

**COLORADO RIVER RECOVERY PROGRAM
FY 2019 ANNUAL REPORT**

**RECOVERY PROGRAM
Project No.: C-14 / PIP 12C**

I. Project Title: Coordinated Reservoir Operations (CROS) and Information and Education (I&E)

II. Bureau of Reclamation Agreement Number(s): Not applicable.

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IV. Abstract:

This project involves coordinated voluntary operations of selected reservoirs and trans-mountain diversion projects in the Colorado River Basin upstream from the confluence of the Colorado and Gunnison rivers. The goal is to enhance spring peak flows to improve endangered fish species habitat in the 15-Mile Reach of the Colorado River without diminishing reservoir or diversion yields or affecting the timing of reservoir filling.

Over the years, reservoirs and trans-mountain diversion projects that have participated in the operation have included the Colorado-Big Thompson Project, Granby Reservoir, Green Mountain Reservoir, the Fryingpan-Arkansas Project, the Homestake Project, the Moffat Tunnel Project, Ruedi Reservoir, Williams Fork Reservoir, Willow Creek Reservoir, Windy Gap Project and Wolford Mountain Reservoir. Participating water management agencies include Bureau of Reclamation (Reclamation), City of Aurora, Colorado River Conservation District, Colorado Spring Utilities, Denver Water Board, Northern Water Conservancy District and Northern Water Municipal Subdistrict.

CROS occurs in years when runoff conditions allow participating reservoirs and trans-basin diversion projects to bypass anticipated surplus water without affecting their

yield. The intent of CROS is to enhance the natural peak flows on the Colorado River for approximately one to two weeks. This typically occurs around the last week of May and first week of June.

Since the first coordinated releases were made in 1997, CROS operations to augment peak flows have been implemented in eleven years, including 2019.

V. Study Schedule: 1995 - present

VI. Relationship to RIPRAP: Colorado Mainstem Action Plan I.A.5.g.(2): Coordinated Reservoir Operations: If available, deliver additional peak flows, evaluate process and hydrology, and provide annual report.

VII. Accomplishment of FY 2019 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Coordinated Reservoir Operations were conducted in 2019 for the fourth time in the past five years. In 2018, very dry hydrologic conditions precluded implementation of CROS. However, 2015, 2016 and 2017 were years of CROS implementation. Prior to that, CROS was last implemented in 2010 (see table below).

Reservoir	Releases for Augmentation of Peak Flows (AF)											Sum
	1997	1998	1999	2006	2008	2009	2010	2015	2016	2017	2019	
Homestake									1,430		655	2,085
Granby			8,515					18,002				26,517
Green Mtn	3,568	12,482	11,010	6,788	2,101	14,113	34,666	11,292	8,632	14,410	21,223	140,285
Ruedi	693	5,106	3,602	6,297	4,848	5,858	10,050	4,599	4,007	4,502	5,998	55,560
Williams Fork	946	1,672	1,543	6,625		5,044	19,982	2,733	4,893	3,293	9,273	56,004
Willow Ck			6,631			2,638		8,000		7,206		24,475
Windy Gap						2,061	Moffat	906			2,007	4,974
Wolford Mtn	10,635	4,431	8,555	9,007		13,069	9,273	4,587	8,452	4,245		72,254
Moffat									1,960	2,079		4,039
Total	15,842	23,691	39,856	28,717	6,949	42,783	73,971	32,117	29,374	35,735	39,156	386,193

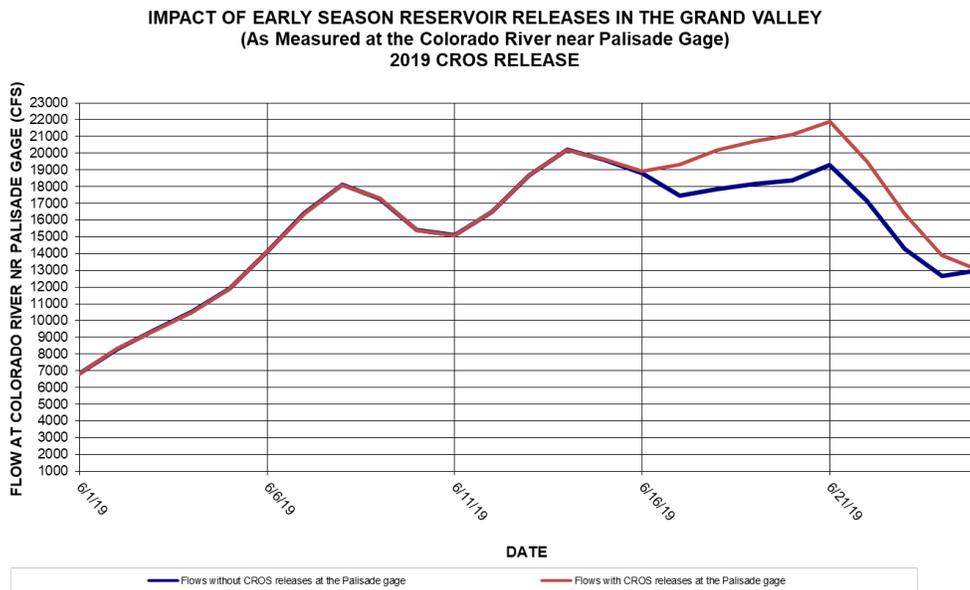
Combined releases/bypasses for CROS purposes in 2019 totaled approximately 39,156 acre-feet (AF). Participating reservoirs included Green Mountain (Reclamation), Williams Fork (Denver Water), Ruedi (Reclamation), Windy Gap (Northern Colorado Water Conservancy District), and Homestake (Aurora and Colorado Springs Utilities). Through a series of conference calls and public outreach activities, real-time conditions were carefully monitored, releases closely coordinated, and the public kept apprised.

A press release describing anticipated CROS operations was jointly disseminated by U.S. Fish and Wildlife Service, the Bureau of Reclamation, and the State of Colorado on June 14 (attached). The *Aspen Times* published an article on June 15 describing the nature and the purpose of the planned CROS operations for its

predominantly West Slope readers.¹

An intentional decision was made early in planning the 2019 CROS to focus on extending the duration of the spring peak flow in the 15-Mile Reach rather than augmenting the peak flow magnitude. This reflected the expectation that peak flows, even in the absence of CROS augmentation, could verge on bankfull river stage in some locations. Thus, efforts were focused on managing CROS releases to sustain high flows and slow their decline in the 15-Mile Reach over the course of about 7 to 9 days, while minimizing flooding concerns.

CROS releases/bypasses began on June 13, peaked on June 18, and terminated on June 22. The result was augmentation of 15-Mile Reach flows from about June 16 to June 24. After accounting for transit losses, a total 35,391 AF of augmented flow is estimated to have passed through the 15-Mile Reach, rising to a daily mean maximum increase of 2,711 cfs on June 20. More than 2,000 cfs of increased flow is estimated to have occurred from June 18 through June 23 (see figure below). During the CROS operation, daily mean flow in the 15-Mile Reach, as measured at the USGS Colorado River at Palisade gage #09106150, peaked at 21,900 cfs on June 22. Finalized USGS data reports an instantaneous peak of 23,200 cfs on June 22. This exceeds the 21,750 cfs peak flow target established by U.S. Fish and Wildlife Service for the 50% exceedance years, and closely approaches the 23,500 cfs target established for the 25% exceedance years (Osmundson et al. 1995)².



¹ “Reservoir releases for Colorado River endangered fish coming after peak flows”, by Brent Gardner-Smith.

² Osmundson, D. B., P. Nelson, K. Fenton, and D. W. Ryden. 1995. Relationships between flow and rare fish habitat in the 15-Mile Reach of the Upper Colorado River. Final Report. U.S. Fish and Wildlife Service, Grand Junction, Colorado.

VIII. Additional noteworthy observations:

Timing of 2019 CROS operations were complicated due to unusually cool and wet late-spring conditions. Throughout most of the 15-Mile Reach contributing basin, May and June maximum temperatures were 5-9 degrees Fahrenheit below average and precipitation was well above average. These factors contributed to an instantaneous peak discharge for the Colorado River near Cameo occurring on July 2, nearly 1 week after the termination of CROS. 2019 had the latest instantaneous peak flow in 87 years. In spite of the historically late runoff peak, CROS contributions increased from 3 to 7 the number of days the 15-Mile Reach daily average flow exceeded 20,000 cfs.

IX. Recommendations: The Recovery Program should continue to support these efforts of and encourage participation in Coordinated Reservoir Operations. The participating entities should continue to work with the National Weather Service Colorado River Basin Forecast Center to improve peak runoff forecasts. Efforts should continue to maintain effective communication and coordination (which has worked well in recent years), address any remaining issues associated with inundation concerns downstream of participating reservoirs, and maintain effective accounting and monitoring. Additionally, the Recovery Program’s I&E Committee is encouraged to work with participants and the U.S. Fish and Wildlife Service to improve the public’s understanding of the role, function, and benefits CROS provides in the Upper Colorado River Basin.

X. Project Status: CROS is an ongoing activity and efforts will continue to refine and improve the process and address issues identified to allow for maximum effectiveness. The Recovery Program is nearing completion of the ‘Phase 3 Coordinated Facilities Operation Study’, which assesses the feasibility of additional activities to augment peak flows in the 15-Mile Reach including ‘enhanced coordinated reservoir operations’ (enhanced CROS) and ‘coordinated facilities operations’ (CFOPS). The former would provide additional bypass flows to CROS flows when feasible, while the latter would provide up to 20,000 AF of additional water to further enhance peak flows, if it can be done without significant cost to water users or Reclamation.

XI. FY 2019 Budget Status

	<u>Federal</u>	<u>State (In Kind)</u>
A. Funds Provided:	\$ 0	\$ 12,000
B. Funds Expended:	\$ 0	\$ 12,000
C. Difference:	\$ 0	\$ 0
D. Percent of the FY 2019 work completed, and projected costs to complete: 100%		
E. Recovery Program funds spent for publication charges: \$0		

XII. Status of Data Submission (Where applicable): N/A

XIII. Writeup prepared with assistance of Don Anderson.

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