars to Colorado's economy each year. As noted by Glenwood Springs, commercial rafting alone generated $145 million in 2013, which much of that economic activity occurring in Glenwood Springs.[35] Water sports in all of the Colorado River Basin tributaries contribute over $739 million to Colorado's economy each year.[36] While non-motorized water sports are only a part of that total, non-motorized boating contributes significantly to Colorado's and Glenwood Springs' economies each year.

xi. The proposed RICD will help protect existing rafting opportunities in the event that the Cameo and/or Shoshone calls are reduced or eliminated.

As noted by the City, the senior Shoshone and Cameo Call water rights contribute greatly to the existing non-motorized boating opportunities at Glenwood Springs.[37] However, the incidental benefits that these rights currently provide are threatened if these rights are sold, abandoned, or otherwise operated in a manner that reduces their call below historical amounts. Securing the proposed RICD will help Glenwood Springs protect these existing benefits, albeit at a much more junior priority date.

xvi. The proposed RICD will work with existing and future uses of water to promote maximum utilization.

The proposed RICD would appropriate a comparatively modest amount of water above and beyond the existing Shoshone and Cameo Call water rights.[38] However, this water may be used—for a wide range of consumptive and non-consumptive uses—downstream. Recreational water rights like the proposed RICD can work in concert with downstream agricultural, industrial, and municipal users, to protect and preserve these uses. As stated in the current draft of Colorado's Water Plan:

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[34] Glenwood Springs' Pre-Meeting Statement Exh. 1 at ¶¶ 6.f, 7.f, and 8.f.

[35] Glenwood Springs' Pre-Meeting Statement Exh. 5 at 14.

[36] PROTECT THE FLOWS & SOUTHWICK ASSOCIATES, COLORADO RIVER INC.: THE $26 BILLION RECREATION RESOURCE EMPLOYING A QUARTER MILLION AMERICANS: COLORADO FACT SHEET at 5 (2012), *attached as* Exh. 5. Water sports are just part of the Colorado River's $9.5 billion contribution to Colorado's river-related recreation economy. *Id.*

[37] Glenwood Springs' Pre-Meeting Statement at 2-3.

[38] *Id.* at 8 (noting that the incremental increase of appropriated water associated with this proposed RICD is "significantly less" than 129,000 AF/year when the full suite of Cameo and Shoshone water rights are taken into account).

> It is critical to note that water is not consumed by environmental or recreational uses, but rather held in streams and designated for those uses. This water is often reused multiple times downstream by agricultural, municipal, or industrial water users.
>
> The ability to decree water using instream flows and recreational in-channel diversions provides Colorado with important, effective tools for meeting environmental and recreational needs and for supporting state and federal values.[39]

Consistent with draft state policy, this proposed RICD application will support existing and future downstream uses of water by the numerous municipal, agricultural, and industrial interests that line the over 130 stream miles between the City of Glenwood Springs and Utah state line.

III) Conservation Groups' Potential Speakers

The following witnesses may testify at the hearing as described below, may give rebuttal testimony, and may be available at the hearing to answer questions from the Board:

A. Nathan Fey, Colorado Stewardship Director for American Whitewater (or an American Whitewater member(s)), may testify regarding the reasonable recreation experiences in the Colorado River sought by the City and his organization's interest in the City securing minimum flows to support those experiences.

B. Robert Harris, and/or Bart Miller, attorneys for the Conservation Groups, may provide legal, factual, and other argument in support of the proposed RICD water rights.

IV) Conservation Groups' Exhibits

The Conservation Groups submit the following exhibits, attached to this party statement:

1. Memorandum by Laura Belanger, P.E., Re: City of Glenwood Springs' Application for Water Rights in Garfield County: Case No. 13CW3109.

2. Jeff Lukas, et al., Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation, A Report for the Colorado Water Conservation Board at (2d Ed., 2014).

[39] Colorado's Water Plan at 79 (First Draft, Dec. 10, 2014), *attached as* Exh. 6.

3. Western Resource Advocates, Trout Unlimited, and Colorado Environmental Coalition, Filling the Gap: Commonsense Solutions for Colorado's Front Range; Joint Executive Summary of the South Platte and Arkansas Basin Reports (2012).

4. Exec. Order No. D 2013-005.

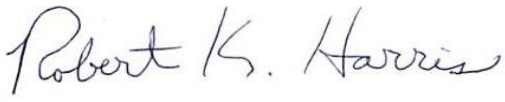
5. Protect the Flows & Southwick Associates, Colorado River Inc.: The $26 Billion Recreation Resource Employing a Quarter Million Americans: Colorado Fact Sheet (2012).

6. Colorado's Water Plan (First Draft, Dec. 10, 2014) (Chapter 5).

V) Conclusion

Wherefore, the Conservation Groups hereby request that, consistent with this party statement, the Board make favorable findings pursuant to C.R.S. § 37-92-105(5) with respect to the Proposed Decree.

Respectfully submitted this 4th day of June, 2015.



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Tel: 303-444-1188
rob.harris@westernresources.org
bart.miller@westernresources.org

CERTIFICATE OF SERVICE

I hereby certify that on this 4th day of June, 2015, true and correct copies of the foregoing **Reply in Support of Unopposed Motion to Intervene** was served by email and to the following:

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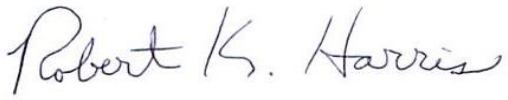
Jay Skinner Water Resources Section Colorado Parks & Wildlife 6060 Broadway St. Denver, CO 80216 Jay.skinner@state.co.us	Casey Shpall, Esq. Coordinator Natural Resources & Environment Section Office of the Colorado Attorney General 1300 Broadway, 7th Floor Denver, CO 80203 casey.shpall@state.co.us



Robert K. Harris
Western Resource Advocates
E-filed per C.R.C.P. 121
Duly signed original on file at Western Resource Advocates

To: Robert Harris

From: Laura Belanger, P.E.

CC: Bart Miller

Date: June 3, 2015

Re: City of Glenwood Springs' Application for Water Rights in Garfield County: Case No. 13CW3109

Introduction

This memo includes an evaluation of what constitutes a reasonable period of record and flow availability for the proposed Recreational In-channel Diversion (RICD) water rights. It does not address recreational flow needs, Colorado's ability to utilize its compact entitlements, or other such concerns. For background, I reviewed City of Glenwood Springs' ("Glenwood Springs" or "Applicant") RICD Application and Pre-Meeting Statement and Wright Water Engineer's (WWE) Preliminary and Supplemental Engineering Reports.

Period of Analysis

The closest upstream stream gage to the RICD reach is the USGS "Colorado River Near Dotsero" (Dotsero) gage (# 09070500). Flow data are available for this location beginning in December 1940. Typically a longer flow record is desirable for hydrologic analyses to capture long-term trends and variability. However, due to numerous upstream transbasin diversions that have come on-line since the Dotsero gage was installed, an evaluation of these diversions over time was made to determine a reasonable and representative period of analysis.

The Colorado River Division 5 Engineer's Annual Reports included annual transbasin diversion data until 2009, after which those data were no longer provided. Total Division 5 transbasin diversions as well as transbasin diversions above the RICD reach going back to 1979 are provided in Figure 1. Transbasin diversions above the RICD reach trended slightly higher over this period, but did not increase greatly. Total diversions from the basin, which include several projects in the Roaring Fork basin, increased more significantly over time. Data for the more recent 1985 to 2009 period (Figure 2) show similar trends. Based on these data, I believe that using data from a recent 30-year period is representative and appropriate for the RICD analysis and that using a shorter period of record would not capture sufficient hydrologic variability.

The applicant Glenwood Springs' used the most recent 30-year period of record that was available at the time of their engineering analysis, which was 1984 - 2013. Having access to an additional water year (October – September) of data, in this memo I evaluate RICD flows using

Arizona
P.O. Box 64128
Tucson, AZ 85728

Colorado
2260 Baseline Rd.
Suite 200
Boulder, CO 80302

Nevada
550 W. Musser Street
Suite I
Carson City, NV 89703

New Mexico
409 East Palace Ave.
Unit 2
Santa Fe, NM 87501

Utah
150 South 600 East
Suite 2AB
Salt Lake City, UT 84102

the 30-year 1985 – 2014 period. Total annual volumes of Dotsero flows and transbasin imports above the RICD reach both trended towards slight increases over the 1985 to 2014 period (Figure 3).

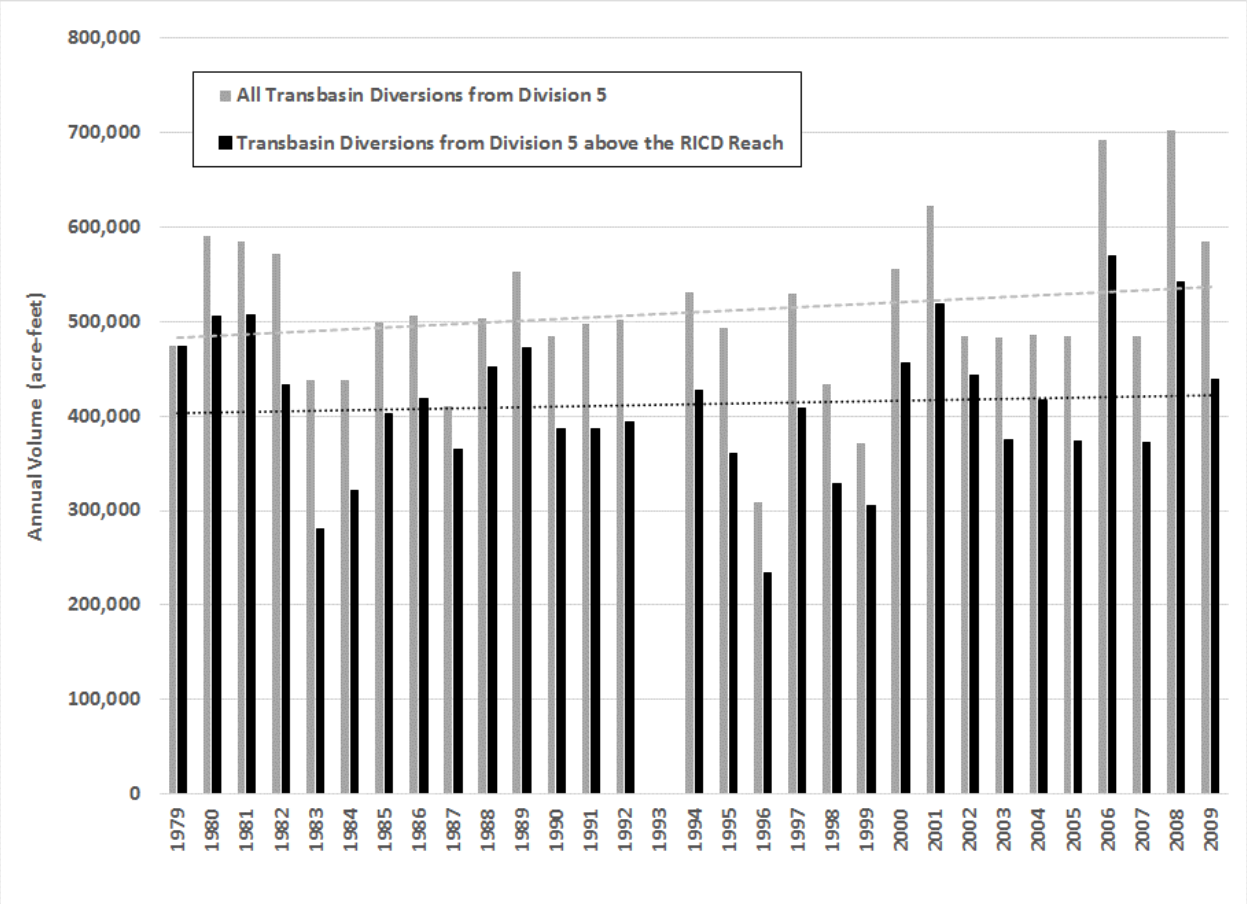


Figure 1: Annual Historical Transbasin Diversions from Division 5 for the 1979 to 2009 Period

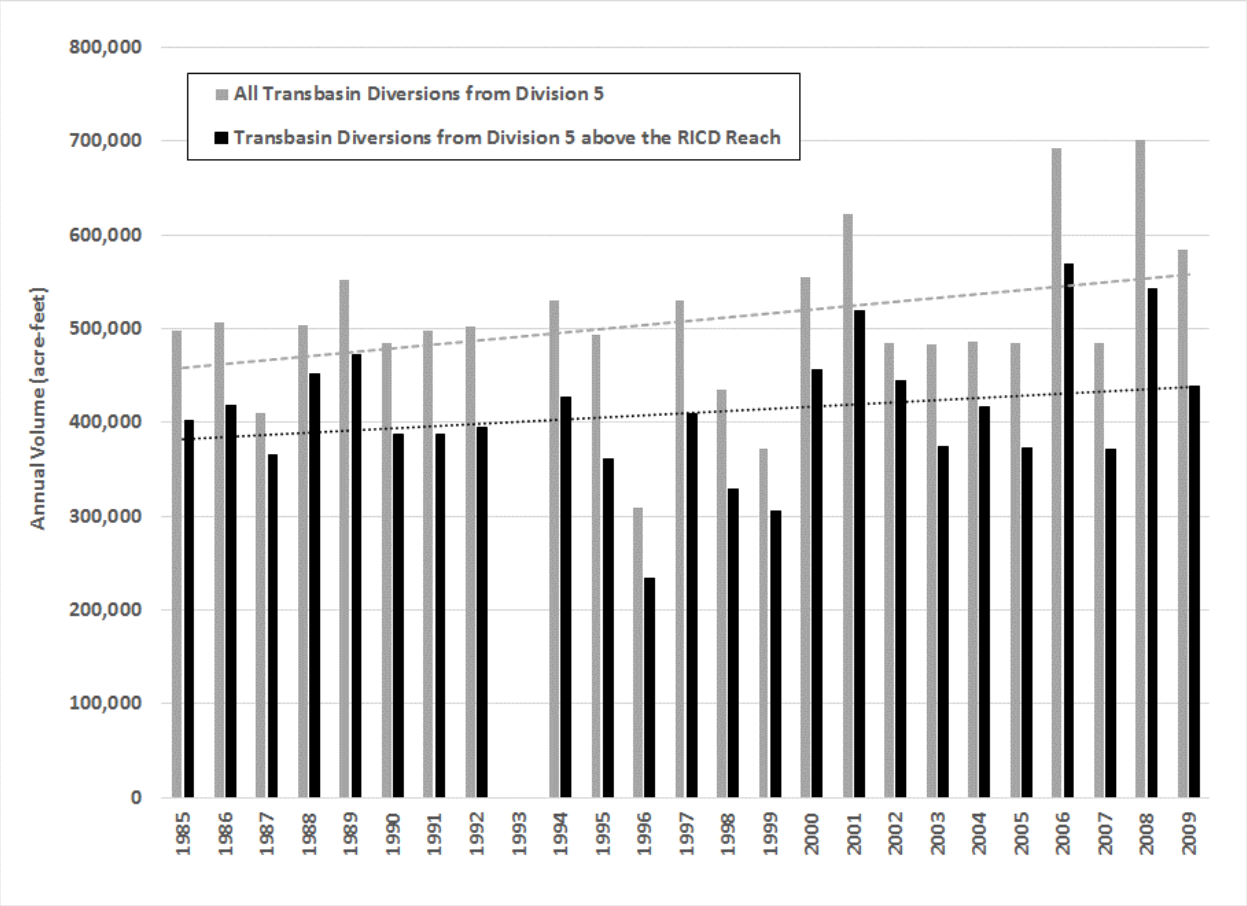


Figure 2: Annual Historical Transbasin Diversions from Division 5 for the 1985 to 2009 Period

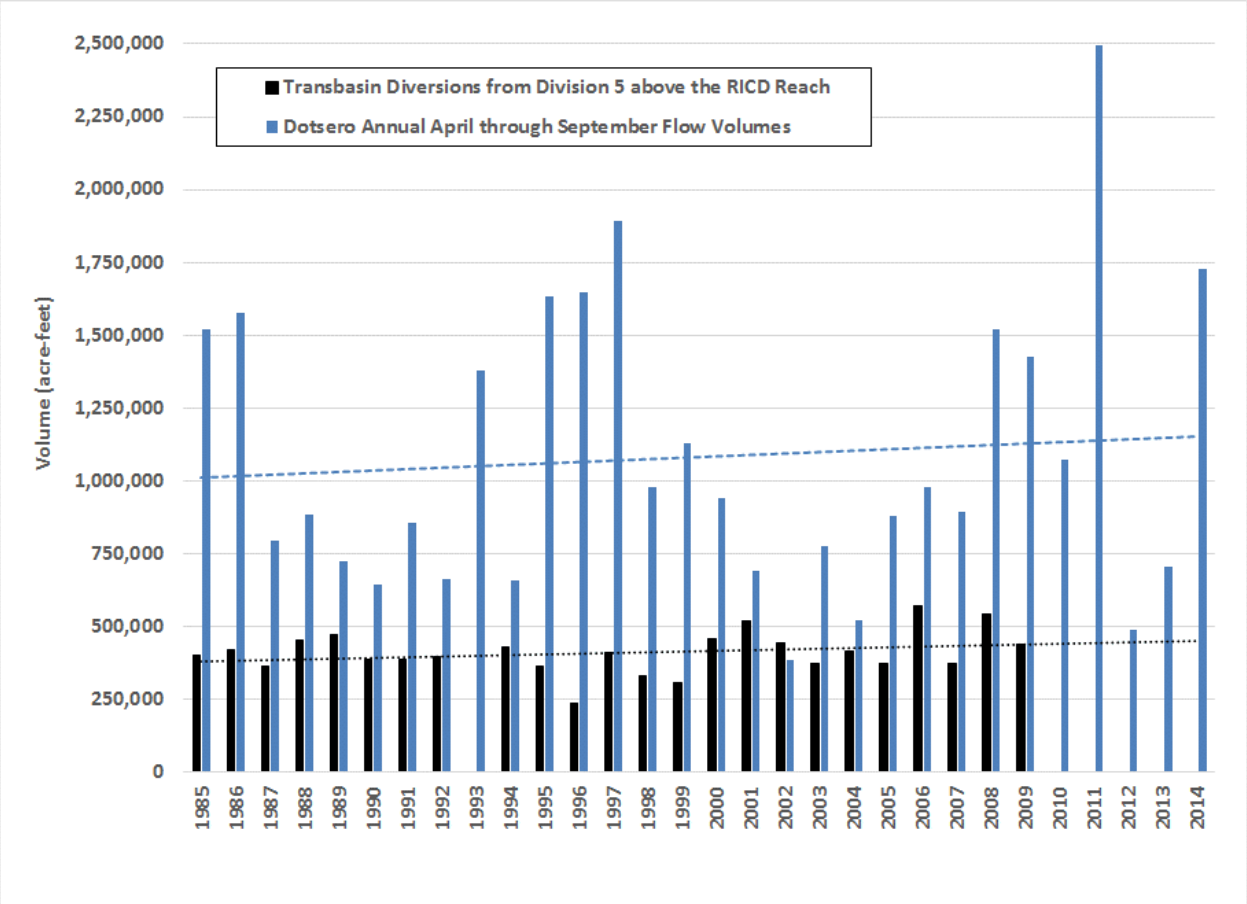


Figure 3: Annual Transbasin Diversions (all year) above RICD Reach and Dotsero Gaged Flows for the months of April – September

Flows in the RICD Reach

In their December 5, 2014 Supplemental Engineering Report, Wright Water Engineers compared Dotsero gaged flows with an historical USGS stream gage "Colorado River at Glenwood Springs, CO" (#09072500) that was located approximately 0.6 miles above the Roaring Fork confluence. These two gages overlapped for the period from December 1, 1940 to September 3, 1966.

I also compared average daily historical flows (in cubic feet per second, or cfs) for these two gages for the period in which they overlapped and, similar to WWE's, found a very strong linear correlation between these two gages (R^2 greater than 0.99), both for the full year (Figure 4) and the proposed RICD months of April through September (Figure 5). In calculating water available for the proposed RICD, I use the April – September relationship of ***Colorado River at Glenwood = (1.0789 * Dotsero Flows) - 13.763*** for these two gages[1] to estimate flows in the RICD reach ("at Glenwood" or "the RICD reach") for the 1985 through 2014 period.

[1] WWE's analysis resulted in a slightly different relationship: CO River at Glenwood = (1.079 * Dotsero Flows) - 14.449. Without access to their data, the reason for this difference cannot be determined.

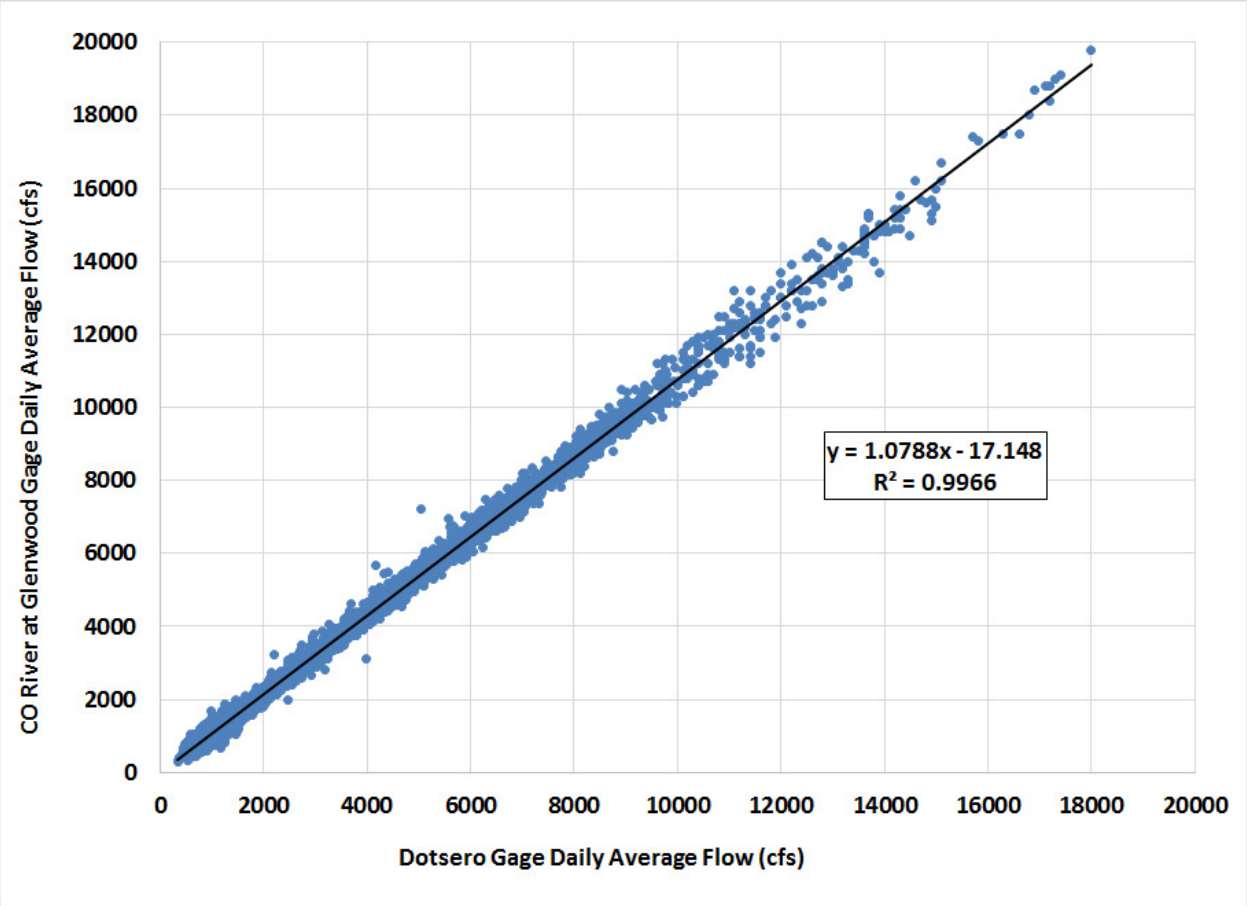


Figure 4: USGS Dotsero Gage (#09070500) and Historical Colorado River at Glenwood Springs, CO Gage (#09072500) 1940 - 1966 Correlation

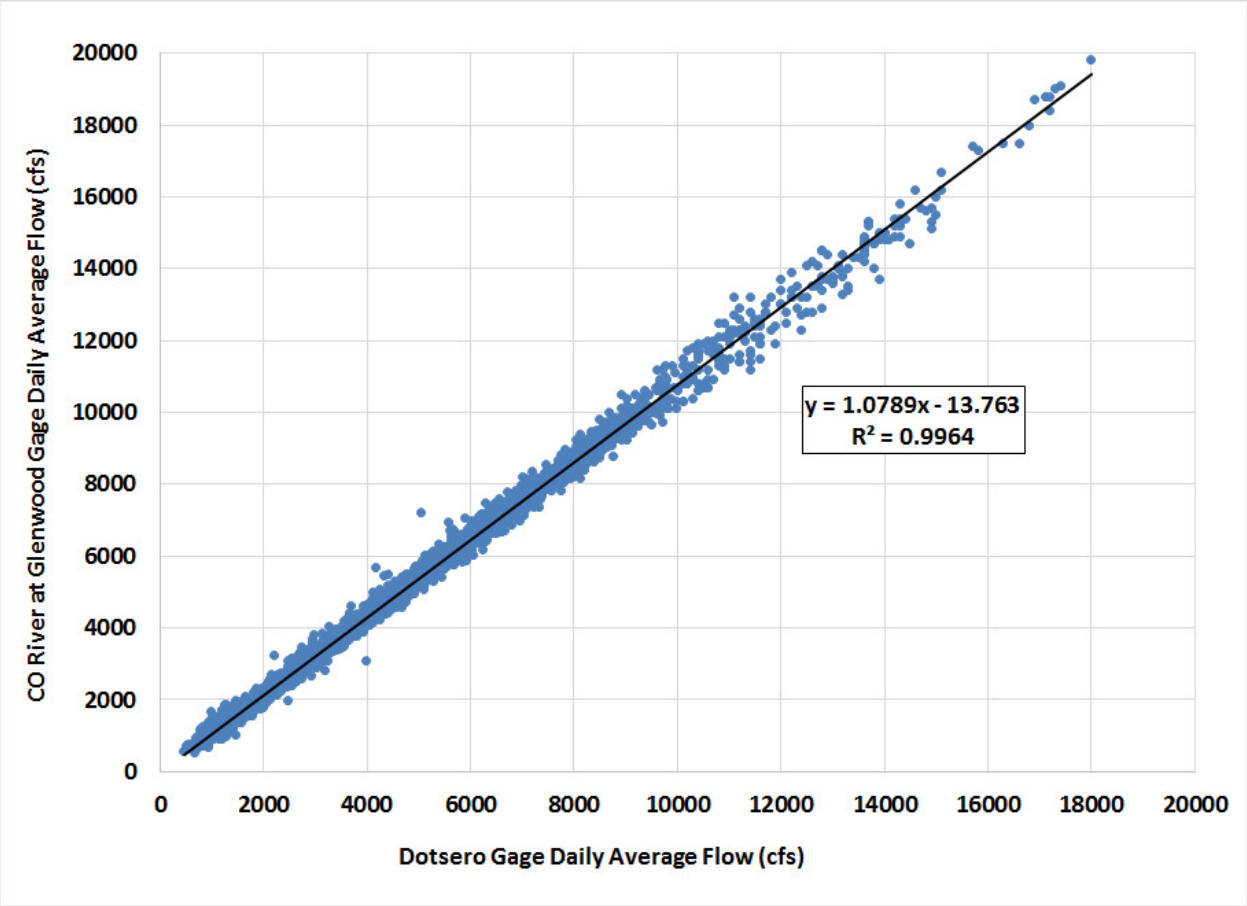


Figure 5: USGS Dotsero Gage (#09070500) and Historical Colorado River at Glenwood Springs, CO Gage (#09072500) April - September Data 1941 - 1966 Correlation

RICD Flow Availability

RICD Base flow

On a daily basis, for the April – September period, I evaluated if the RICD flows would have been available over the 1985 – 2014 period. The percentage of time RICD flows would have been met each year, excluding event flows which are discussed below, are shown in Figure 6. On average, the RICD flows (excluding events flow) would have been available 82% of the time.

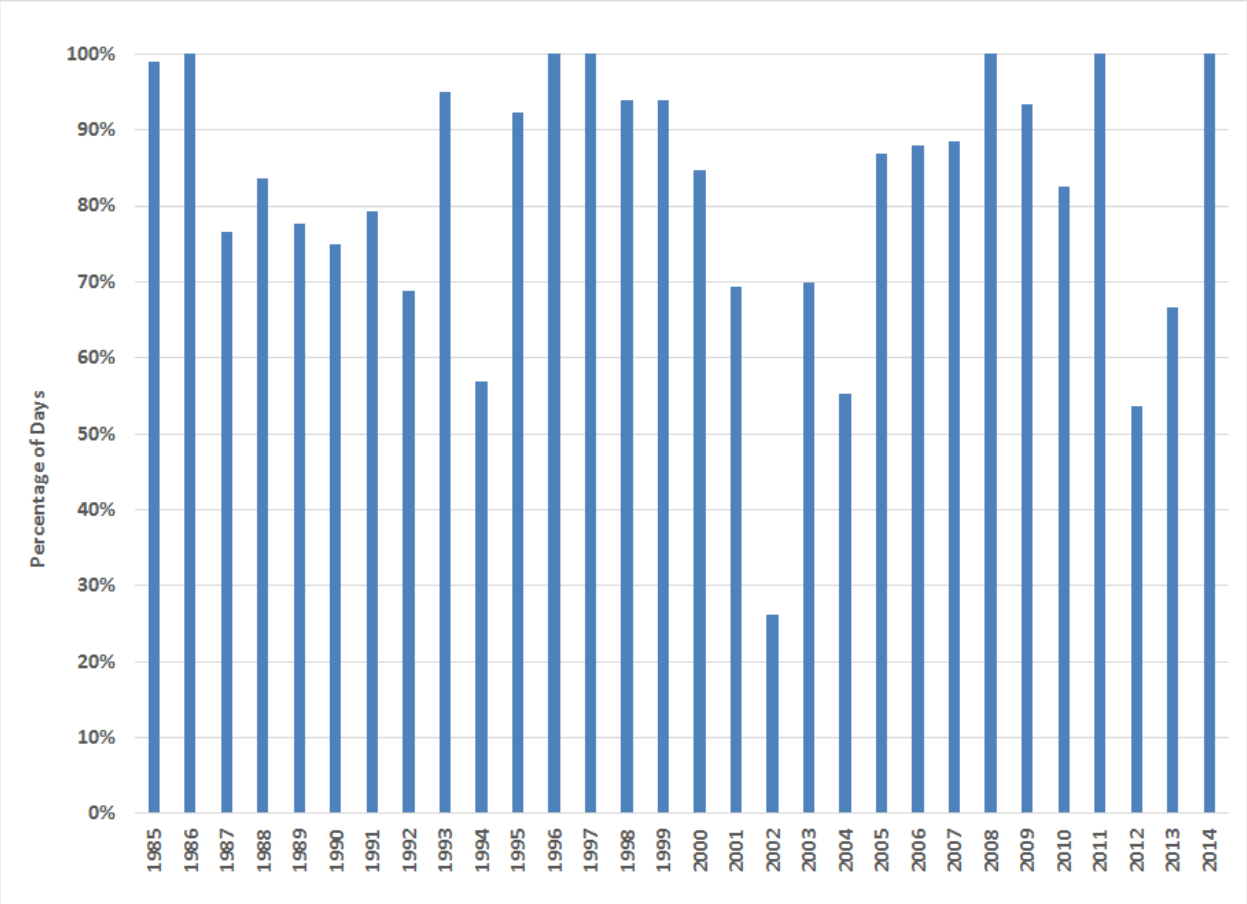


Figure 6: Percentage of Days Each Year during the April through September Period that Proposed RICD Flows (Excluding Event Flows) Were Available at Glenwood (above Roaring Fork)

RICD Event Flow

In their Pre-Meeting Statement, the applicant identifies the specific dates each year that event flows would be claimed. This varies depending on the day of the week that the July 4th holiday falls on[2]. For each year in the 1985 – 2014 period, I compared flows at Glenwood for the specific days that the event flow would have been in place that year to determine if they would have been available (up to 5 days of flows of 4,000 cfs). The full event flow (4,000 cfs) would have been present in 43% of years, with five consecutive days of flows of 4,000 cfs or greater in each of those years except for two, when the full event flows were available for two consecutive days.

RICD Flow Exceedance Data

Using daily data for the entire analysis period, I evaluated the how often RICD flows would have been available. The last row in the Table 1 includes the percentage of time that flow at

[2] If July 4 falls on a Sunday, Monday, Tuesday or Wednesday, the event flow will be in effect for up to five days over July 30 – July 4. If July 4 falls on a Thursday or Friday, the event flow will be in place for up to five days over July 2 – July 6. If July 4 falls on a Saturday, the event flow will be in effect for up to five days from July 1 – July 5.

Glenwood would have been equal to or greater than RICD flows (taken from a larger, more detailed table).

Table 1: Summary Exceedance Table of Percentage of Days (April – September) Over the 1985 – 2014 Period that Flows would have been Met or Exceeded

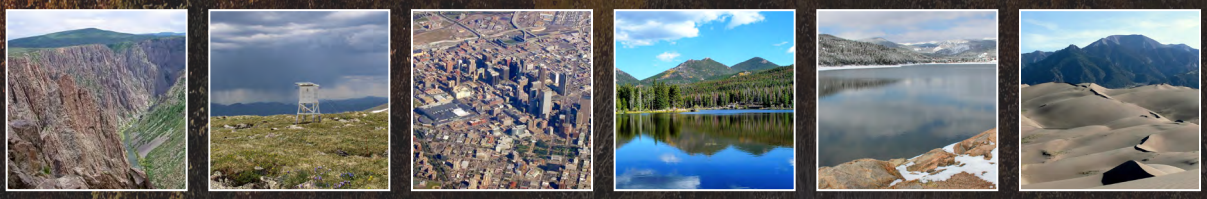
Percent Exceedance	Apr 1 - Jun 7	Jun 8 - Jul 23	Jun 30 - Jul 6	Jul 24 - Sep 30
RICD	**1,250**	**2,500**	**4,000**	**1,250**
1%	15,410	16,596	16,596	4,859
5%	9,962	12,605	11,094	2,820
10%	8,193	9,811	7,944	2,345
15%	6,682	8,538	7,383	2,076
20%	5,549	7,276	6,671	1,935
25%	4,805	6,197	6,197	1,838
30%	4,276	5,258	5,722	1,784
35%	3,845	4,579	5,226	1,731
40%	3,489	3,985	3,964	1,677
45%	3,187	3,618	3,564	1,633
50%	2,852	3,306	3,047	1,601
55%	2,421	2,971	2,507	1,569
60%	2,033	2,540	2,194	1,536
65%	1,838	2,227	2,000	1,504
70%	1,687	2,000	1,892	1,461
75%	1,579	1,849	1,655	1,418
80%	1,428	1,644	1,579	1,375
85%	1,299	1,526	1,493	1,331
90%	1,180	1,439	1,439	1,267
95%	1,025	1,310	1,331	1,116
99%	803	1,042	1,191	710
RICD Percent Exceedance	**87.0**	**60.5**	**38.9**	**91.0**

Conclusions

Based on this analysis, I conclude that using a recent 30-year period of record to evaluate the proposed RICD is reasonable and sufficient to capture a range of hydrologic conditions and that water is available for Glenwood Springs' proposed RICD water rights.

Climate Change in Colorado

A Synthesis to Support Water Resources Management and Adaptation



A Report for the Colorado Water Conservation Board

Executive Summary

Adapted from the Report

Western Water Assessment
CIRES
University of Colorado Boulder
COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Climate Change in Colorado

A Synthesis to Support Water Resources Management and Adaptation

Second Edition - August 2014

A Report for the Colorado Water Conservation Board

Western Water Assessment, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder

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Executive Summary

This report is a synthesis of climate science relevant for management and planning for Colorado's water resources. It focuses on observed climate trends, climate modeling, and projections of temperature, precipitation, snowpack, and streamflow. Climate projections are reported for the mid-21st century because this time frame is the focus of adaptation strategies being developed by the State of Colorado and other water entities.

Overview

In the past 30 years, Colorado's climate has become substantially warmer. The recent warming trend in Colorado is in step with regional and global warming that has been linked to increasing atmospheric concentrations of greenhouse gases. Annual precipitation, which has high natural variability, has not seen a statewide trend over that period. However, some drought indicators have worsened due to the warmer temperatures.

As greenhouse gases and other human effects on the climate continue to increase, Colorado is expected to warm even more by the mid-21st century, pushing temperatures outside of the range of the past century. The outlook for future precipitation in Colorado is less clear; overall increases or decreases are possible. The risk of decreasing precipitation appears to be higher for the southern parts of the state.

The future warming is projected to generally reduce Colorado's spring snowpack, cause earlier snowmelt and runoff, and increase the water use by crops, landscaping, and natural vegetation. While future increases in annual natural streamflow are possible, the body of published research indicates a greater risk of decreasing streamflow, particularly in the southern half of the state.

Summit Lake Park, along Mount Evans Scenic Byway. Photo: Creative Commons, Matt Wright.

Observed climate trends in Colorado (Section 2)

- Statewide annual average temperatures have increased by 2.0°F over the past 30 years and 2.5°F over the past 50 years (Figure ES-1). Warming trends have been observed over these periods in most parts of the state.
- Daily minimum temperatures in Colorado have warmed more than daily maximum temperatures during the past 30 years. Temperatures have increased in all seasons.
- No long-term trends in average annual precipitation have been detected across Colorado, even considering the relatively dry period since 2000.
- Snowpack, as measured by April 1 snow-water equivalent (SWE), has been mainly below-average since 2000 in all of Colorado's river basins, but no long-term (30-year, 50-year) declining trends have been detected.
- The timing of snowmelt and peak runoff has shifted earlier in the spring by 1–4 weeks across Colorado's river basins over the past 30 years, due to the combination of lower SWE since 2000, the warming trend in spring temperatures, and enhanced solar absorption from dust-on-snow.
- The Palmer Drought Severity Index (PDSI) shows a trend towards more severe soil-moisture drought conditions in Colorado over the past 30 years, reflecting the combination of the below-average precipitation since 2000 and the warming trend.
- No long-term statewide trends in heavy precipitation events have been detected. The evidence suggests that there has been no statewide trend in the magnitude of flood events in Colorado.

FIGURE ES-1. Colorado statewide annual temperature, 1900–2012

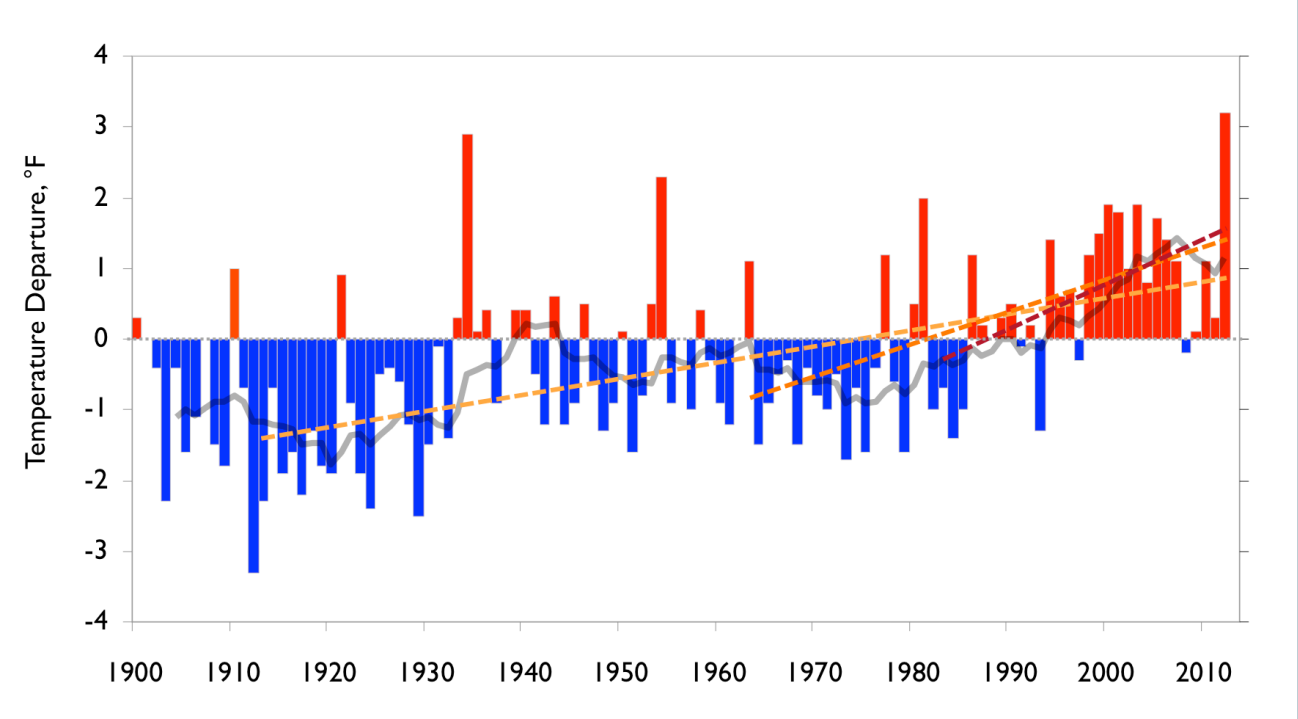

Fig. ES-1. Colorado statewide annually-averaged temperature (°F), 1900–2012. Annual departures are shown relative to a 1971–2000 reference period. The light-orange, orange, and red lines are the 100-year, 50-year, and 30-year trends, respectively. All three warming trends are statistically significant. The gray line shows the 10-year running average. The record shows a cool period from 1900 to 1930, a warm period in the 1930s and again in the 1950s, a cool period in the late 1960s and 1970s, and consistently warm temperatures since the mid-1990s. (Data source: NOAA NCDC; http://www.ncdc.noaa.gov/cag/)

- Tree-ring records and other paleoclimate indicators for Colorado show multiple droughts prior to 1900 that were more severe and sustained than any in the observed record.

Linking changes in Colorado to global changes (Section 4)

- The global climate system has warmed since 1900, particularly in the past 30 years, as evidenced by increased surface, atmospheric, and ocean temperatures; melting glaciers and ice sheets; rising sea levels; and increased atmospheric water vapor.
- These global changes have been attributed mainly to anthropogenic (human-caused) influences, primarily the increase in greenhouse gases in the atmosphere to the highest levels in at least 800,000 years.
- In North America, temperatures have increased by about 2°F in the last 30 years, with anthropogenic influences making a substantial contribution.
- In Colorado, temperatures have also warmed by 2°F in the past 30 years. The statewide warming is plausibly linked to anthropogenic influences, but definitive attribution at this spatial scale is difficult.
- Recent variability in Colorado's annual precipitation has not exhibited trends that might be attributed to anthropogenic climate change.
- Anthropogenic climate change may have increased the severity of recent drought conditions in the western U.S., due to the influence of the warming on snowpack, streamflow, and soil moisture.

Projections of Colorado's future climate and implications for water resources (Section 5)

- All climate model projections indicate future warming in Colorado (Figure ES-2). The statewide average annual temperatures are projected to warm by +2.5°F to +5°F by 2050 relative to a 1971–2000 baseline under a medium-low emissions scenario

FIGURE ES-2. Projected annual temperature and precipitation changes for the western U.S. for 2050

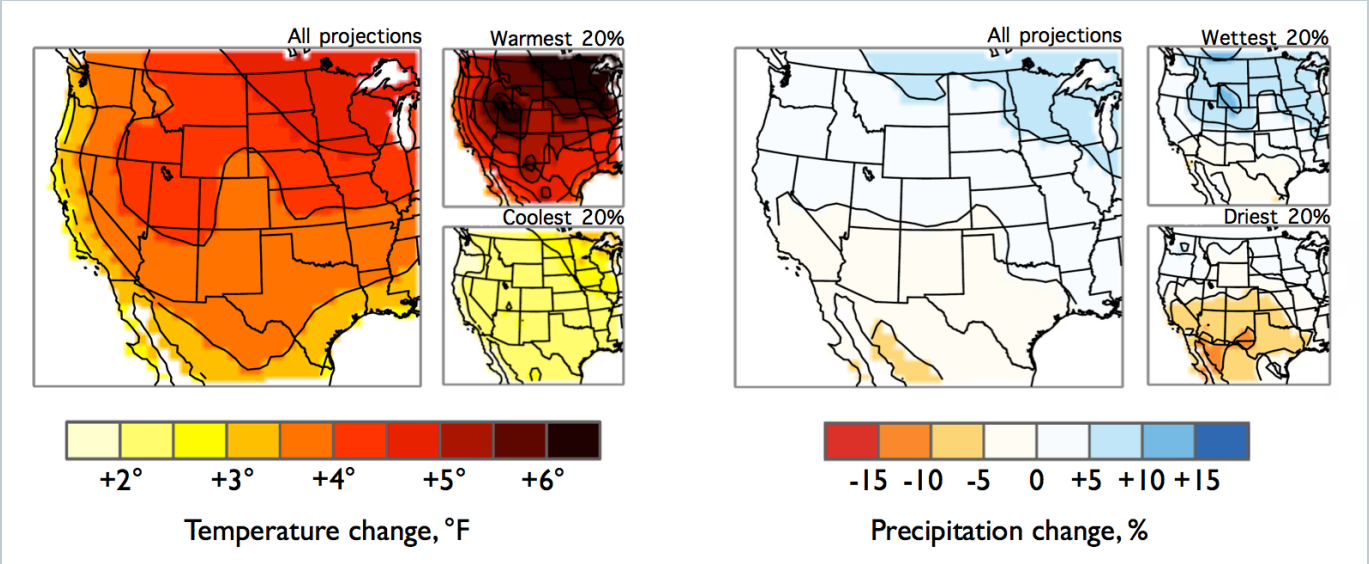

Fig. ES-2. Projected changes in annual average temperature and precipitation by 2050 (2035–2064) over the western US from an ensemble of 37 climate models under RCP 4.5, a medium-low emissions scenario. The large maps show the average change for all of the models (n=37), and the small maps show the average changes for the highest 20% (n=8) and lowest 20% (n=8) of the models, based on the statewide change for Colorado. For Colorado, all models show substantial warming, but there is less agreement about the direction of precipitation change. See Figure 5-1 for an expanded version that also shows seasonal changes. (Data source: CMIP5 projections re-gridded to 1-degree grid, Reclamation 2013; http://gdo-dcp.ucllnl.org/)

(RCP 4.5). Under a high emissions scenario (RCP 8.5), the projected warming is larger at mid-century (+3.5°F to +6.5°F), and much larger later in the century as the two scenarios diverge.

- Summer temperatures are projected to warm slightly more than winter temperatures. Typical summer temperatures by 2050 are projected under RCP 4.5 to be similar to the hottest summers that have occurred in past 100 years.
- Climate model projections show less agreement regarding future precipitation change for Colorado. The individual model projections of change by 2050 in statewide annual precipitation under RCP 4.5 range from -5% to +6% (Figure ES-2). Projections under RCP 8.5 show a similar range of future change (-3% to +8%).
- Nearly all of the projections indicate increasing winter precipitation by 2050. There is weaker consensus among the projections regarding precipitation in the other seasons.
- In the first projections of future Colorado hydrology based on the latest climate model output, most projections show decreases in annual streamflow by 2050 for the San Juan and Rio Grande basins. The projections are more evenly split between future increases and decreases in streamflow by 2050 for the Colorado Headwaters, Gunnison, Arkansas, and South Platte basins. However, other hydrology projections show drier outcomes for Colorado, and the overall body of published research indicates a tendency towards future decreases in annual streamflow for all of Colorado's river basins.
- The peak of the spring runoff is projected to shift 1–3 weeks earlier by the mid-21st century due to warming. Late-summer flows are projected to decrease as the peak shifts earlier. Changes in the timing of runoff are more certain than changes in the amount of runoff.
- Most projections of Colorado's spring snowpack (April 1 SWE) show declines for the mid-21st century due to the projected warming.
- Most climate projections indicate that heat waves, droughts and wildfires will increase in frequency and severity in Colorado by the mid-21st century due to the projected warming.

Incorporating climate change information into vulnerability assessment and planning (Section 6)

- Colorado water entities have been at the forefront of incorporating climate change into long-term planning, and their experience can inform future efforts by others.
- Observed records of climate and hydrology are still fundamental to assessing future climate risk, but should be supplemented with information from climate model projections and paleoclimate records.
- Planning approaches that explore multiple futures, rather than assuming a single future trajectory, are more compatible with climate projections and may improve preparedness for a changing climate.
- The uncertainty in projections of precipitation and streamflow for Colorado should not be construed as a "no change" scenario, but instead as a broadening of the range of possible futures, some of which would present serious challenges to the state's water systems (Table ES-1).

To download the full report, go to:

http://cwcb.state.co.us/environment/climate-change/

Supplemental information is available at:

http://wwa.colorado.edu/climate/co2014report/

TABLE ES-1. Summary of projected changes and potential impacts to water resources for Colorado

Element	Projected changes and potential impacts	Studies that have assessed this vulnerability for Colorado
Overall surface water supply	Most projections of future hydrology for Colorado's river basins show decreasing annual runoff and less overall water supply, but some projections show increasing runoff. Warming temperatures could continue the recent trend towards earlier peak runoff and lower late-summer flows.	CWCB (2012); Reclamation (2012); Woodbury et al. (2012)
Water infrastructure operations	Changes in the snowpack and in streamflow timing could affect reservoir operations, including flood control and storage. Changes in the timing and magnitude of runoff could affect the functioning of diversion, storage, and conveyance structures.	CWCB (2012); Reclamation (2012)
Crop water demand, outdoor urban watering	Warming temperatures could increase the loss of water from plants and soil, lengthen growing seasons, and increase overall water demand.	CWCB (2012); Reclamation (2012)
Legal water systems	Earlier and/or lower runoff could complicate the administration of water rights and interstate water compacts, and could affect which rights holders receive water.	CWCB (2012)
Water quality	Warmer water temperatures could cause many indicators of water quality to decline. Lower streamflows could lead to increasing concentrations of pollutants.	EPA (2013)
Groundwater resources	Groundwater usage for agriculture could increase with warmer temperatures. Changes in precipitation could affect groundwater recharge rates.	
Energy demand and operating costs	Warmer temperatures could place higher demands on hydropower facilities for peaking power in summer. Warmer lake and stream temperatures, and earlier runoff, could affect water use for cooling power plants and in other industries.	Macknick et al. (2012)
Forest disturbances in headwaters regions	Warmer temperatures could increase the frequency and severity of wildfire, and make trees more vulnerable to insect infestation. Both have implications for water quality and watershed health.	
Riparian habitats and fisheries	Warmer stream temperatures could have direct and indirect effects on aquatic ecosystems, including the spread of non-native species and diseases to higher elevations. Changes in streamflow timing could also affect riparian ecosystems.	Rieman and Isaak (2010)
Water- and snow-based recreation	Earlier streamflow timing could affect rafting and fishing. Changes in reservoir storage could affect recreation on-site and downstream. Declining snowpacks could impact winter mountain recreation and tourism.	Reclamation (2012); Battaglin et al. (2011); Lazar and Williams (2008)

Table ES-1. Potential water-related impacts from climate change in different areas and sectors. See the *References* section of the full report for the studies cited in the last column.

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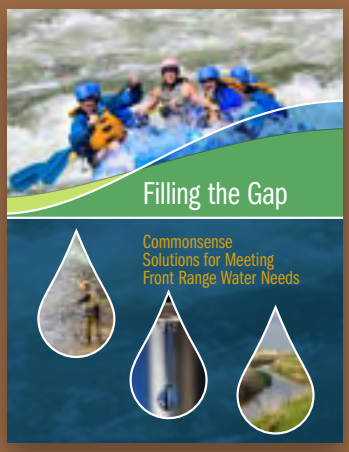
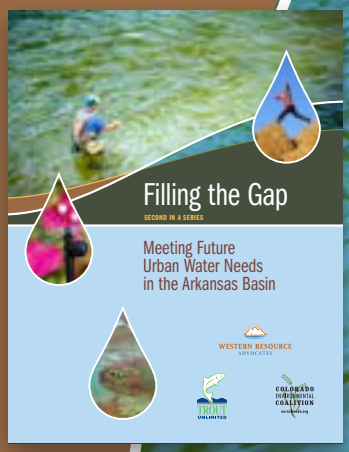




Filling the Gap

Commonsense Solutions for Colorado's Front Range

JOINT EXECUTIVE SUMMARY OF SOUTH PLATTE AND ARKANSAS BASIN REPORTS

WESTERN RESOURCE ADVOCATES

TROUT UNLIMITED

COLORADO ENVIRONMENTAL COALITION
ourcolorado.org

Colorado's Water Future

Folks in Colorado have plenty to be thankful for—and water is right at the heart of it all.

Colorado's millions of people, its landscape, its fish and wildlife, and its farms and businesses all depend on water. We place great value on this natural resource. Whether it falls from the sky as rain or snow, and whether it ends up as an ear of corn, a bottle of beer, or instream habitat for trout, water is essential to Colorado's exceptional quality of life.

Sustaining Colorado's lifestyle and economy demands that we preserve the state's waterways. Healthy rivers and streams support a diversity of fish, wildlife, and ecosystems, and draw residents and visitors to our state's world-famous natural areas. Colorado's rivers provide gold-medal trout fisheries and whitewater recreation, and are focal points for urban greenways in communities from Fort Collins to Durango and from Steamboat Springs to Pueblo. Healthy waterways are key to Colorado's tourism industry, which injects billions of dollars into the economy each year, and to attracting new businesses to the state. All of this is at

Fly fishing and canoeing on Dillon Reservoir in Summit County, Colorado, one of the Front Range's principal water storage reservoirs.

risk, however, unless decision makers in Colorado prioritize an innovative and balanced 21st century approach for supplying water to a growing population, while sustaining Colorado's rivers and streams.

The Colorado Water Conservation Board, Interbasin Compact Committee, local communities, and citizens' roundtables at the river basin level are engaged in a water supply planning process known as the Statewide Water Supply Initiative (SWSI). The SWSI effort is intended to answer the important questions of how much water Colorado will need in the future, and how these needs can be met. This document summarizes the answer to those questions for the Front Range of Colorado from Western Resource Advocates, Trout Unlimited, and the Colorado Environmental Coalition.

This joint executive summary provides a synopsis of our *Filling the Gap* report series. *Filling the Gap: Commonsense Solutions for Meeting Front Range Water Needs* (2011) focused on the Front Range counties of the South Platte River Basin, and *Filling the Gap: Meeting Future Urban Water Needs in the Arkansas Basin* (2012) focused on the urban counties of the Arkansas River Basin.* In these two reports, we employ widely accepted data to offer a realistic and balanced water supply portfolio that more than meets the projected needs of the entire Front Range while protecting Colorado's waterways, economy, and quality of life.

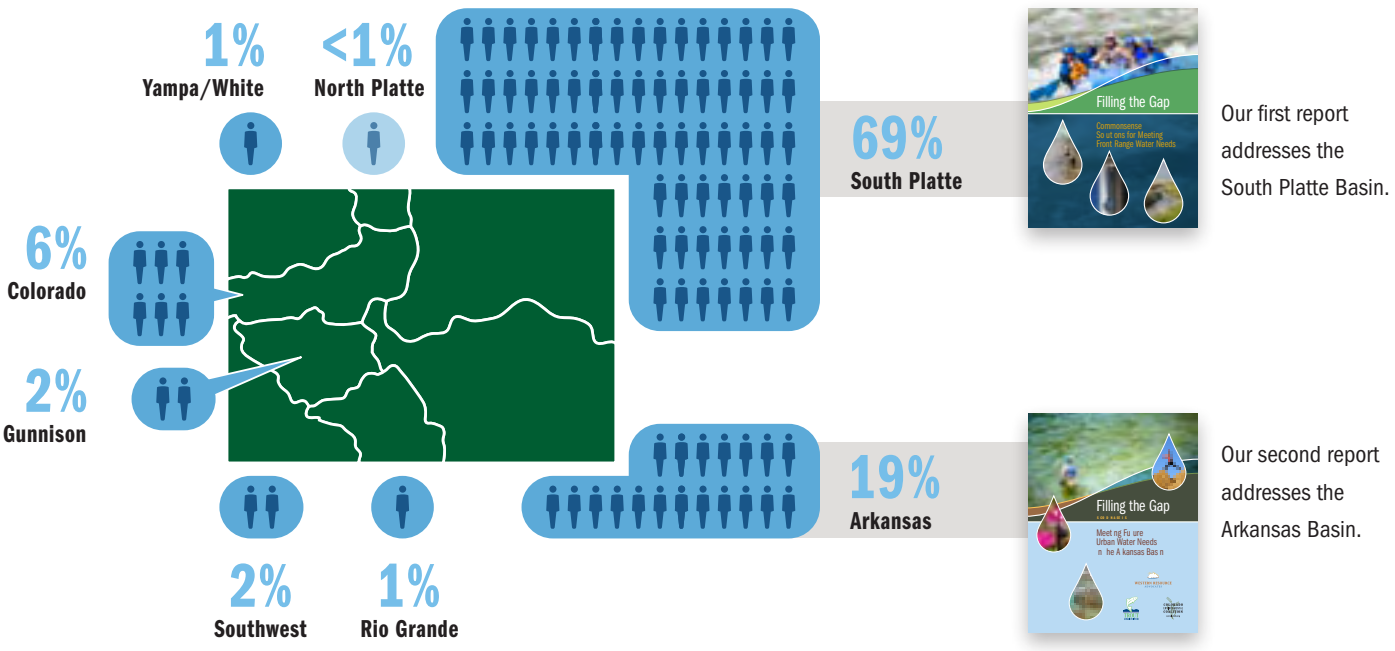
* This executive summary addresses the water needs of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Elbert, El Paso, Jefferson, Larimer, Pueblo, Teller, and Weld counties.

Our *Filling the Gap* series demonstrates that by developing select structural water projects, implementing increased water conservation and water reuse projects, and integrating agricultural and municipal water supply systems to allow for increased ag/urban cooperation, the Front Range of Colorado can meet its water needs through 2050 at a reasonable cost without highly damaging new water supply developments. **We commend the Front Range water managers, decision makers, and citizens who are working towards implementation of the *Filling the Gap* recommendations, and we urge them to pursue fully the strategies we present as soon as possible.**

Today, we must look beyond old ways of thinking and find innovative tools to meet our new challenges. The time is now to embrace water supply strategies that meet our consumptive water use needs while sustaining the nonconsumptive, instream flows that keep Colorado's rivers and streams healthy. The methods and ideas laid out in the *Filling the Gap* reports should guide choices that are made as we embark on this new era of Colorado's water future.

FIGURE Nº 1 2010 POPULATION DISTRIBUTION BY RIVER BASIN.

The vast majority of Colorado's population is concentrated east of the Rocky Mountains, in the Front Range area of the South Platte and the Arkansas basins.



> We will not successfully solve 21st Century water management challenges in Colorado using 19th and 20th Century institutions and approaches. This is especially true in our State where heightened competition for over-allocated water resources by individual users or sectors is increasingly unproductive—there is not enough water! The use of multi-objective portfolio approaches is considered to be one of the most constructive options we have available if we are to protect and enhance environmental values while providing adequate and reliable water services to municipalities, industries, and farms.
>
> **—Peter Binney, Director of Sustainable Infrastructure, Merrick & Company, former Director of Aurora Water**

Growing Water Demands

Approximately 80% of Colorado's population lives in the South Platte and the Arkansas basins (Figure 1). Most of the population in these two basins is concentrated along the Front Range, an area of the state immediately east of the Rocky Mountains and generally extending from Fort Collins to Pueblo. Under a medium-growth scenario, the population of the Front Range is projected to nearly double between 2010 and 2050 to a total of 7.2 million people (Figure 2).

Increasing population along the Front Range is the primary driver for growing water demands in Colorado. Accounting for the effects of passive conservation, which occur with new, more efficient development and when older, inefficient appliances and fixtures are replaced over time, water demand for 7.2 million residents and related industry in the Front Range will be approximately 1.37 million acre-feet* annually (446 billion gallons) in 2050.

This means that within the next 40 years, the Front Range will need to fill an annual water supply gap of 428,000 acre-feet (139 billion gallons) in order to meet its projected future water demands (Figure 3).

The *Filling the Gap* series relies on the same data used by Colorado's *Statewide Water Supply Initiative* report to project future water demand, and includes both municipal and industrial (M&I) and self-supplied industrial demands. It is worth noting that our reports were produced to inform water supply planning from a statewide perspective, and the data presented therein should not supplant individual water provider information for local planning purposes. Furthermore, the water supply gap is projected for the Front Range as a whole, and does not take into account more localized water supply and demand issues, such as local climate variations and water infrastructure system flexibility. This aggregation of data to a multicounty level assumes a more dynamic and integrated water system along the Front Range than what currently exists today, a goal we think worthy of pursuing.

* One acre-foot equals 325,851 gallons (the amount of water two to four families use in one year).

FIGURE Nº 2 POPULATION PROJECTIONS FOR THE FRONT RANGE OF COLORADO.

The population of the Front Range of Colorado is expected to increase by 70% over the next 40 years under a scenario of medium population growth. To put this growth into perspective, this would be equivalent to adding in the Front Range five new cities the size of Denver by 2050.

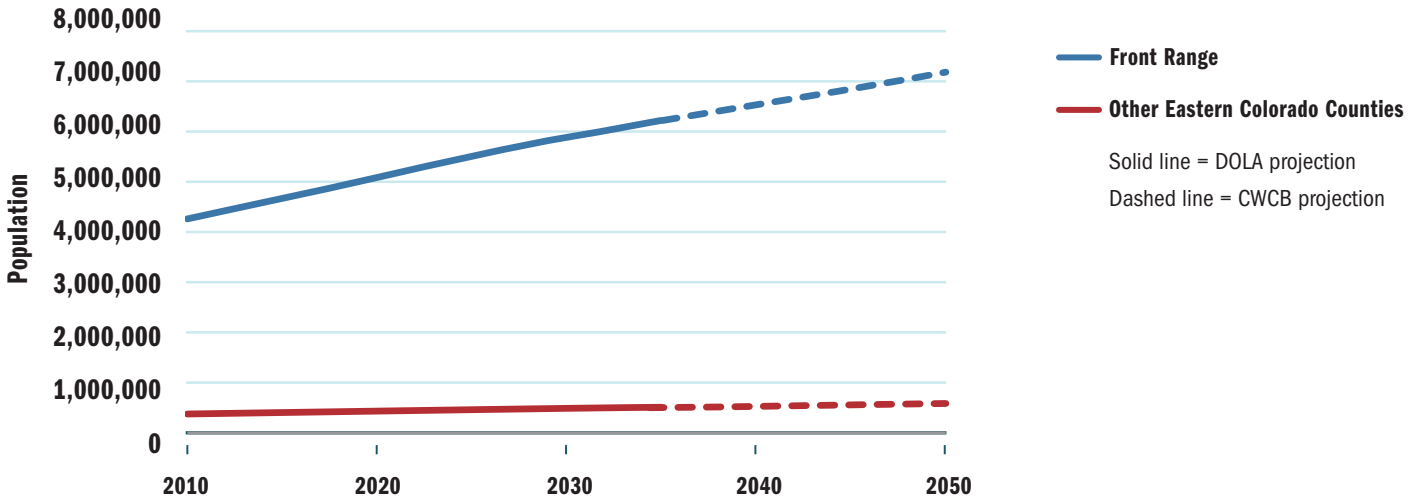


FIGURE Nº 3 FUTURE WATER NEEDS FOR THE FRONT RANGE OF COLORADO.

Using the most current Colorado Water Conservation Board data, we assume the Front Range will need an additional 428,000 acre-feet by 2050 to fully meet projected demands.

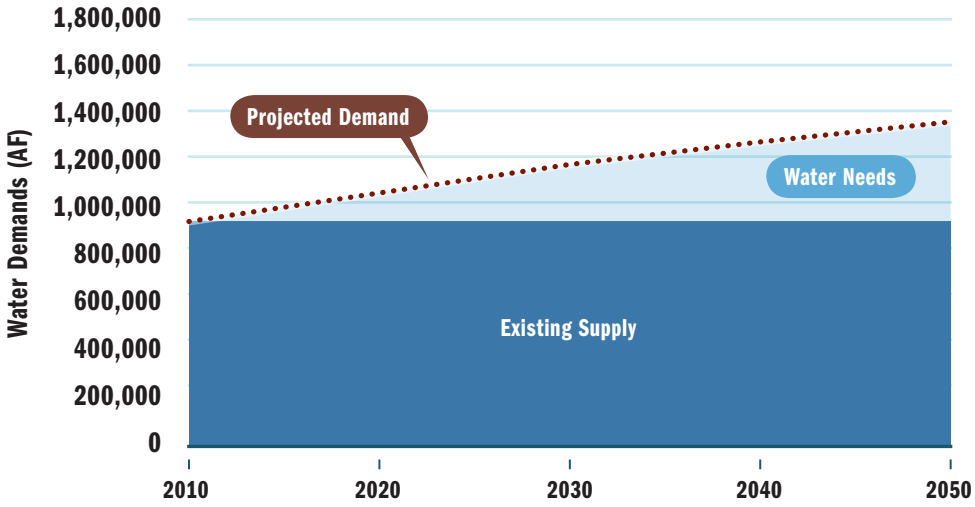
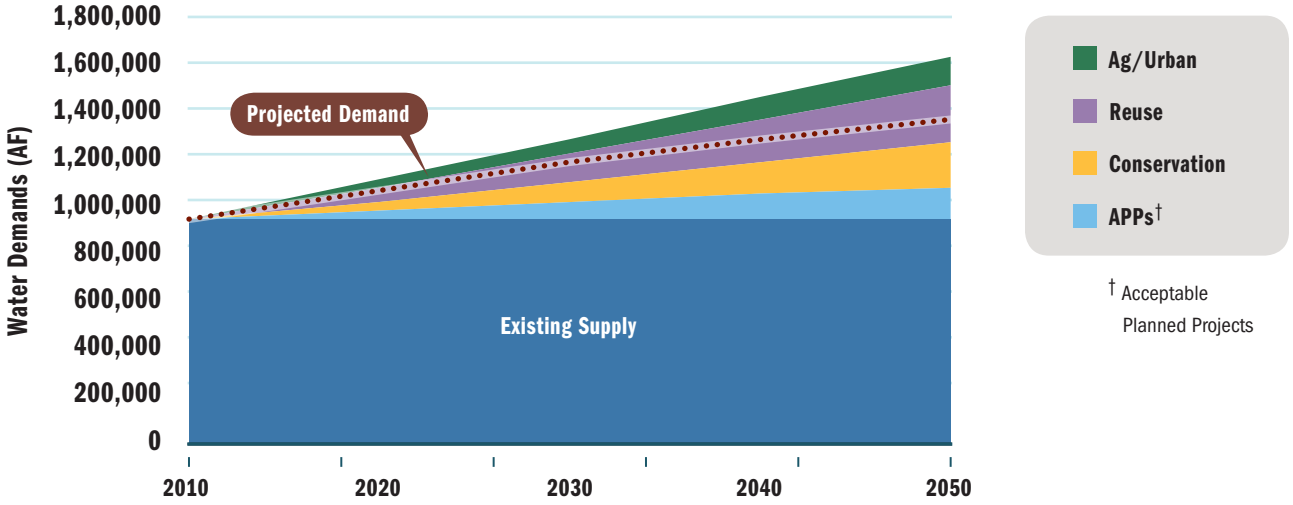


FIGURE Nº 4 OUR PORTFOLIO FOR MEETING THE PROJECTED DEMAND OF THE FRONT RANGE IDENTIFIED IN SWSI 2010.*

Our balanced portfolio more than fills the projected needs of the Front Range of Colorado while protecting the state's environment, economy, and vibrant quality of life.



* Our South Platte Basin report covers the years 2008–2050, whereas our Arkansas Basin report is based on 2010–2050 data. Accordingly, this figure assumes implementation of our South Platte Basin portfolio from 2008–2050, and of our Arkansas Basin portfolio from 2010–2050.

Underwater rainbow Trout.

Our Water Management Portfolio

The *Filling the Gap* series explores four water supply strategies for meeting growing needs along Colorado's Front Range—acceptable planned projects, water conservation, reuse, and voluntary cooperative water sharing with the agricultural sector. **This balanced portfolio would provide 250,000 acre-feet (81 billion gallons) of water in excess of the Front Range's 2050 demands while protecting our rivers, economy, and quality of life (Figure 4).** Importantly, our portfolio meets future needs more cheaply and without the need for new, large, environmentally damaging transbasin diversions that have been a hallmark of traditional water supply planning.

Our innovative 21st century approach provides more flexibility and less risk than do dams and pipelines against the impacts of social, economic, and climate change.

Acceptable Planned Projects

Some of the state of Colorado's *structural* Identified Projects and Processes (IPPs) could be acceptable to our groups if designed and implemented pursuant to the "smart" principles listed on the back cover. We refer to these projects as Acceptable Planned Projects, or APPs. The list of APPs for the South Platte and Arkansas basins include Chatfield Reservoir Reallocation, Halligan Reservoir Enlargement, Seaman Reservoir Enlargement, Gross Reservoir Expansion, Windy Gap Firming Project, Rueter-Hess Reservoir Expansion, Beebe Draw Aquifer Recharge, East Cherry Creek Valley's Northern Project, and the Eagle River Joint Use Project. The Southern Delivery System is also accounted for in the APP category because it is a permitted *structural* project under construction that is not yet operational. Collectively, these APPs can provide 149,000 acre-feet of new supply to the Front Range annually by 2050.

The Moffat Pipeline, part of Denver Water's Gross Reservoir Enlargement project. Photo: Mark Conlin.

Conservation

Published literature and studies by the state of Colorado indicate that per capita water use can be significantly reduced over the next 40 years through conservation techniques, practices, and technology. Accounting for both active and passive conservation savings, a 34% reduction in per capita demand—the state's "high" conservation strategy under SWSI— would result in an annual reduction in water demand in the Front Range of 454,000 acre-feet by 2050. For the purposes of this report, passive conservation savings are accounted for as a reduction in the future demand projections, and 60% of the active conservation savings are allocated to meet future demands.

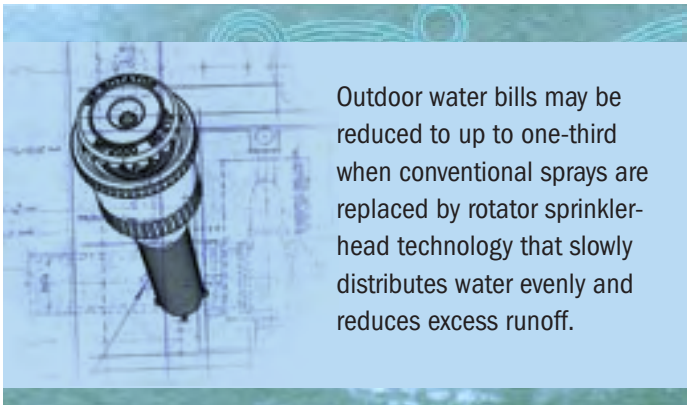
Achieving the water savings from a high conservation strategy will require an immediate and enduring investment in conservation programs, but no unreasonable measures that aren't already being implemented in many western communities. In addition, water utilities should not be expected to do this alone. Our proposed conservation levels will require a sustained, coordinated effort between utilities, the state, city planners, private industry, the general public, and the conservation community. By dedicating a little more than half of active water conservation savings to meeting future needs, 192,000 acre-feet of additional water supply will be made available annually by 2050 (Table 1).

With over-appropriated rivers in our state, a growing water supply and demand imbalance on the Colorado River, future population booms expected along the Front Range and throughout the Colorado River Basin, and the significant uncertainties of climate change, it is imperative to prioritize water conservation and reuse as strategies to meet future water needs.

Reuse

A state study on water reuse in the Denver area and nearby cities concluded that reuse in the South Platte Basin would grow to more than 170,000 acre-feet annually in the years beyond 2030. Additionally, the Arkansas Basin has established a strong precedent for reuse, and we conclude that reuse in the Arkansas Basin could rise to 46,500 acre-feet annually by 2050. Together, the Front Range will have approximately 246,000 acre-feet of reuse water available annually in 2050 by maximizing exchange opportunities and substitution plans, significantly increasing direct and indirect reuse, and constructing the Denver metro area's Water, Infrastructure, and Supply Efficiency (WISE) project and Aurora's Prairie Waters project, as well as two additional projects planned by the El Paso County Water Authority and Pueblo Board of Water Works.

Residential/Commercial MP 2000
Rotator Nozzle, Hunter Industries.



Outdoor water bills may be reduced to up to one-third when conventional sprays are replaced by rotator sprinkler-head technology that slowly distributes water evenly and reduces excess runoff.

TABLE Nº 1 ALLOCATION OF OUR CONSERVATION STRATEGY'S WATER SAVINGS.

In parallel with the Statewide Water Supply Initiative, we use passive conservation to reduce demands, and a portion of active conservation savings to meet future water needs.

	M&I Passive Conservation	M&I Active Conservation	Total Acre-Feet
Savings allocated as reduction in future demand projections	100%	0%	134,000
Savings allocated to meeting future demands	0%	60%	192,000
Savings allocated to system reliability	0%	40%	128,000
Total			**454,000**

	Passive Conservation	Active Conservation
% of total savings for the conservation strategy	30%	70%

> Water conservation is a critical way we can protect and preserve one of the West's most precious resources. As our western economies are inextricably tied to clean water and healthy flowing rivers, investments in conservation are essential as part of our efforts to protect our water supply for generations of Coloradans to come.
>
> **—Michael F. Bennet,**
> **United States Senator for Colorado**

Pipes moving reclaimed water.

Ag/Urban Cooperation

Cooperative agreements between agricultural irrigators and urban municipal suppliers based on rotational land fallowing, deficit irrigation, temporary water leasing, and/or a number of other alternative transfer methods are a central feature of current discussions about future municipal water supply. In fact, with the creation of the Super Ditch, the Arkansas Basin is well on its way to developing the institutions necessary for a comprehensive ag/urban cooperative sharing program. Pilot projects are already in place and larger projects are contemplated.

Our ag/urban cooperation strategy is premised on agreements that would lease water to municipalities on a temporary basis at a price attractive to irrigators, on schedules that are sufficiently reliable for municipal suppliers and that are established well in advance of actual reallocation of water. Based on state reports and various engineering analyses, and assuming the physical and administrative structures are put in place, we believe that voluntary and compensated ag/urban cooperative water sharing arrangements can provide 129,000 acre-feet of new supply for the Front Range annually by 2050 without permanently drying irrigated acreage.

Center pivot irrigation of a cornfield, eastern Colorado.

> After reading *Filling the Gap: Meeting Future Urban Water Needs in the Arkansas Basin*, I am once again impressed with the exceptional work of Western Resource Advocates on issues relating to water in Colorado. They are joined in this effort by Trout Unlimited and the Colorado Environmental Coalition, two other groups that care deeply about the future of Colorado. The report tackles one of the thorniest issues I wrestled with as Governor—how to protect the Arkansas River Basin. Different stakeholders have locked horns over this problem, but answers have been elusive. This report presents real solutions going forward, and everyone who cares about the Arkansas River Basin should pay attention.
>
> **—Bill Ritter, Jr., Former Governor of Colorado**

Recommendations

Planning for Colorado's water future is at a critical juncture. The SWSI process presented an abundance of information regarding water supplies, and the basin roundtables and Interbasin Compact Committee are engaged in discussions about what the next steps should be. Moving forward, it is imperative that all stakeholders are involved in the important planning processes occurring at the local and state levels.

We believe Colorado can chart an innovative path forward, one that differs from the traditional approach of building large dams and pipelines, to meet growing water needs along the Front Range. **Our portfolio of APPs, conservation, reuse, and ag/urban sharing would produce approximately 250,000 acre-feet (81 billion gallons) of water *in excess* of the Front Range's 2050 demands.** While each strategy has its individual trade-offs, our portfolio does not require new, large-scale, environmentally damaging, transbasin diversions from the Western Slope.

Based on our data analysis, this report offers several key recommendations that water planners and policy makers should consider carefully in forging Colorado's water future:

We believe Colorado can chart an innovative path forward, one that differs from the traditional approach of building large dams and pipelines, to meet growing water needs along the Front Range.

- ✓ Close the projected Front Range gap with balanced strategies that are more cost-effective and environmentally friendly than traditional transbasin diversion projects.
- ✓ Protect Colorado's rivers, streams, and lakes as an integral part of any future water development strategy. Nonconsumptive uses of water—for fishing, whitewater recreation, and other uses—are worth billions of dollars annually to our state economy and are critical to the quality of life in this state.
- ✓ Pursue only those Identified Projects and Processes that can be constructed and operated according to the "smart" principles.
- ✓ Implement more aggressive water conservation strategies. Conservation is often the cheapest, fastest, and smartest way to gain "new" water supplies, and there are significant opportunities to boost existing water conservation efforts in the Front Range.
- ✓ Maximize the role of reuse in meeting the future water needs of Colorado's residents, and work to improve public perception and acceptance of reuse projects.
- ✓ Cooperate with agriculture on voluntary water sharing agreements that benefit both municipalities and the agricultural community without permanently drying irrigated acres.

By following these recommendations, Colorado can more than meet the future water needs of the Front Range while protecting our rivers, economy, and quality of life.

The Smart Principles

Western Resource Advocates, Trout Unlimited, and the Colorado Environmental Coalition recommend that future water supply management and development efforts adhere to a set of basic "smart" principles. We initially published these principles in 2005 in the *Facing Our Future* report, where we used them to evaluate water storage and supply projects at that time proposed for the South Platte and Arkansas river basins. Our *Filling the Gap* series built on these smart water supply principles to analyze projects proposed for the entire Front Range of Colorado. We offer these principles as a guide to assure protection of rivers and other natural resources against damage that often results from structural water supply projects. The smart principles are:

1. Make full and efficient use of existing water supplies and reusable return flows before developing new diversion projects.

2. Improve use of existing water supply infrastructure by integrating systems and sharing resources among water users to avoid unnecessary new diversions and duplication of facilities.

3. Recognize the fundamental political and economic inequities and the adverse environmental consequences of new transbasin diversions.

4. Expand or enhance existing storage and delivery before building new facilities in presently undeveloped sites, and expand water supplies incrementally to better utilize existing diversion and storage capacities.

5. Recognizing that market forces now drive water reallocation from agricultural to municipal uses, structure voluntary transfers, where possible, to maintain agriculture and, in all cases, to mitigate the adverse impacts to rural communities from these transfers.

6. Involve all stakeholders in decision-making processes and fully address the inevitable environmental and socioeconomic impacts of increasing water supplies.

7. Design and operate water diversion projects to leave adequate flows in rivers to support healthy ecosystems under all future scenarios, even if water availability diminishes in the future as a result of climate change or other factors.

8. Seek to develop "multi-purpose projects" to spread project benefits as well as costs.

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Western Resource Advocates is a nonprofit environmental law and policy organization dedicated to protecting the West's land, air, and water.

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Trout Unlimited's mission is to conserve, protect and restore North America's coldwater fisheries and their watersheds.

COLORADO ENVIRONMENTAL COALITION
ourcolorado.org

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Colorado Environmental Coalition works to protect Colorado's environment by educating and mobilizing citizens, providing technical and organizing assistance to environmental organizations and other allies, and uniting and supporting them in coalitions that defend and preserve Colorado's natural heritage and quality of life.

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Download the full reports at:
westernresourceadvocates.org/gap

To receive a hard copy of the full reports, contact Madeleine Tengler at 720.763.3746 or at madeleine@westernresources.org

STATE OF COLORADO

OFFICE OF THE GOVERNOR

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John W. Hickenlooper
Governor

D 2013-005

EXECUTIVE ORDER

DIRECTING THE COLORADO WATER CONSERVATION BOARD TO COMMENCE WORK ON THE COLORADO WATER PLAN

Pursuant to the authority vested in the Governor of the State of Colorado, and in particular, pursuant to powers vested in the Governor pursuant to article IV, section 2 of the Colorado Constitution, I, John W. Hickenlooper, Governor of the State of Colorado, hereby direct the Colorado Water Conservation Board to commence work on the Colorado Water Plan.

I. Background

Colorado has long been on the leading edge of water innovation and solutions. We are the home of the "Colorado Doctrine" of prior appropriation and the birthplace of the interstate water compact, of which we have nine. We are a headwater state – vital rivers and streams begin here, provide water to Colorado uses, and exit to water 18 downstream states as well as the United Mexican States. Colorado has benefited much from its water and has taken seriously its responsibilities as a headwater state. The creation of a Colorado Water Plan is in keeping with Colorado's water heritage and continued responsibility.

The Colorado Water Conservation Board (CWCB) was created in 1937 "[f]or the purpose of aiding in the protection and development of the waters of the state, for the benefit of the present and future inhabitants of the state." C.R.S. § 37-60-102. More than 75 years later, we reaffirm this purpose and seek to tap Colorado collaboration and innovation in addressing our water challenges. The Board's recently-adopted strategic framework is consistent with this mission.

We also recognize the important role the Office of the State Engineer has played throughout Colorado's water history. This office administers water rights, issues water well permits, represents Colorado in certain interstate water compact proceedings, monitors streamflow and water use, approves construction and repair of dams and performs dam safety inspections, assures the safe and proper construction of water wells, and maintains numerous databases of state water information.

The Interbasin Compact Committee and Basin Roundtable processes, established by House Bill 05-1177, have produced more than eight years worth of important discussion and information about the basins from Coloradans in each basin.

In addition, many state agencies, lead by DNR, play important roles in Colorado water including:

- The Colorado Department of Public Health and Environment that includes the Colorado Water Quality Control Division and the Commission, the administrative agency responsible for developing specific state water quality policies, in a manner that implements the broader policies set forth by the Legislature in the Colorado Water Quality Control Act. The Commission adopts water quality classifications and standards for surface and ground waters of the state, as well as various regulations aimed at achieving compliance with those classifications and standards.
- The Colorado Water Resources and Power Development Authority that provides low-cost financing to governmental agencies in Colorado primarily for water and wastewater infrastructure development.
- The Colorado Department of Agriculture that works to strengthen and advance Colorado's largest consumptive use of water, its agriculture industry.
- The Colorado Energy Office that maintains information helpful in understanding Colorado's water-energy nexus as well as state agency water use.

Throughout our state's history, other water plans have been created by federal agencies or for the purpose of obtaining federal dollars. We embark on Colorado's first water plan written by Coloradans, for Coloradans. Nevertheless, our past and current data and studies will aid in developing a plan for the future.

II. Purpose and Need

The Colorado Water Plan is necessary to address the following:

A. The gap between our water supply and water demand is real and looming. The Statewide Water Supply Initiative forecasts that this gap could exceed 500,000 acre feet by 2050. Moreover, our largest regional gap is set to occur in the South Platte Basin, our most populous as well as our largest agriculture-producing basin.

B. Colorado's drought conditions threaten to hasten the impact of the water supply gap. Indeed, the past two decades have been Colorado's warmest on record, dating back to the 1890s.

C. Coloradans find that the current rate of purchase and transfer of water rights from irrigated agriculture (also known as "buy-and-dry") is unacceptable. We have witnessed the economic and environmental impacts on rural communities when water is sold and removed from an agricultural area. For example, projected reduction in irrigated acreage in the South Platte Basin alone is currently estimated at 20% of agricultural land under production.

D. The Interbasin Compact Committee and Basin Roundtables have worked for the past eight years to engage in a visioning process and to discuss long-standing intrabasin and interbasin challenges by defining scenarios, portfolios, and strategies. These efforts have produced informed discussions, provided a forum for building consensus, and generated momentum that the Colorado Water Plan should utilize.

E. Colorado's water quantity and quality questions can no longer be thought of separately. Each impacts the other and our state water policy should address them conjunctively.

F. Our interstate water concerns are as pressing as ever and require Colorado to be vigilant in protecting its interstate water rights pursuant to its nine interstate compacts and two equitable apportionment decrees.

G. CWCB is well-positioned to conduct this work given its duties and history, statewide representation, and expertise.

III. Declaration and Directives

A. Colorado's water policy must reflect its water values. The Basin Roundtables have discussed and developed statewide and basin-specific water values and the Colorado Water Plan must incorporate the following:

- a productive economy that supports vibrant and sustainable cities, viable and productive agriculture, and a robust skiing, recreation, and tourism industry;
- efficient and effective water infrastructure promoting smart land use; and
- a strong environment that includes healthy watersheds, rivers and streams, and wildlife.

B. The CWCB is directed to commence the work necessary to submit a draft Colorado Water Plan for review by the Governor's Office no later than December 10, 2014. The CWCB will work with the Governor's Office to complete the final plan no later than December 10, 2015.

C. The CWCB is directed to align state water projects, studies, funding, and other efforts as part of the Colorado Water Plan to the greatest extent possible. As part of this alignment, the CWCB is directed to develop an inventory of water rights held by state agencies and evaluate the opportunities for those rights. The CWCB is also directed to ensure that financial assistance for water funding activities is in accordance with the Colorado Water Plan.

D. The CWCB is directed to align the state's role in water project permitting and review processes with the water values included in the Colorado Water Plan and to streamline the state role in the approval and regulatory processes regarding water projects. The

Colorado Water Plan should place an emphasis on expediting permitting processes for projects that stress conservation, innovation, collaboration, and other criteria as determined by the CWCB. Efficient infrastructure promoting smart land use, healthy watersheds that support Colorado's rivers and streams, and smart water conservation practices that utilize demand-management are examples of criteria to be considered.

E. In drafting the Colorado Water Plan, the CWCB is directed to utilize the Interbasin Compact Committee and the Basin Roundtables. The CWCB is also directed to review and build upon discussions and points of consensus that have emerged as part of the Interbasin Compact Committee and Basin Roundtable processes so as to capitalize on the momentum generated by these grassroots efforts.

F. When drafting the Colorado Water Plan, the CWCB is directed to work with its sister agencies within the Colorado Department of Natural Resources as well as the Colorado Department of Public Health and Environment, the Colorado Water Resources and Power Development Authority, the Colorado Department of Agriculture, the Colorado Energy Office, and other relevant state agencies as needed. Each of these agencies is directed to cooperate with the CWCB as needed on the Colorado Water Plan.

G. The CWCB is directed to assemble ad-hoc panels of Coloradans and inter-agency water working groups to develop recommendations regarding specific topics as it deems necessary.

H. The Colorado Water Plan will reaffirm the Colorado Constitution's recognition of priority of appropriation while offering recommendations to the Governor for legislation that will improve coordination, streamline processes, and align state efforts.

IV. Duration

This Executive Order shall remain in full force and effect until modified or rescinded by future Executive Order of the Governor.

GIVEN under my hand and the Executive Seal of the State of Colorado this fourteenth day of May, 2013.

John W. Hickenlooper
Governor

Colorado River, Inc.:

The $26 Billion Recreation Resource Employing a Quarter Million Americans

Please visit www.ProtectFlows.com to view our full technical report.

protect the flows $$$

The Business of the Colorado River

If the Colorado River were a company, **it would rank #155 in the 2011 Fortune 500** ahead of companies like General Mills, USAirways, and Progressive Insurance, and be the **19th largest employer** on the Fortune 500.

Economic Impact of Recreation Along the Colorado River

- 5.36 million adults use the Colorado River for recreational activities each year
- Supports **234,000 jobs** across Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming
- Produces **$26 billion** in economic output[i]
- Generates $17.0 billion in retail sales[ii]
- Out performs regional farming revenues by 14.6% on average
- Contributes $3.2 billion in federal, state, and local tax revenue annually
- State and local tax revenues are enough to fund over 29,000 teacher positions
- Creates $10.4 billion in annual earnings, salaries, and wages

The Bottom Line: When Supply & Demand Don't Add Up

You can't run a business without watching your bottom line. The river works the same way. Right now:

- Stored water on the river has dropped 35% in the last 12 years[iii]
- Demand now far outweighs the river's supply[iv]
- The river now dries up in the Sonoran Desert, miles before it reaches the sea

---

[i]To estimate the economic impacts, the data were analyzed with the IMPLAN input-output model. Input-output models describe how sales in one industry impact other industries. For example, once a consumer makes a purchase, the retailer buys more merchandise from wholesalers, who buy more from manufacturers, who, in turn, purchase new inputs and supplies. In addition, the salaries and wages paid by these businesses stimulate more benefits. Simply, the first purchase creates numerous additional rounds of purchasing. Input-output analysis tracks how the various rounds of purchasing benefit other industries and generates economic benefits.

The relationships between industries are explained through multipliers. For example, an income multiplier of 1.29 for industry X would indicate that for every dollar of income generated by the industry under study, $0.29 would be paid to the employees of industries impacted by the indirect and induced effects. The IMPLAN model provides multipliers for all major industries in the U.S. and for each state. The IMPLAN model includes output, earnings and employment multipliers. The output multiplier measures the total economic effect created by the original retail sale. The earnings multiplier measures the total salaries and wages generated by the original retail sale. The employment multiplier estimates the number of jobs supported by the original retail sale. IMPLAN also estimates federal, state and local tax revenues.

To apply the IMPLAN model, recreational expenditures were matched to the appropriate industry sector. The resulting estimates describe the salaries and wages, total economic effects, and jobs supported by the purchases made by Colorado River recreational users. This same process is repeated for all reported expenditures for all activities, and then summed to arrive at state and regional totals.

[ii]Sales include not just recreational equipment, but also include travel expenses (restaurants, lodging, fuel and transportation, etc.), apparel, maintenance and repair of equipment, and more.

[iii]U.S. Department of the Interior, Bureau of Reclamation. 2012. Colorado River Basin Water Supply and Demand Study

[iv]Bureau of Reclamation. 2011. Colorado River Basin Water Supply and Demand Study, Interim Report No. 1.

What's At Stake

If we stay on our current course, the Colorado River will slow to a trickle. Fish won't be beckoning anglers to book a weekend trip. Rafters won't show up to brave the rapids. Hikers and scenery seekers will go elsewhere. Local communities will become a less attractive place to live. State and the federal economies will suffer.

Without water flowing in the Colorado River and its tributaries to attract recreation and tourism:

- Basin state unemployment rates would increase by **an average of 3%**
- State treasuries would risk losing **$614 million** in taxes
- Federal government would risk losing **over half a billion dollars** in tax revenue
- The six state area's economy would shrink by **$25.67 billion**—equivalent to the entire economy in Wyoming

Colorado

Colorado provides the largest share of the river's recreational activity, with over one million adults (or 45% of its adult population) using the Colorado River or its tributaries for recreation. It also stands to benefit the most. Its tributaries include the Green, Little Snake, Blue, Gunnison, Uncompahgre, Yampa, White, Delores, San Miguel, and San Juan, plus any of the creeks and other tributaries that flow into these rivers.

Colorado's River Economy

- The number of adults who use the Colorado River and its tributaries for recreation is 2.2 times greater than the population of the Denver metropolitan area.
- Employs 79,585 Coloradans; that's equivalent to Fed Ex and outranks DISH Network, a major Colorado employer with 22,000 employees.
- Retail sales in Colorado on recreation activity associated with the Colorado River is greater than the value of the state's annual agricultural production.
- If people stopped using the Colorado River and its tributaries for recreation, and did not spend their dollars elsewhere in the state, Colorado's unemployment rates would increase by approximately 3.5%.

Economic Gains of River-Related Recreation

Arizona

Direct Spending	$3,794,644,820
Total Output	$5,962,031,159
Labor Income	$2,456,958,038
Employment	53,508 jobs
Fed., State, Local Taxes	$763,857,410

Colorado

Direct Spending	$6,364,292,781
Total Output	$9,577,271,371
Labor Income	$4,046,382,438
Employment	79,585 jobs
Fed., State, Local Taxes	$1,188,371,868

Nevada

Direct Spending	$1,996,169,031
Total Output	$2,888,735,494
Labor Income	$1,178,298,209
Employment	25,329 jobs
Fed., State, Local Taxes	$358,613,631

New Mexico

Direct Spending	$1,206,132,350
Total Output	$1,684,428,434
Labor Income	$666,992,155
Employment	17,129 jobs
Fed., State, Local Taxes	$191,158,581

Utah

Direct Spending	$2,089,492,177
Total Output	$3,351,775,769
Labor Income	$1,347,511,505
Employment	34,100 jobs
Fed., State, Local Taxes	$428,485,240

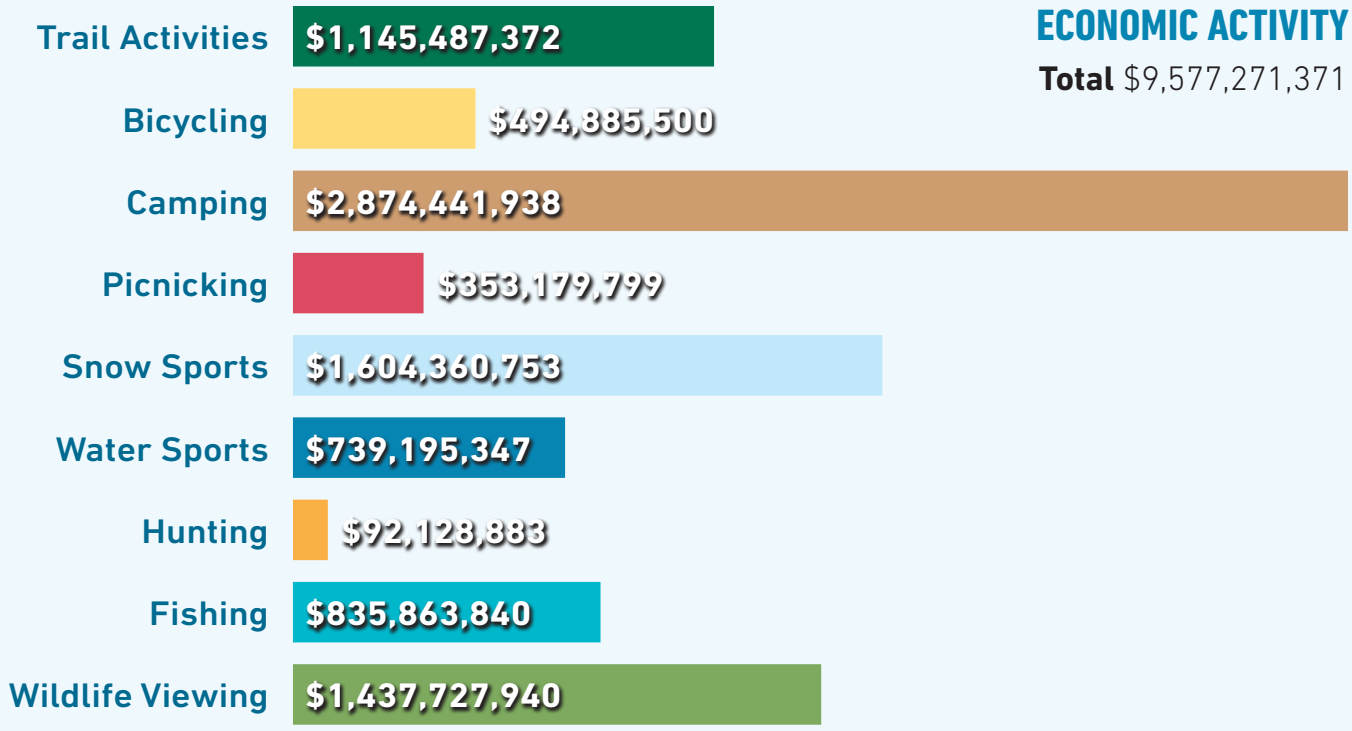
Wyoming

Direct Spending	$1,587,748,500
Total Output	$2,208,194,838
Labor Income	$741,102,520
Employment	24,681 jobs
Fed., State, Local Taxes	$302,732,874

REGIONAL TOTALS

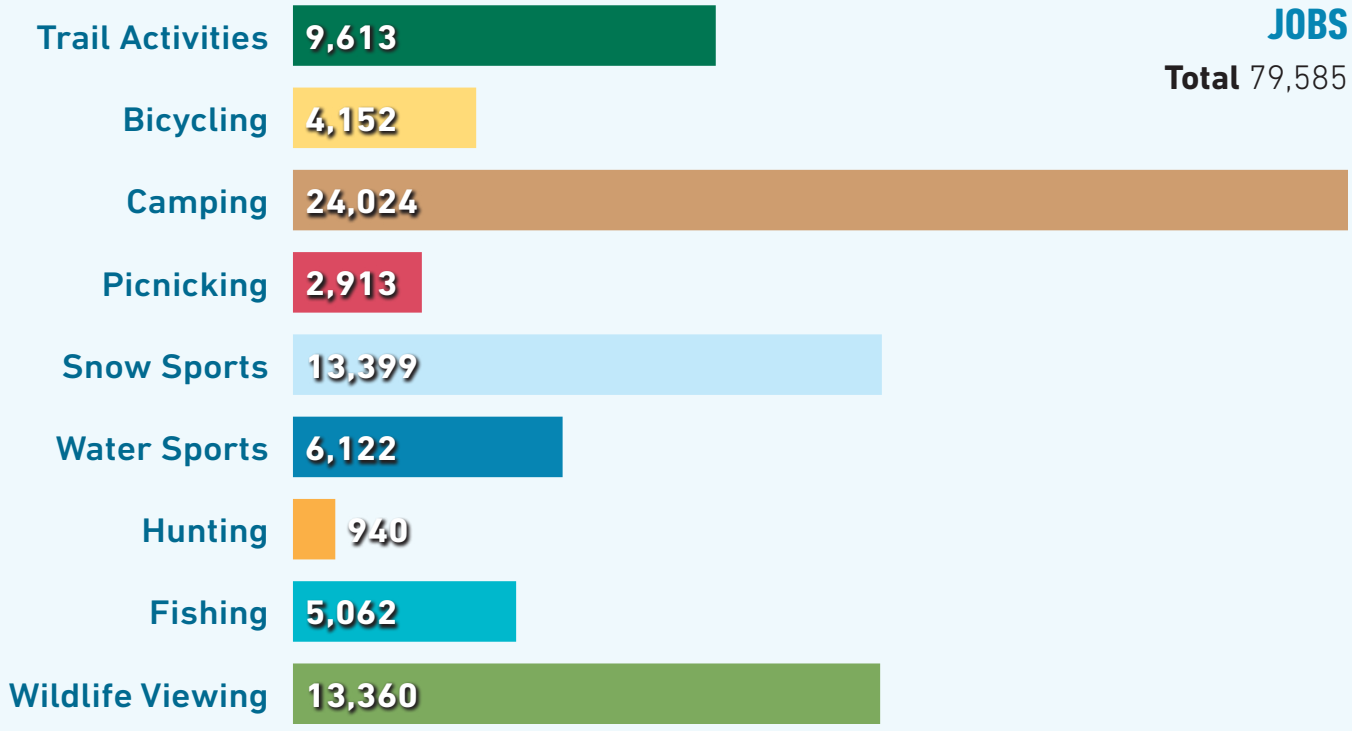
Direct Spending	**$17,038,479,659**
Total Output	**$25,672,437,065**
Labor Income	**$10,437,244,865**
Employment	**234,332 jobs**
Fed., State, Local Taxes	**$3,233,219,604**

Colorado Economic Gains of River-Related Recreation by Activity



ECONOMIC ACTIVITY

Total $9,577,271,371



JOBS

Total 79,585

Methodology

Southwick Associates, Inc. conducted a telephone survey from among randomly selected, English-speaking adults, 18 years and older, residing in Arizona, Colorado, Utah, New Mexico, Nevada, and Wyoming in January and February 2012. 1,050 participants were considered "qualified respondents," meaning they had participated in at least one of the outdoor activities within the past year. 175 respondents from Colorado completed the survey. The data reflects 2011 activity.

The economic study covered recreational activity on the Colorado River and all its tributaries in the six states that represent the Colorado River system's primary region: Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. California also has part of the river basin within its extreme southern section, but based on the limited population in this area and the expected low economic contributions from Colorado River-based recreation to the State's economy, California was not included in this study. To any degree economic impacts are generated by the Colorado River within California, the results in this report are understated.

Similarly, out of state tourism is not a part of the estimates. The results reflect only residents' in-state travel. While many are still tourists, they are not out-of-state residents. Considering the tourists who head west every year for vacation, it is important to note that the study findings are much more conservative with the exclusion of out-of-state tourism.

Southwick Associates, Inc. The economic analysis was conducted by Southwick Associates, Inc., which specializes in quantifying the economics of fish, wildlife, and outdoor-related activities for government agencies and industry. www.southwickassociates.com

Protect the Flows is a coalition of more than 400 businesses from the seven Colorado River basin states of Colorado, New Mexico, Arizona, Nevada, Wyoming, California, and Utah who directly depend on the river for their livelihood. www.ProtectFlows.com

coloradowaterplan.com
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5. Water demands

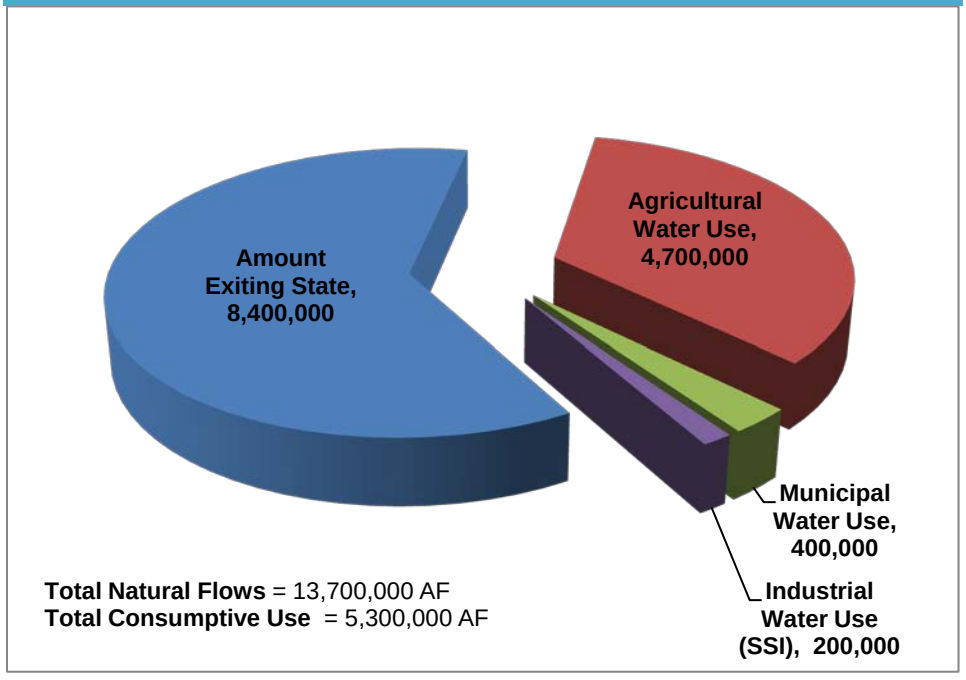
This chapter provides an overview of Colorado's current and projected municipal, industrial, agricultural, environmental, and recreational uses. Colorado's Water Plan identifies our water resource challenges. To assess the road ahead, it is essential to understand the many ways that water is used throughout the state and how these uses are connected. As municipal and industrial (M&I) needs expand, pressure on agriculture, the environment, and water-based recreation rises. As the state grows, associated municipal supply needs will likely increase, more people will seek the outdoor opportunities that Colorado offers, and Coloradans will continue to increase their consumption of a variety of locally grown agricultural products provided by ranches and farms across the state.

Overview

Water use in Colorado is calculated in acre-feet, which is the amount of water that it takes to cover one acre to a depth of one foot. An acre is about the size of a football field, including both end zones.

Water in Colorado is often used multiple times, as this sequence demonstrates: 1) water is diverted for a given use, 2) the plant, person, or process consumes a portion of the water, 3) the portion of water that is not consumed makes its way back to the river (referred to as "return flows"), 4) the return flows are subsequently used by other water users downstream, and the cycle repeats. On average, Colorado consumes 5.3 million acre-feet, but this water can be used multiple times as described in the sequence of 1-4 above, with total diversions equivalent to 15.3 million acre-feet.

Figure 5-1: Statewide consumptive water use[1]



The total water that originates within Colorado is on average 13.7 million acre-feet. Over 60 percent of this water exits the state to be used by downstream users. The 5.3 million acre-feet consumed in Colorado totals less than 40 percent of all of waters originating within the state.[2] Of the water consumed, 89 percent is for agricultural use, followed by municipalities at 7 percent and large industries at 4 percent (Figure 5-1). [3]

In addition to meeting the requirements of communities and food production, water is necessary to support aquatic and riparian dependent species, boating, fishing, camping, and other water-based recreational activities.

Overview of M&I needs

To determine the amount of water needed by a municipality, factors such as population, jobs, economic trends and recreational use are used. Colorado's population growth is tied to economic growth. In 2012, water dependent sectors, including agriculture, mining, and utilities contributed nearly $17 billion dollars to Colorado's gross domestic product (GDP) (total state GDP in 2013 was over $273 billion) and represented over 58,000 jobs and $4.7 billion in annual wages.[4] These sectors, coupled with numerous others, contribute to a vibrant economy which leads to more jobs, and to more people moving to and residing in Colorado.[5] This growth, in part, drives M&I water demands.

Municipal needs

Water needs for municipalities are determined by multiplying per person water use by the number of new people expected to live in a municipality, then subtracting water conservation demand reductions, and finally adding any expected increases due to higher temperatures or commercial activities.[a]

Looking ahead to 2050, the future population within Colorado is difficult to accurately predict. For that reason low, medium, and high population estimates were developed. However, even under slow economic growth conditions, most communities throughout the state are projected to grow.[6] Current indications show that Colorado has one of the fastest growing state economies nationwide, even receiving the top ranking in some analyses.[7] Under the high growth scenario, the state's population could nearly double by 2050, with some communities growing moderately while others are expected to triple in size.[8] Such growth will mean additional revenue for education and services and less unemployment, but it will also increase water demands. The total change in water demands will also be effected by further increases due to climate changes and decreases from water conservation actions (see Section 6.3).

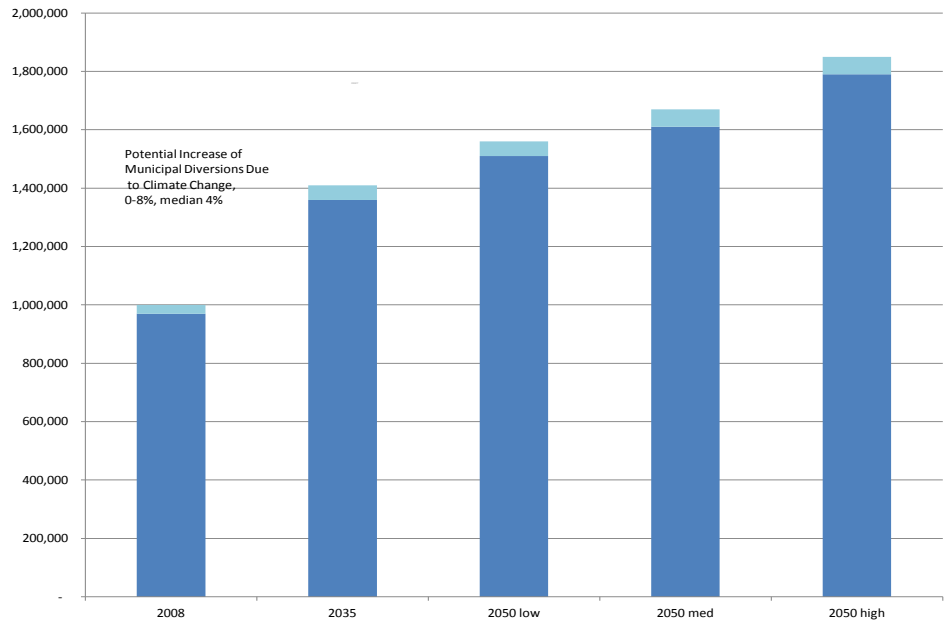
[a] For the purposes of CWCB's technical work, conservation savings were divided into two categories. The first is passive conservation, which was used to reduce demand projections. Passive conservation results from the replacement of old indoor fixtures and appliances with newer, more efficient ones. Active conservation, which takes a concerted effort on the part of water providers and/or property owners, is treated as a method to address the water supply gap. It is incorporated into section 6.3 so that a conscious effort can be made to reduce demands through active conservation.

Colorado's growing economy leads to population growth in two primary ways. First, Coloradans are having children who attend college in the state and are able to remain as working adults who start their own families. With the birth rate exceeding the death rate, roughly half of the state's growth comes from residents born in Colorado.[9] Second, Colorado is a desirable place to live. A diverse and healthy economy, combined with vibrant communities, natural beauty, and a high quality of life draw people and businesses to the State and keep them here.[10]

To continue to employ current and future citizens, Colorado needs to maintain a healthy economy. Furthermore, Colorado does not have the work force needed to keep pace with growth in various employment sectors. For instance, with a growing elderly population, more people will need medical care. To serve this population, the state of Colorado will need additional health workers, some of whom must come from out of state.[11]

Population growth for the state is inevitable, but Colorado state and local governments can influence how and where the population grows, and how much water is needed to support such growth. These strategies are further discussed in Section 6.3. Climate change could also increase municipal needs as outdoor landscapes adapt to longer growing seasons, higher temperatures, and higher rates of evapotranspiration. The effects of climate change on total annual municipal diversions are expected to range from no effect to an increase of much as 8 percent (Figure 5-2).[12] If Colorado experiences a future where population rises while the climate becomes hotter and dryer (a scenario known as hot growth)[b] more than a million acre-feet per year may be needed by 2050 beyond the 2008 demand levels.[13] However, if Colorado experiences weak population growth, matched with historical temperature conditions, the additional annual demand beyond 2008 levels is approximately 600,000 acre-feet.[14]

Figure 5-2: Projected M&I water demands (acre-feet) with range of climate change increases



[b] This scenario is also known as the "hot growth" scenario in IBCC scenario planning work, which has hot and dry climate matched with high population growth.

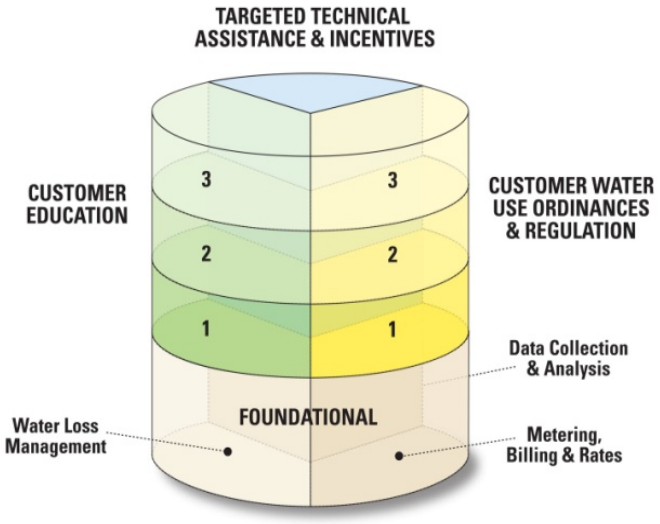
The degree to which climate change could impact municipal demands varies considerably across the state because of differences in the amount of outdoor irrigation, potential temperature increases, and potential changes in precipitation patterns throughout the state.[15] Increases in demand from climate change do not take into account potential hydrological changes, which could further decrease municipal supply and exacerbate future municipal needs as discussed in Chapter 4.

While climate change has the potential to intensify municipal needs, water conservation, reuse, and land use planning have the potential to attenuate them. As described in Section 6.1, no matter what future Colorado faces, a significant amount of conserved water will be needed to ensure that we have enough water to meet Colorado's future needs.

State of knowledge on water conservation

In 2010, the Colorado Water Conservation Board (CWCB) funded a first *Best Practices Guidebook for Municipal Water Conservation in Colorado.* Colorado WaterWise created the best practices guidebook with a large technical and stakeholder group and established fourteen best practices that outline the potential benefits and costs for active water conservation measures, indoor and outdoor, residential and non-residential practices. The guidebook provides a menu of options that can be selected to add to water providers' water conservation programs. The best practices require financial and human resources to accomplish and implementation varies greatly among water providers.[16]

Figure 5-3: SWSI levels analysis framework



The CWCB created the levels analysis framework prioritizing the best practices a local water provider may undertake to achieve its goals. The levels analysis focuses on foundational practices first and then proceeds in varying degrees of difficulty organized by technical assistance and incentives, regulations, and education (Figure 5-3). This analysis will help water providers focus both human and financial resources on the most cost efficient activities (most acre-feet saved/resources expended) first and then later expand to attain the more difficult activities.[17]

Using the best practices as a basis, the Statewide Water Supply Initiative (SWSI) 2010 estimated low, medium and high strategies for active water conservation savings. Active water conservation is water conservation that occurs because of the enactment of programs at the local level where financial and human resources are committed to carrying out water efficiency programming. Depending on the level of savings, a varying amount of effort is required to achieve penetration

rates consistent with the savings estimates. The SWSI 2010 M&I Water Conservation Strategies report states:

"If water conservation is to be part of Colorado's future water supply portfolio, it must be supported and funded like other supply initiatives. To obtain the savings forecast in this report, the strategies described must be rigorously implemented at the state, regional, local, and customer level. Water is saved by municipal customers, but customers can be aided in the effort. State polices that promote conservation-oriented rates, water loss control measures, water efficient landscape and building standards, improved plumbing codes, and education and outreach set the stage for regional and local conservation program measures that target high demand customers and ensure new customers join the water system at a high level of efficiency."

The total potential savings in SWSI 2010 range from 160,000 to 461,000 acre-feet statewide in 2050 (Table 5-1).[18]

Table 5-1: Potential water savings for 2030 and 2050 in SWSI 2010

Project	Level	2030 Forecast Savings* (AFY)	2050 Forecast Savings* (AFY)
SWSI 2010	Passive***	131,000	154,000
	Low (active only)	78,000	160,200
	Medium (active only)	133,000	331,200
	High (active only)	197,100	461,300

Even at the highest level of conservation savings, there is still considerable flexibility for individual water utilities. For instance, under high conservation savings, 50 to 80 percent of utilities statewide will need to implement targeted audits for customers that use high amounts of water on their landscapes (Table 5-2). While this practice may not make sense for every provider, it may for the majority of providers. By following best practices, water providers can get results while implementing the audits in a way that makes the most sense for the utility. Furthermore, high conservation levels still allow for attractive landscapes that include grass, parks, and trees and therefore maintain property values and continue to help reduce increased urban temperatures. Efforts to address outdoor water conservation need to balance the vital importance of urban landscape and its benefits, including improved air quality, surface water and groundwater quality, increased property values, aesthetics, and general quality of life.

Table 5-2: Comparison of 2050 implementation and penetration level for 3 conservation strategies and demand reductions used in forecasts			
Measure	**Implementation or Penetration Level by 2050**		
	Low Strategy	**Medium Strategy**	**High Strategy**
System-wide conservation measures with potential to impact all customers			
Public information and education	~100%	~100%	~100%
Integrated resources planning	~100%	~100%	~100%
Conservation-oriented water rates	~100%	~100%	~100%
Water budget-based water rates	<=10% of utilities implement	<=30% of utilities implement	<=50% of utilities implement
Conservation-oriented tap fees	0 - 5% of utilities implement	5 - 10% of utilities implement	<= 50% of utilities implement
Smart metering with leak detection	<=10% of pop.	<=50% of pop.	50 - 100% of pop.
Residential indoor savings and measures			
Reduction in Residential Per Capita Indoor Use	**Res. Indoor gpcd = 40**	**Res. Indoor gpcd = 35**	**Res. Indoor gpcd = 30**
Conservation-oriented plumbing and building codes, green building, rules for new residential construction	30-50% of state impacted	50-70% of state impacted	70-100% of state impacted
High efficiency toilets, clothes washers, faucets, and CII equipment	Passive ~100%	Passive ~100%	Passive ~100%
Submetering of new multi-family housing	0%	~50%	~100%
Reduction in customer side leakage	33% savings -passive from toilet replacement	37% savings -passive from toilet replacement and active repairs	43% savings -passive from toilet replacement and active repairs
Non-Residential indoor savings and measures			
Reduction in Non-Residential Per Capita Indoor Use	**15% reduction**	**25% reduction**	**30% reduction**
High efficiency toilets, urinals, clothes washers, faucets, and showers	Passive ~100%	Passive ~100%	Passive ~100%
Conservation-oriented plumbing and building codes, green building, rules for new non-residential construction	30-50% of state impacted	50-70% of state impacted	70-100% of state impacted

Table 5-2: Comparison of 2050 implementation and penetration level for 3 conservation strategies and demand reductions used in forecasts

Measure	Implementation or Penetration Level by 2050		
	Low Strategy	**Medium Strategy**	**High Strategy**
Specialized non-residential surveys, audits, and equipment efficiency improvements	0-10% of utilities implement	10-50% of utilities implement	50-80% of utilities implement
**Landscape conservation savings and measures*			
Landscape water use reductions (residential and non-residential)	**15% reduction**	**22-25% reduction**	**27-35% reduction**
Targeted audits for high demand landscape customers	0-30% of utilities implement	30-50% of utilities implement	50-80% of utilities implement
Landscape transformation of some high water requirement turf to low water requirement plantings	<=20% of landscapes	20-40% of landscapes	>50% of landscapes
Irrigation efficiency improvements	<=10% of landscapes	<=50% of landscapes	50 - 100% of landscapes
Utility Water Loss Control			
Improved utility water loss control measures	**<=7% real losses**	**<=6% real losses**	**<=6% real losses**
*Landscape water demand reductions include the anticipated impact of urban densification.			

Not all conservation savings can or should be applied to meet future growth. Not every municipality that conserves water will need all of it to meet future growth, and legal barriers restrict water providers from sharing conserved water. Most entities do not have the infrastructure to either share water or re-time conserved water so that it can be used when needed. Additionally, some entities may choose to use conserved water as part of their strategic drought reserve. Initial estimates by the roundtables indicate that between fifty and sixty percent of conserved water could be used to meet future growth. Through the stakeholder engagement process described Section 6.3, it was determined that approximately 170,000 acre-feet was the plausible amount that could be applied to meet future needs, no matter what type of future Colorado may face.[19] During the latest IBCC discussions, it was determined that Colorado should strive for a high conservation standard that recognizes that each water utility has unique opportunities and capacity for conservation. The IBCC is working to further define what this high conservation standard means. [20]

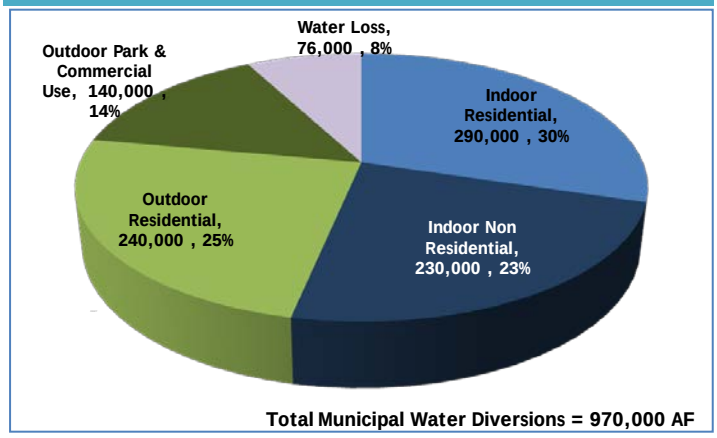
In addition to this amount, another 150,000 acre-feet of savings will likely accrue by 2050 because of natural replacement rates of fixtures and appliances.[21] These passive water conservation savings occur when home and property owners replace their indoor water fixtures and appliances. Their choices save water as a result of large-scale regulatory or legislative initiatives such as the Energy

Policy Act of 1992 (1992 EPACT). Passive water conservation can be considered a baseline of water savings that will occur naturally and thus is included in demand projections. As customers replace their toilets, dishwashers, clothes washers, showers and the like, many will choose WaterSense or EnergyStar labeled fixtures and appliances, which use less water. Colorado may experience these savings sooner than expected because of the recent legislation, such as Senate Bill 14-103, as described further in Section 6.3.

Looking forward, additional technical work is needed to better inform the statewide discussion. The SWSI 2010 technical analysis should be updated to take into account the length and severity of the recent economic recession.

Population projections from the Department of Local Affairs indicate that even with the recent economic recession, Colorado's population is projected to reach between 8.3 and 9.2 million people by 2050, compared to the current population of 5.2 million.[23] The CWCB is in the process of applying new water use data to future population projections for low, medium, and high scenarios. This data will result in updated water demand projections, and will be available by early 2015.

Figure 5-4: Statewide municipal use patterns[22]



Colorado's current municipal diversions total approximately 970,000 acre-feet annually.[24] This use is split between indoor use, outdoor use, and water loss in distribution systems. These numbers can be further divided between residential, parks, and commercial uses. Statewide, Colorado uses 53 percent indoors, 39 percent outdoors, and 8 percent due to water loss (Figure 5-4).[c]

Municipal reuse

According to SWSI 2010, the reuse of existing supplies has been projected to provide 43,000 to 61,000 acre-feet of water per year, which accounts for about 10 percent of the total Identified Projects and Processes (IPP) projected yield.[25] The full use of reusable water supplies will play an integral role in closing the supply gap by extending the resource through efficient reuse of water.

Colorado water law defines which water supplies can be reused and the extent to which each source can be reused. With limited exceptions, the following sources can legally be reused in Colorado:

[c] Water loss is defined as the difference between system input volume and authorized consumption, consisting of apparent plus real losses.

- **Nonnative water:** In most cases, water imported into a basin through a transbasin diversion can be reused to extinction. Transbasin diversions account for a substantial quantity of the total reusable supply in Colorado.
- **Agricultural-Municipal Water Transfers:** Agricultural transfers are generally available for reuse; however, reuse is limited to the historic consumptive use of the original agricultural water right decree. This includes water from traditional purchase of agricultural water rights and alternative transfer methods.
- **Nontributary groundwater:** Reuse of nontributary groundwater is allowed.
- **Other Diverted Water:** Any water right with a decreed reuse right may be reused to the extent described in the decree.

These sources can be reused directly, by piping the recycled water from the water reclamation facility to beneficial uses such as nonpotable irrigation sites or industrial uses, or indirectly, by augmenting a surface water or groundwater body with recycled water and diverting an equal amount of flow from a different point of diversion.[26]

The use of reclaimed domestic wastewater is subject to Regulation 84, which was developed by the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission (WQCC). This regulation currently authorizes the use of reclaimed water for landscape beneficial uses such as nonpotable irrigation (including single-family residential irrigation) and various commercial and industrial uses such as cooling tower use, dust control, soil compaction, mechanized street cleaning, fire protection, and zoo operations.[27]

Municipal land use

Higher density development saves water compared to traditional developments and has other benefits, such as more efficient infrastructure. The 2009 California Water Plan Update showed that a 20 percent increase in density could yield a 10 percent water savings.[28] Denser development can also enhance other elements that help define a community, such as transportation, open space, neighborhood design, and walkability. Landscape and irrigation best practices may offer more benefits within a denser land use environment than within a traditional less-dense environment. Urban parks and landscapes will not disappear with denser urban development, because healthy urban landscapes enhance the livability of a city or town and are a crucial asset for urban populations.

Large industry

The types of large industries located in Colorado include breweries, snowmaking, energy and mining extraction, power generation, food processing, and a multitude of other industries. Collectively, these industries currently require approximately 200,000 acre-feet of water annually. Projections indicate that future large industry needs could increase by 50,000 to 130,000 acre-feet per year by 2050.[29]

Additional analyses of industrial needs regarding the use associated with energy and extraction will be incorporated into future water planning efforts. Through statewide and basin-wide planning efforts, existing data will be confirmed and future uses updated. For instance, the Colorado and Yampa/White/Green basin roundtables conducted an Energy Development Water Needs

Assessment Update and have asked the CWCB to incorporate this work into future statewide planning efforts.[30]

Summary

Demand management strategies such as water conservation, reuse, and land use will play a central role in reducing future demands. As seen in this section, much work has been accomplished by Colorado water providers in the areas of demand management and alternative supplies. Additionally, innovative work is occurring across the United States and points to trends that Colorado may wish to follow. Next steps and future actions will be described in Section 6.3.

Overview of agricultural needs

Statewide, agriculture diverts 34 percent of the total amount of water originating within Colorado, which is 89 percent of the total amount of water consumed. Current agricultural consumptive use is estimated at approximately 4.7 million acre-feet on an average annual basis.[31] However, taking into account crop irrigation requirements, current agricultural crops could use an additional 2 million acre-feet if a plentiful supply existed.[32] It is important to note, however, that some water shortages are because of management decisions in addition to physically or legally limited water supplies. It is not expected that every agricultural shortage can or should be met in the future.

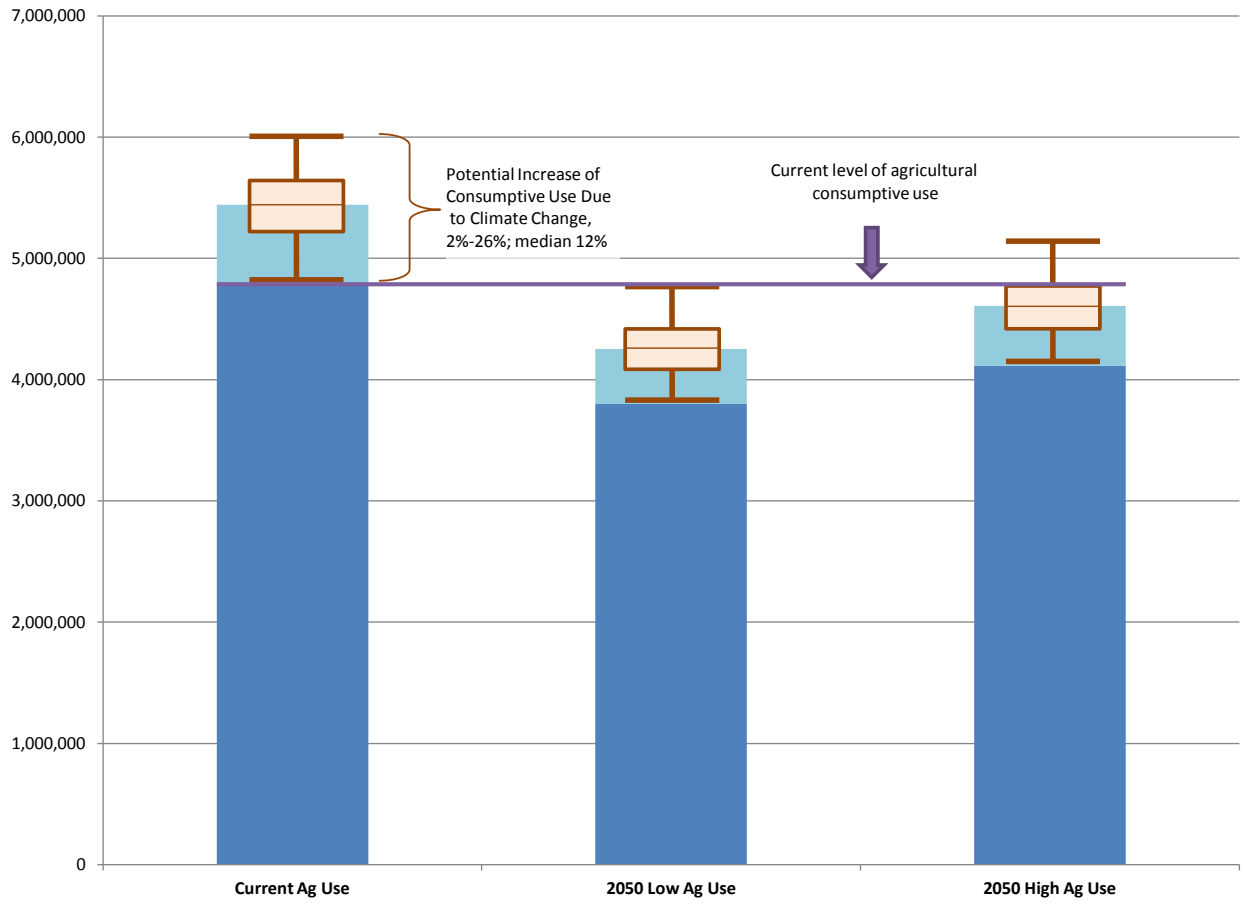
Statewide irrigated acreage is expected to decline for a variety of reasons:

- Many municipalities turn to agricultural water rights as an affordable, reliable source of water and purchase them from willing sellers.
- Urban areas expand onto irrigated farmlands, thus urbanizing those agricultural lands.
- Due to aquifer sustainability and some compact-related issues, the South Platte, Republican, and Rio Grande Basins have reduced, or are in the process of reducing, irrigated acreage. [33]

Irrigated acres could decrease from 3.5 million irrigated acres to 2.7 million acres statewide.[34] The potential effect is most pronounced in the South Platte basin, where as much as 35 percent of the irrigated acres in the basin could be taken out of production.[35]

In addition to potential decreases in irrigated acres, agricultural producers could be further affected by climate change. Depending on location, higher temperatures in the future could increase water consumption by 2 to 26 percent on the lands still in production (Figure 5-5). [36] More frequent or severe droughts could also impact agricultural production and slow economic agricultural activity. During the 2012 drought the state experienced a loss of agricultural revenues of $409 million and an additional loss of $317 million in secondary spending in local communities.[37]

Figure 5-5: Projected agricultural water demands (acre-feet) with range of climate change increases



As part of the Basin Implementation Plans (BIPs), the basin roundtables have examined future agricultural water needs. Six basins expect decreases in irrigated acres, while two basins expect increases. All of the basin roundtables aim to reduce expected shortages, and in a few cases meet additional expected agricultural needs. Section 6.5 further explores projects and methods to achieve these goals. Below is a brief summary of agricultural needs, as identified in the BIPs.

Table 5-3: Summary of agricultural goals indicated in the BIPs

Basin	Identified Agricultural Goals
Arkansas	Increase amount of agricultural augmentation water by 30,000-50,000 acre-feet
Colorado	Reduce agricultural shortages
Gunnison	Reduce agricultural shortages by approximately 17,000 acre-feet
Metro/South Platte	Reduce agricultural shortages
North Platte	Add an additional 28,000 acres of irrigated farmland; continue to restore, maintain, and modernize critical water infrastructure to preserve current uses and increase efficiencies
Rio Grande	Manage water use to sustain optimal agricultural economy throughout the Basin's communities
Southwest	Reduce agricultural shortages by implementing at least 10 projects
Yampa/White/Green	Add an additional 14,000 acres of irrigated farmland; reduce agricultural shortages

Overview of environmental and recreational needs

Environmental and recreational attributes are not solely based on the amount of water needed. Water supply, aquatic and riparian habitat, water quality, bank stability, stream access, and habitat connectivity are all critical.

Additionally, many recreational activities are not river-based. Outdoor recreational activities such as golf, hiking, biking, and team sports such as baseball or football require a certain amount of water use to maintain the grassy areas these activities involve. The irrigation of sports fields, golf courses, and grassy open spaces are primarily served by a municipal water provider. Snow skiing and the surrounding tourism industry are major economic drivers in the state, and the water supply for snowmaking is primarily classified as self-supplied industrial, with resort operators owning the associated water rights and infrastructure. Maintaining flows in rivers also can result in economic value through healthier habitats for wildlife and wildlife viewing and real estate.

Therefore, river-based environmental and recreational needs are often represented in number of stream miles or acres of wetland, featuring important attributes which need protection. A collaborative effort between the CWCB and the basin roundtables, as part of SWSI 2010, identified 13,500 perennial stream miles in Colorado that have important attributes and were selected as "focus areas."[38] Figure 5-6 shows the important areas identified by the basin roundtables.

The focus area information can be further broken down by attribute. For instance:

- 2,260 perennial stream miles of Colorado River and greenback cutthroat trout habitat were identified in focus areas across the state.
- 3,164 perennial stream miles of warm-water fish habitat were identified in focus areas. These reaches include endangered, threatened, or imperiled fish species.
- 7,642 perennial stream miles of significant riparian areas and wetlands were identified. These include occurrences of exemplary plant communities as well as rare plant communities.

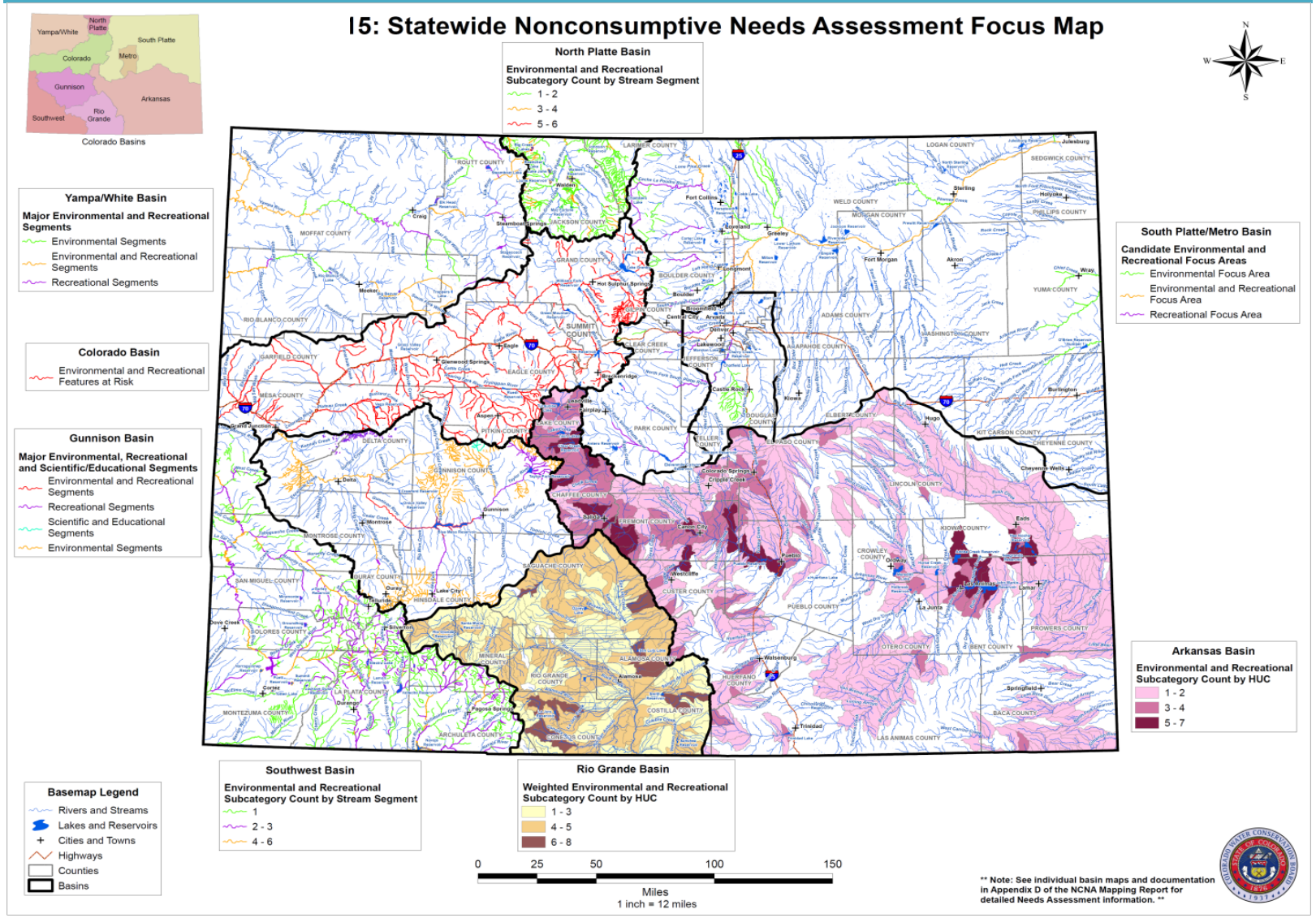
The number of water rights appropriated for instream flows, natural lake levels, and recreational in-channel diversions demonstrate the existing needs for the environment and recreation:

- In stream flow: 9,180 stream miles for 1,595 decreed water rights
- Natural lake levels: 126,000 acre-feet for 476 decreed water rights
- Recreational in-channel diversions: 20 decreed water rights, ranging in size from 5 to 1,800 cubic feet per second

It is critical to note that water is not consumed by environmental or recreational uses, but rather held in streams and designated for those uses. This water is often reused multiple times downstream by agricultural, municipal, or industrial water users.

The ability to decree water using instream flows and recreational in-channel diversions provides Colorado with important, effective tools for meeting environmental and recreational needs and for supporting state and federal values.

Figure 5-6: Statewide Environmental and Recreational Needs[39]

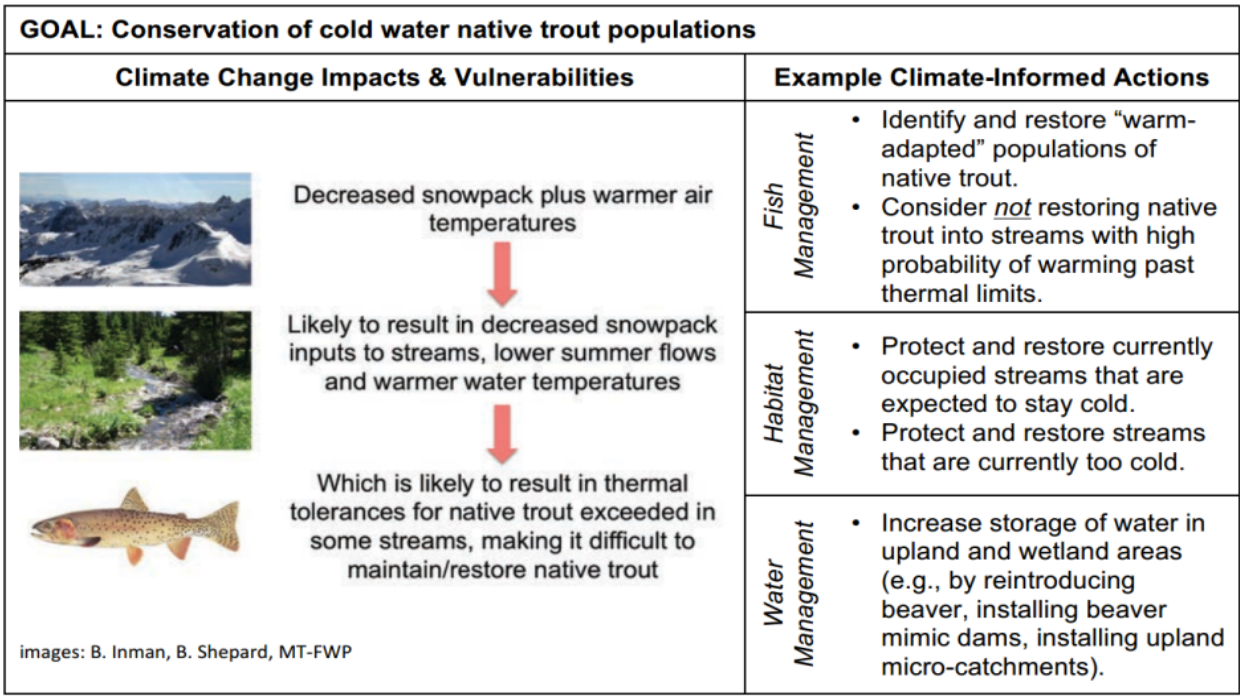


Climate change could impact environmental and recreational needs. If temperatures continue to increase, the range of suitable habitat for cold water fish species is expected to diminish (Figure 5-7). Rising temperatures could also adversely affect plant communities.[40] Reduced water supplies, because of increased evapotranspiration, could also be a factor in maintaining the range of cold water species because of the lower capacity of reduced flows to dissipate heat.[41]

In addition to the previously mentioned state tools, various projects and methods, such as flow maintenance agreements and habitat restoration, help meet environmental and recreational needs. As Figure 5-7 indicates, mitigation measures for cold water habitats as well as environmental, agricultural and municipal partnerships will be critical to meet the future needs of cold water fish species. Several examples of multi-purpose projects are listed in Sections 6.6 and 9.2, and a few multi-purpose projects that meet multiple needs are listed below:

- Upper Arkansas Voluntary Flow Management Program
- Alternative Wild and Scenic Processes (e.g., the Upper Colorado, Lower Colorado, and Dolores River)
- Colorado River Cooperative Agreement
- Elkhead Reservoir Enlargement
- Rio Blanco River Restoration

Figure 5-7: Illustrative climate-informed actions in response to climate change impacts on the availability of suitable habitat for cold water native trout[42]



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COLORADO WATER CONSERVATION BOARD 1313 Sherman Street, Suite 718 Denver, CO 80203 (720) 530-0837	
CONCERNING THE APPLICATION FOR WATER RIGHTS OF: CITY OF GLENWOOD SPRINGS, in Garfield County, Colorado	
***Attorneys for Colorado River Water Conservation District*:** Name: Peter C. Fleming, #20805 Jason V. Turner, #35665 Address: P.O. Box 1120 Glenwood Springs, CO 81602 Phone #: (970) 945-8522 Fax #: (970) 945-8799 E-mail: pfleming@crwcd.org jturner@crwcd.org	▲ COURT USE ONLY ▲ Case No.: 13CW3109 Div.: Ctrm.:

PARTY STATEMENT OF THE
COLORADO RIVER WATER CONSERVATION DISTRICT

The Colorado River Water Conservation District and the Colorado River Water Conservation District acting by and through its Colorado River Water Projects Enterprise ("River District") respectfully requests that the Colorado Water Conservation Board consider the following comments in deliberation on the recreational in-channel diversion ("RICD") proposed by the City of Glenwood Springs.

I. Introduction.

The River District is a political subdivision of the State formed by the Colorado Legislature (*See* C.R.S. § 37-46-101, *et seq.*) in 1937 for the purpose of safeguarding that portion of the waters of the Colorado River apportioned to the state by interstate compact and for promoting the welfare of the inhabitants of the River District. Geographically, the River District encompasses an area of approximately 29,000 square miles, including all of twelve and parts of three western Colorado counties. Included in that area are the headwaters and tributaries of the Colorado River mainstem and its principal tributaries, the Gunnison, the White and the Yampa Rivers.

The general powers of the River District, set forth in C.R.S. § 37-46-107, *inter alia*, direct the River District to make appropriations "for the use and benefit of the ultimate appropriators . . . ." This statute further directs the River District "to perform all acts and things necessary or

advisable to secure and insure an adequate supply of water, present and future, for irrigation, mining, manufacturing, and domestic purposes within said districts."

II. Comments regarding the City of Glenwood Springs RICD.

River District counsel and staff have been involved in detailed settlement discussions with staff and counsel for Glenwood Springs. While substantial progress has been made in those discussions, the River District's concerns have not yet been finally resolved.

The River District's primary concern with the proposed RICD is whether the RICD, as originally proposed, conflicts with maximum utilization and optimum use of the state's water supply. The River District operates a water marketing enterprise that leases "wholesale" water supply within the Colorado River basin. The River District's water marketing supply includes sources available to it upstream of the RICD. In addition, the River District owns contractual rights to sources that are located within the Roaring Fork River basin and that are used by the River District and its contractors by exchange. The claimed RICD water right has the potential to constrain the ability of upstream water users to use Ruedi Reservoir supplies by exchange.

The River District believes that a negotiated "carve-out" or "no-call" provision will address its concerns about maximum utilization and optimum use. Such provisions have become relatively standard terms in recent RICD cases, although the specific language in this case – as in other cases is highly dependent on the unique factual circumstances of the proposed RICD.

In addition, most RICD cases within the Colorado River basin and its tributaries include specific terms to address potential conflicts between the RICD and the ability of Colorado to develop its Colorado River compact entitlement in the face of potential Colorado River Compact curtailment. In contrast with the fact-specific maximum utilization "carve-out" terms and conditions, the compact language in recent RICD cases has become relatively standard. The River District believes that Glenwood Springs has included language in its proposed RICD decree that is consistent with the de facto adopted standard compact language in other RICD cases. It warrants mention that very similar compact language also was adopted in the CWCB's own Instream Flow Decrees on the mainstem of the Colorado River from Gore Canyon to the confluence with the Eagle River in Case Nos. 11CW159, 11CW160, and 11CW161.

The River District requests the opportunity to comment at the CWCB Hearing on Glenwood Springs' RICD proposal, the proposed settlement, as well as in support or rebuttal of statements made by any other party to the proceeding.

III. Potential Speakers and Witnesses that may be called.

Peter C. Fleming, Colorado River Water Conservation District, General Counsel,
Jason V. Turner, Colorado River Water Conservation District, Senior Counsel
John Currier, P.E., Colorado River Water Conservation District, Chief Engineer.

IV. Exhibits that may be introduced.

A. The Application, Statements of Opposition, and other pleadings and Documents of record in Case No. 13CW3109.

B. Any pleadings or documents submitted to the CWCB pursuant to C.R.S. §37-92-101(6)(b).

C. Decrees, stipulations and other documents of record, if any, pertaining to the water rights that are the subject of the Application in Case No. 13CW3109.

D. Decrees, stipulations, and other documents of record related to RICD and instream flow decrees entered by Colorado water courts.

E. Public documents related to River District contract supplies and the River District's water marketing program.

F. Water rights tabulations, gage or stream flow records, diversion records and other public documents pertaining to water rights and water rights administration in Water Division No. 5.

Respectfully submitted on June 4, 2015.

/s/* *Peter C. Fleming* .
Peter C. Fleming, #20805
Jason V. Turner, #35665
Attorneys for the Colorado River Water Conservation District

**In accordance with C.R.C.P. 121 §1-26(9), this document has been electronically filed via the State of Colorado's Integrated Colorado Courts E-Filing System (ICCES). A printed copy of this document with original signatures is maintained by the filing party and will be made available for inspection by other parties or the Court upon request.*

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PARTY STATEMENT OF THE COLORADO RIVER WATER CONSERVATION DISTRICT** will be e-mailed to the CWCB's Board Staff at Suzanne.sellers@state.co.us and served upon the following parties through www.jbits.courts.state.co.us/icces.com within twenty-four (24) hours of this date, June 4, 2015, as follows:

Certificate of Service
CWCB Public Meeting on City of Glenwood Springs RICD Application

Party Name	Party Type	Email Address	Attorney Name
American Whitewater	Opposer	rob.harris@westernresources.org bart.miller@westernresources.org	Bartlett Phillip Miller Robert Kortum Harris (Western Resource Advocates)
City of Aurora	Opposer	jdingess@hrodlaw.com poolteri@hrodlaw.com	John Marshall Dingess Ryan P. McLane Teri L Petitt (Hamre Rodriguez Ostrander And Dingess PC)
City and County of Denver and Denver Water	Opposer	casey.funk@denverwater.org	Casey S Funk (Denver Water)
Colorado Department of Transportation	Opposer	jennifer.mele@state.co.us	Jennifer Lyn Mele (Colorado Attorney General's Office)
Colorado River Water Conservation District	Opposer	pfleming@crwcd.org jturner@crwcd.org	Jason Victor Turner Peter Cheney Fleming (Colorado River Water Conservation District)
City of Colorado Springs	Opposer	mgustafson@springsgov.com	Michael John Gustafson (Colorado Springs Office of the City Attorney)
Division 5 Engineer	Division Engineer	alan.martellaro@state.co.us	Division 5 Water Engineer (State of Colorado DWR Division 5)
Glenwood Hot Springs Lodge And Pool Inc	Opposer	scott@balcombgreen.com dhallford@balcombgreen.com	David Carl Hallford Scott M Balcomb (Balcomb & Green PC)

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Party Name	Party Type	Email Address	Attorney Name
City of Glenwood Springs	Applicant	CThorne@hollandhart.com KJCrandall@hollandhart.com	Christopher Langhorne Thorne Kylie Jo Crandall Mark Edward Hamilton (Holland & Hart LLP)
Grand County Board of Commissioners	Opposer	davet@white-jankowski.com mitrap@white-jankowski.com adamd@white-jankowski.com	Adam Charles Davenport David C Taussig Mitra Marie Pemberton (White & Jankowski, LLP)
Grand Valley Water Users Association	Opposer	mhcrm@Jwth-law.com kmkurath@Jwth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad (Williams Turner and Holmes PC)
Town of Gypsum	Opposer	kropf@waterlaw.com groves@waterlaw.com	Jason M. Groves Ramsey Elizabeth Kropf (Patrick, Miller & Kropf, P.C.)
Homestake Steering Committee	Opposer	mhammond@chp-law.com mbrown@chp-law.com	Mary Mead Hammond Mason Hamill Brown William Arthur Paddock (Carlson, Hammond & Paddock, L.L.C.)
Orchard Mesa Irrigation District	Opposer	mhcrm@wth-law.com kmkurath@wth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad (Williams Turner and Holmes PC)
State Engineer	State Engineer	dick.wolf@state.co.us	Colorado Division of Water Resources (State)
United States of America	Opposer	kristen.guerriero@sol.doi.gov	Kristen C Guerriero (US Attorney's Office)

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Party Name	Party Type	Email Address	Attorney Name
Ute Water Conservancy District	Opposer	mhcrm@wth-law.com kmkurath@wth-law.com	Kirsten Marie Kurath Mark Allen Hermundstad (Williams Turner and Holmes PC)
West Divide Water Conservancy District	Opposer	ed@ommpc.com	Edward Bryan Olszewski (Olszewski, Massih & Maurer, P.C.)
Western Resource Advocates	Opposer	rob.harris@westernresources.org bart.miller@westernresources.org	Bartlett Phillip Miller Robert Kortum Harris (Western Resource Advocates)
Colorado Parks and Wildlife		Jay.skinner@state.co.us	Jay W. Skinner (CPW - Water Resources Section)

/s/* *Lorra Nichols* .
Lorra Nichols

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