Cimarron Canal Diversion Gate Replace & Water Management Plan

Final Report-POGG1 2020-2130

Prepared for:
Colorado Water Conservation Board
Water Supply Reserve Fund
Grant Amount: $30,418
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Introduction

In July of 2019 the CWCB approved a funding request to the WSRF Grant Program of $11,500 and $18,918 from the Colorado Water Plan Grants to fund irrigation modernization and water modeling for the Cimarron Canal lead by Trout Unlimited (TU).

Background

TU along with Bostwick Park Conservancy District and Cimarron Canal and Reservoir Company ("District") have been working on several projects to improve flows in the Cimarron River without impacting water supply for consumptive users. A downward trend in water supplies and an increasing or stable demand for irrigation water has stressed the environment and impacted the fishery in the watershed. Since 2018 TU has worked with the District and Colorado Parks and Wildlife ("CPW") to release water from Silver Jack Reservoir stored for fish and wildlife purposes to support flows and lower water temperatures below the Cimarron Canal diversion which can remove the majority of the water from the river in mid-summer to early fall. These releases were critical to sustaining a wild trout fishery through the Cimarron State Wildlife area in 2018, 2020, and 2021.

To accurately deliver the water past the diversion new infrastructure was installed at the diversion as a result of the grant funding (see photo on cover). Funding for this part of the project were provided by the District from a Bureau of Reclamation WaterSmart grant. Both TU and district staff provided considerable in-kind support for the project.

TU also worked with the district through this project to develop a water management model that would help with decision making related to diversions, reservoir releases, and operations of the bypass gate.

Methods

TU worked with district staff to develop a plan for allocating funding to the improvements at the diversion that complemented the available matching funds and ongoing efforts by the district to upgrade and install SCADA. TU and the district discussed goals of the project and how the structural

improvements along with the modeling effort could best serve the district as well as the goals of TU and the grant funded project.

J-U-B Engineers of Palisade were already under contract with the district working on related projects and understood the irrigation system, operations, and SCADA plan. For these reasons TU hired J-U-B to provide engineering. J-U-B analyzed the design specifications and provided feed back on the gate design that was to replace the old radial gate at the diversion. The old gate was difficult to operate and could not be operated remotely due to its configuration and lift mechanism.

A knife gate on a lifting screw attached to an actuator, that TU purchased with grant funds, communicated with the existing SCADA system at the diversion was installed. The lift mechanism or actuator was provided by Watch Technologies. There were delays experienced in receiving the order, but the actuator was eventually installed by Mountain Controls of Paonia, Colorado in September of 2020.

J-U-B provided a gate orifice calculation to help with operations of the new bypass gate. TU installed a staff gage below the diversion and field measured the stream several times throughout the project to verify streamflow and gate opening and calculation. The district installed Wi-Fi, cameras, and a sonar level sensor to help with the monitoring and operations of the diversion and bypass gate.

TU and District staff worked began working with J-U-B in the fall of 2020 on creating the model. The first attempts at the model were difficult to operate and did not account for changing demands by the water users within the district. TU wanted the model to show a reasonable representation of crop demands based on actual crop patterns and irrigated lands that changed based on temperatures, system efficiency and the like. The model also needed to reflect changing supplies not only from year to year but also during the irrigation season.

To accomplish this J-U-B used information from the CWCB flow tool as well as observed data from the Cimarron near Cimarron USGS gage located just upstream from the canal diversion. J-U-B created several more models through 2020 that were evaluated by TU and District staff. Once a model was created that met the goals of the project and the needs of the stakeholders, TU and District staff met in person with J-U-B staff to make final changes and discuss how the model could be tested and used during the 2021 water year.

Results

The new bypass gate, actuator, level sensors, and related infrastructure that was added to the diversion made bypassing water much easier and added a level of accuracy that was difficult and timely to acquire prior to the project. This project resulted in new infrastructure and controls, that along with the SCADA system and remote-controlled cameras, help to meet water demands below the Cimarron diversion

including the CWCB instream flow right. The new automated gates allow for faster responses to rain events or similar situations that may significantly change water levels at the headgate.

During the summer of 2021 TU and District staff discussed how the model could be applied to direct uses, reduce waste, and better meet environmental and recreational needs downstream of the diversion. The model results helped inform how to best use the 1500-acre-foot fish and wildlife pool to improve streamflow and reduce water temperatures in the Cimarron River during the 2021 water year. Diversions were not altered as a result of the modeling effort in 2021.

The model was also used in recent months as to help determine how water stored in the newly rehabilitated Fish Creek Reservoir #2 could best be used to meet needs of irrigators and environmental and recreation uses. Additional storage in the model showed how the storage water could extend the length of time CWCB ISF rights are met and/or create flow peaks that can drop water temperatures.

Conclusions and Discussion

Largely the objectives and goals of this project were met thanks to the investments from the CWCB. The expenditures, particularly those for infrastructure improvements, will help maximize beneficial use of water in the Cimarron River by meeting the needs of water users downstream of the Cimarron canal including the CWCB instream flow rights. Without this project future water sharing agreements would not be possible and meeting downstream demands would be much more difficult.

TU hoped the model would be to direct diversions based on demands. Unfortunately, decisions about amount of water diverted are based only partially on actual crop demands and system efficiency. Expectations of individual shareholders along with a perceived need to divert a certain amount of water plays an outsized role in the operation of the headgate as well as the health of the river. To put it another way, if the shareholders pay for water, they expect a certain amount of water to be delivered regardless of actual demands. While these types of operations are not unusual, they can result in waste in the form of excessive outflow, which in the case of the Cimarron canal, largely accrues to the Uncompahgre River. The outflow from the district is not monitored and the district is not encouraged to reduce diversions because of outflow levels. Division of Water Resources does not monitor or administer waste in Division 4.

The district has made considerable efforts to reduce irrigation transit losses in the large canal system and is in the process of a NRCS project that may result in the piping of a large part of the system. The district, with TU's assistance, has investigated conservation projects that could leave water in the river through a flexible market driven mechanism. TU hopes that as these efficiency and conservation projects move forward, the model will be used to inform operations of the diversion and use of storage water to address the needs of the shareholders in the district as well as the environmental and recreation needs.

Shepherding the 1,500-acre-feet of storage water past the diversion was barely adequate to sustain the fishery in the state wildlife area and in 2018 water temperatures in the lower section reached fatal levels for trout. Without creative thinking and a shift away from status-quo operations the fishery and health of the watershed will continue to suffer as aridification continues to reduce water supplies.

Many diversions in the Gunnison basin and elsewhere in Colorado are similar to the Cimarron canal diversion in that they are designed to divert water from the stream and during low summer flows can easily sweep the stream. Investments like this grant that makes it easier to leave water in rivers is important for protecting Colorado's water resources and mitigating impacts of diversions.

Expenses

CWCB funds were used for the following tasks and items:

Task	CWCB CWP	CWCB WSRF	Match/Source		Contractor/Vendor
Design and Planning		$1,500	$1,400	TU, BPWCD	J-U-B Engineers
Fabrication			$15,000	BPWCD	Ag-Fab
Installation	$2,062		$1,846	TU, BPWCD	Mtn. Peak Controls, Recla Metals, Ace Hardware, Bollinger & Queen, Quentin Gray
SCADA	$4,195	$1,000	$850	TU, BPWCD	Mtn. Peak Controls, Watch Technologies
Modeling	$4,400	$7,500	$2,225	TU, BPWCD	J-U-B Engineers
Project Management			$3,200	TU, BPWCD	
Grant Administration	$1,748	$1,350			TU
TOTALS	**$12,405**	**$11,350**	**$24,521**		

The project was completed $6,664 under budget.

*Match amounts included in-kind labor and staff time but not overhead.

Photos

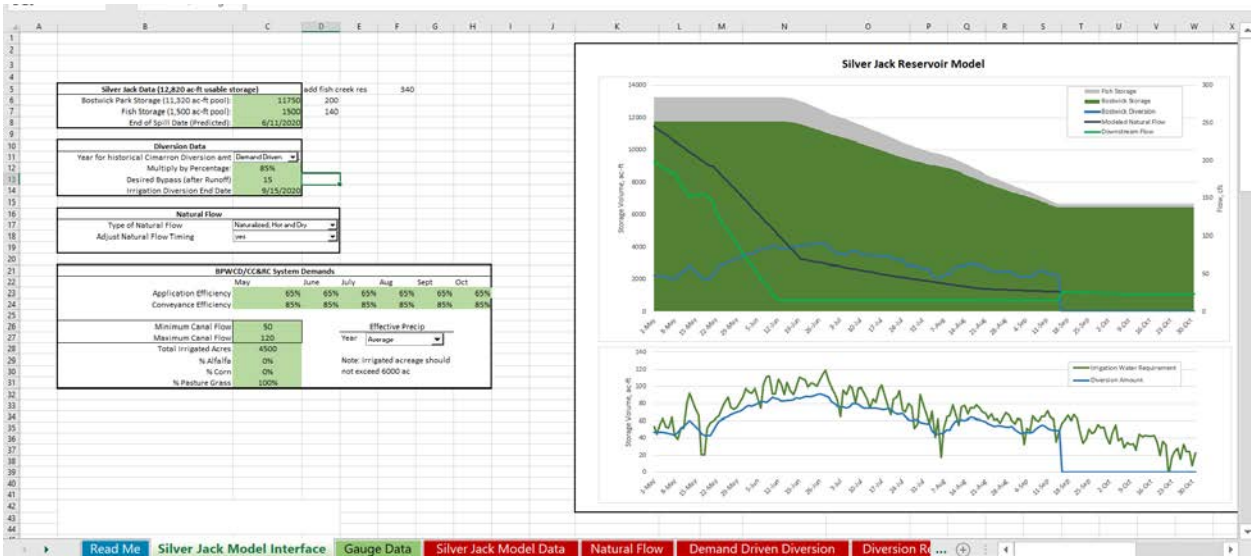

Figure 1 Big Cimarron River July 2018 cty. Rd bridge

Figure 2 Big Cimarron River July 2018 cty. Rd bridge

Figure 3 Big Cimarron River Sept. 2020 cty. Rd bridge

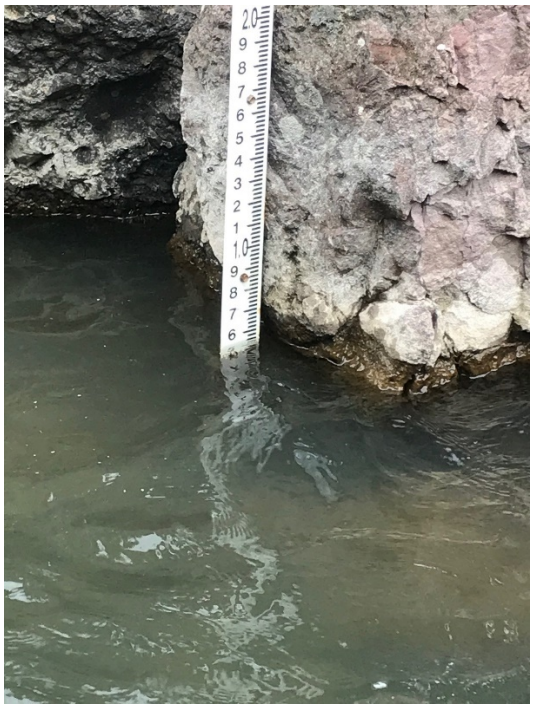

Figure 4 staff gauge installed below diversion

Figure 5 SCADA system at diversion

Figure 6 district staff using system to control gates