

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: 19

Project Title

General Hydrology Support

Bureau of Reclamation Agreement Number:

R18PG40023

Project/Grant Period:

Start date: 10/1/2017

End date: 9/30/2022

Reporting period end date: 10/31/2020

Is this the final report? Yes _____ No x

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Abstract:

The Service's hydrologist provides basic hydrology support to Recovery Program operators and researchers. Accomplishments during FY 2020 include: (1) coordinating and posting temperature data for sites on the Colorado, Green, Yampa, and Gunnison rivers, (2) providing technical hydrology support for a wide range of Recovery Program activities; (3) coordinating and collaborating with a wide range of stakeholders to protect and augment instream flows for endangered fish, and (4) supporting the Recovery Program in basic data collection and monitoring of project efforts relating to hydrology and related habitat conditions.

Study Schedule:

1990-Ongoing

Relationship to RIPRAP:

General Recovery Program Support Action Plan:

I.A.4.b. Conduct needed Geomorphology research and monitoring.

Green River Action Plan: Mainstem

I.A.3. Deliver identified flows.

Colorado River Action Plan: Mainstem

I.E. Evaluate and revise as needed flow regimes to benefit endangered fish populations.

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Colorado River Action Plan: Gunnison River

I.D. Evaluate and revise as needed flow regimes to benefit endangered fish populations.

Yampa River Action Plan:

I.B.2 Provide augmentation of low flows.

Duchesne River Action Plan:

I.D Coordinate reservoir operation

Accomplishment of FY 2020 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

The Recovery Program Director's Office (PDO) provides basic hydrology support to Recovery Program researchers and undertakes tasks that support the Recovery Program with basic data collection, monitoring, partner coordination, flow augmentation, data analysis, report reviews, and data summaries and reporting. The work provided is, in large part, supportive of other research projects or collaborative activities such as flow delivery, flow quantification, and habitat restoration, all of which have a direct impact on the recovery of the Colorado River endangered fish.

Stream Temperature Data Collection

One Recovery Program task is the collection of water temperature data in various river reaches of the Upper Basin. Temperature monitoring duties are divided between the PDO staff in Lakewood and the Fish and Wildlife Conservation Office field station in Grand Junction (FWCO-GJ)¹. PDO staff currently collect data from seven locations on the Yampa and Green Rivers, as described below. CRFP-GJ currently collects water temperature data from five sites on the mainstem Colorado River, four sites on the Gunnison River and one site on the Uncompahgre River, as described in the separate Project #19b annual report. These data are downloaded semiannually, quality-checked, and assembled into an Excel temperature database for use by Recovery Program researchers, following the format used by USGS in their Water Resources Data yearbooks. The PDO web-enables them and links them to the webpage: <https://www.fws.gov/mountain-prairie/riverdata/temperatures.html>. GPS locations for each thermograph are available by request; for security purposes exact locations are not provided on the web page.

FY2020 temperature data were downloaded in the field in July and October 2020 by Jim Renne, Program volunteer, and over the summer of 2020 by Benjamin Schleicher of FWCO-GJ. The data collection generally went well, with all seven sites on the Yampa and Green rivers yielding what appear to be complete and valid data for the period, and most sites on the Gunnison and Colorado rivers yielding good data as well. The one-hour interval readings from the previous year (FY19) as well as for FY20 were converted to daily means, and site-specific daily-mean tables completed. Temperature data for FY20 have already been processed and uploaded to the Program website for the Yampa and Green rivers. The remaining sites should be completed by early 2021.

¹ Temperature data collection on the Colorado River by FWCO was consolidated in this Scope of Work beginning in FY99 and a separate budget table is included for this work. See annual report 19b General Hydrology Support (CRFP-Grand Junction contribution). Principal Investigators for 19b in previous years were Brendan Crowley and Dale Ryden; this year Ben Schleicher replaced Brendan Crowley.

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In FY2020 the PDO cleaned up broken links on the stream temperature data web page and made other updates in an effort to provide a more user-friendly interface. That interface now includes orientation maps illustrating the approximate location of the relevant monitoring sites, and links to a description of the Program's data collection and reporting protocols.

The PDO maintains a summary table of site information for all known long-term stream temperature monitoring locations in the upper Colorado River basin, including those managed by cooperating entities such as USGS, Colorado State University, and the State of Utah. The purpose is to have a centralized inventory of this information to help address such questions as where temperature data are collected, why those sites were selected, and how the data are used by the Program.

Jana Mohrman (Recovery Program Hydrologist through December 2016) and Don Anderson in FY2020 finalized a report documenting the rationale for discontinuing two Gunnison River sites originally established in 1996, and reviewing the information gleaned from those sites (*"Evaluation of Data from Two Gunnison River Temperature Monitoring Stations Discontinued in 2018 by the Program Director's Office"*). A link to this report is available on the Gunnison Basin temperatures page.

Hydrology Support for Program Implementation and Monitoring

Overall, runoff in the Upper Colorado River basin in Water Year 2020 was well below-normal, resulting in total inflow to Lake Powell of just 55% of average. As of October 1, 2020, the storage content of Lake Powell, at 13.27 million acre-feet, was 47% of capacity and 1.91 million acre-feet less than one year earlier.

Runoff conditions varied from one sub-basin to the next, but runoff was below-average in all major subbasins. April-through-July runoff measured at various gage locations is shown in Figure 1 below, as percent of average (1981-2010). Peak season runoff was highest in the Yampa River basin (at 91% of average) and lowest for the Gunnison River near Grand Junction (at 46% of average).

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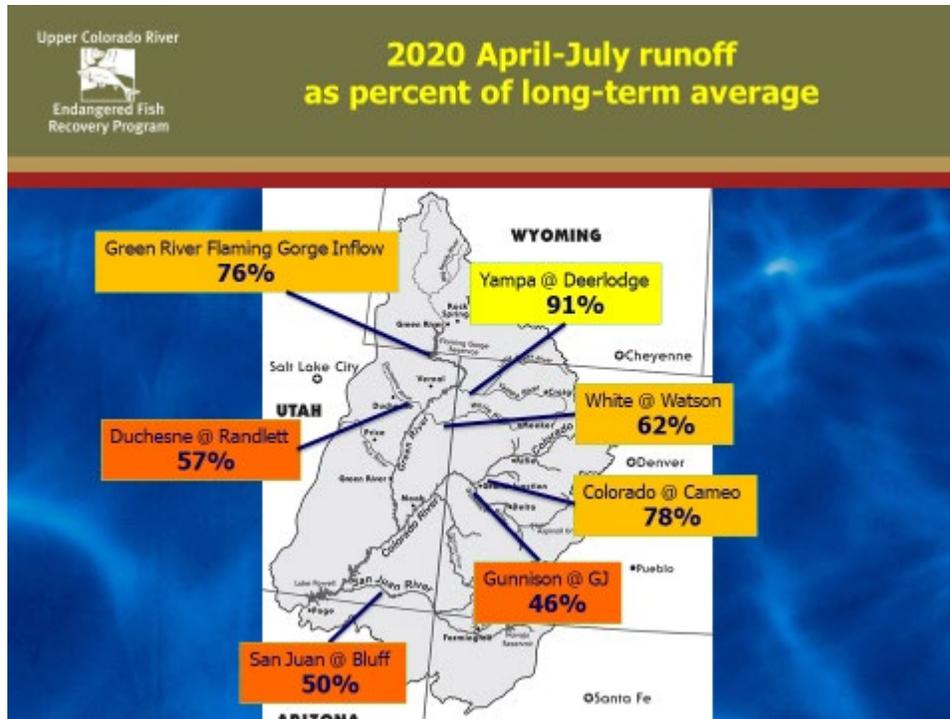


Figure 1. 2020 April-through-July runoff as a percent of long-term average at seven representative Upper Basin gage locations.

Peak mean daily flows observed at key gaging locations in the upper Colorado River basin are summarized in Table 1 below. Naturally elevated spring flow in the Green River at Jensen was augmented in 2020 with an intentional, targeted ramp-up of releases from Flaming Gorge Reservoir aimed at maximizing the entrainment of larval razorback sucker from the Green River into multiple floodplain wetlands. In the mainstem Colorado River, coordinated reservoir operations (CROS) were used to augment peak flows in 2020 in the 15-Mile Reach (see Annual Report for Project C-14). In the Gunnison River, the Bureau of Reclamation timed releases out of the Aspinall Unit to augment the modest natural peak of the North Fork Gunnison River and achieve a combined peak of 4,840 cfs at the Whitewater gage near Grand Junction, in alignment with the target established for this dry hydrologic year.

Table 1. 2020 peak flow magnitudes compared to mean daily annual peak flow magnitudes at seven representative Upper Basin gage locations.

| River / Location | Mean Daily Peak (cfs) | 2020 Peak (cfs) | % of Avg Peak |
|---------------------------|-----------------------|-----------------|---------------|
| Yampa @ Deerlodge | 12,500 | 11,900 | 95% |
| Green @ Jensen | 16,500 | 18,300 | 111% |
| White @ Watson | 2,400 | 1,870 | 78% |
| Duchesne @ Myton | 2,142 | 1,770 | 83% |
| Gunnison @ Grand Junction | 8,000 | 4,840 | 61% |
| Colorado @ Cameo | 17,700 | 13,300* | 75% |
| San Juan @ Bluff | 10,500 | 4,190 | 40% |

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*Augmented with coordinated reservoir releases

From April onward weather in the Upper Colorado River Basin remained unusually hot and dry, with little monsoon-season moisture to relieve drought conditions. This resulted in persistently low streamflow in most Upper Colorado system tributaries. By August the entire Upper Basin was in drought condition, and Colorado experienced the driest August-October period on record. **Base flows** observed during the August-through-October period of 2020 were well below-average, as summarized in Table 2 below. At all these gage locations **except for the San Juan River at Bluff**, base flows were augmented by releases from reservoir storage targeted to supplement flow for the endangered fish.

Table 2. 2020 flow volumes, August through October, as a percentage of long-term averages at ten representative Upper Basin gage locations. The minimum mean daily flow at these gages also identified.

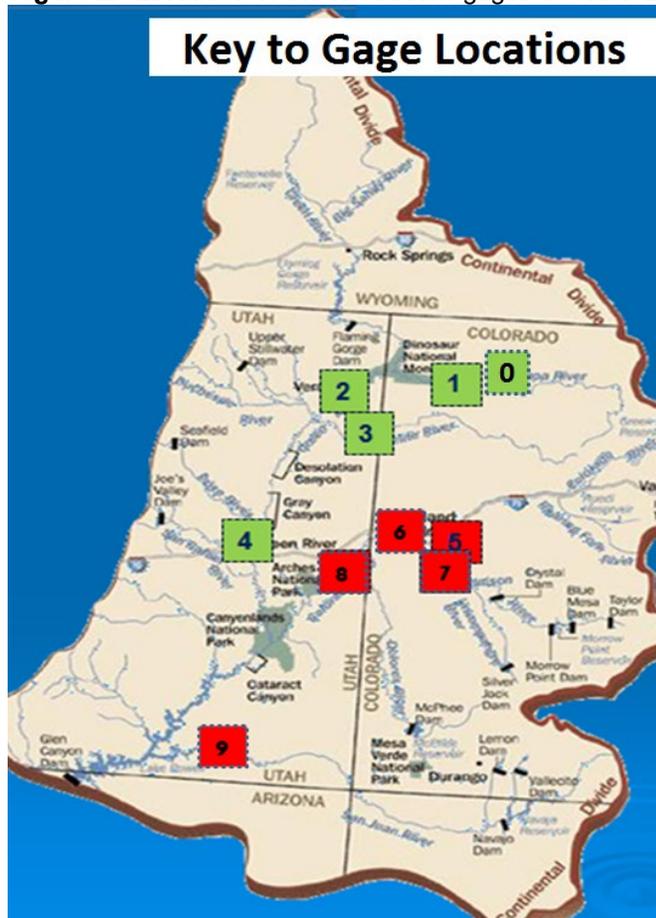
| Map Key | River | Location | % of Aug-Oct Avg, (1981-2010) | Minimum mean daily cfs |
|---------|----------|----------------|-------------------------------|------------------------|
| 0 | Yampa | Maybell | 44% | 69 |
| 1 | Yampa | Deerlodge Park | 34%** | 45 |
| 2 | Green | Jensen | 83% | 1,150 |
| 3 | White | Watson | 48% | 31 |
| 4 | Green | Green River | 59% | 1,530 |
| 5 | Colorado | Cameo | 66% | 1,510 |
| 6 | Colorado | Palisade | 39%* | 245 |
| 7 | Gunnison | Grand Junction | 58% | 811 |
| 8 | Colorado | Cisco | 56% | 2,100 |
| 9 | San Juan | Bluff | 40% | 332 |

*Based on WY1990-2010 average; pre-1990 data not available

** Based on WY1982-2010 average; pre-1982 data not available

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Figure 2. Locations of the ten stream gages in Table 2.



As of this writing, considerable uncertainty surrounds next season's snowpack development and resulting upper Colorado basin runoff. The Colorado Basin River Forecast Center forecast for Water Year 2021 unregulated inflow to Lake Powell, issued on November 1, 2020, projects a 'most probable' (median) unregulated inflow volume this coming year of 6.79 MAF (63% of average). Their forecast ranges from a minimum probable of 5.17 MAF (48%) to a maximum probable of 16 MAF (148%).

usbr.gov/uc/water/crsp/cs/gcd.html

Additional Support Provided by the Program Hydrologist in FY2020:

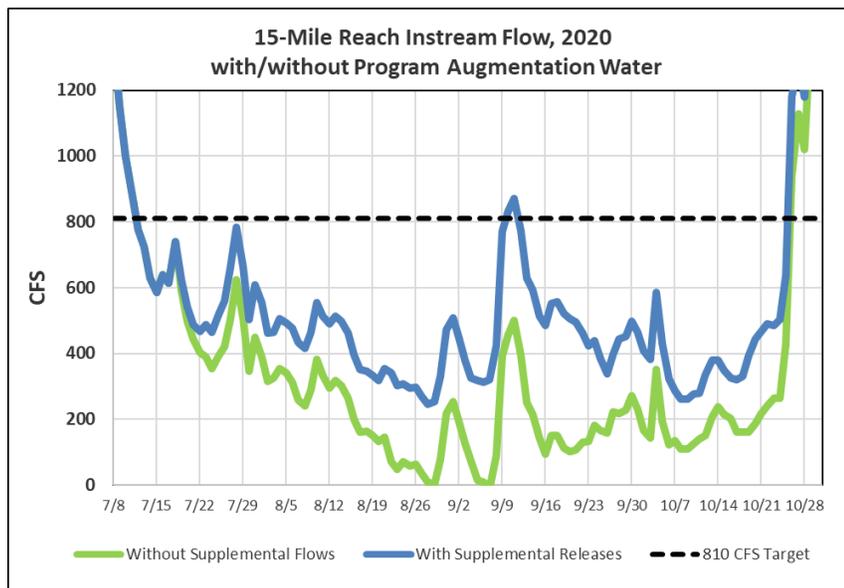
Mainstem Colorado River

- Participated in the weekly 15-Mile Reach coordination calls during the 'April Hole' period and throughout summer/fall irrigation season. 2,385 acre-feet of surplus water from the Green Mountain Reservoir Historic Users Pool (including water provided by exchange from Williams Fork Reservoir) was used to supplement 15-Mile Reach base flows in 2020. Approximately 8,400 acre-feet remained in the HUP at the end of the season as carryover for possible delivery in 2021, prior to declaration of fill, including possible delivery to alleviate an 'April hole' in 15-Mile Reach flows, should one develop.

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- With CWCB and Reclamation, coordinated development of a press release for the 2019 CROS operations.
- Coordinated releases of water for the endangered fish from designated pools in Ruedi, Granby, and Wolford Mountain Reservoirs to support April and summer base flows in the 15-Mile Reach. A total of 39,522 acre-feet were released from endangered fish accounts at these three reservoirs between July 17 and October 27, 2020 for delivery to the 15-Mile Reach. This includes 5,000 acre-feet of water contributed by Exxon-Mobil/XTO Energy and 1,500 acre-feet contributed by the Colorado River District from Ruedi Reservoir. This also includes 9,830 acre-feet leased from the Ute Water Conservancy District and 350 acre-feet leased from Garfield County by CWCB at Ruedi Reservoir. Benefits to flows in the 15-Mile Reach are illustrated in Figure 3.

Figure 3. July-through-October 2020 flows in the Colorado River at the Palisade gage location (USGS #09106150), with and estimated without Recovery Program’s augmentation flow releases from the collected Recovery Program reservoir sources.



- Coordinated with Exxon/XTO Energy, Colorado River District, CWCB, and water users in the Grand Valley to secure additional water for the 15-Mile Reach
- Provided feedback to Middle Colorado River Watershed Council regarding possible future projects to support mainstem Colorado River flows and habitat.
- Attended and presented at the 2019 HUP ‘Wrapup’ Meeting (Grand Junction, March 2020) and 2020 HUP Kickoff Meeting (on-line meeting, June 2020).
- With Reclamation, prepared press release on the Exxon-Mobil/XTO Energy, Colorado River District, Colorado Water Trust, and other water donations in 2020.
- Presented the 2020 plan for Ruedi releases at the on-line public meeting of August 5. Coordinated with CWCB to manage releases of the 10,000 acre-feet of water leased out of Ruedi from the Ute Water District, and coordinated with Colorado Water Trust for their release of 999 acre-feet leased water from Ruedi.

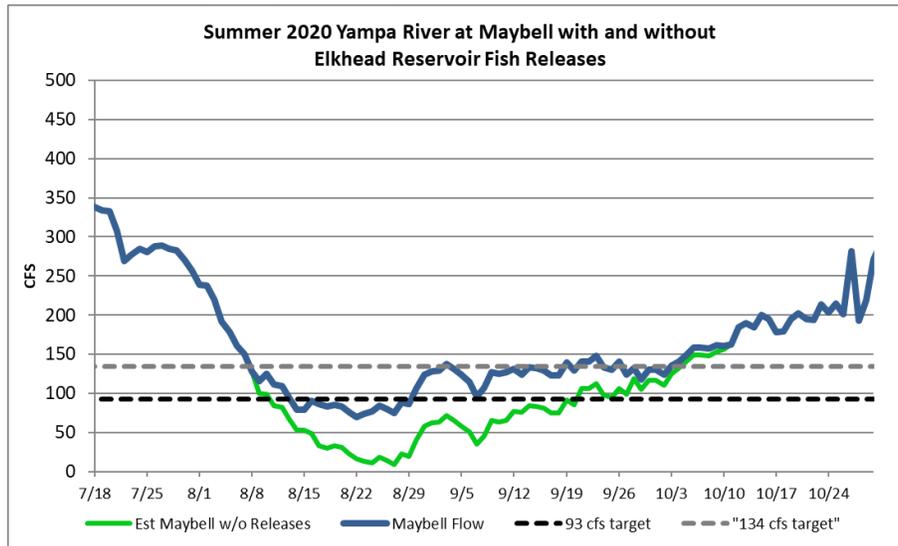
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- Coordinated the review, finalization, and approval of CWCB’s analysis of 15-Mile Reach depletions for the period 2006 through 2015, and assisted with development of a final draft of this report for review by the Program’s technical committee.

Yampa River

- Arranged to lease 1,500 acre-feet of ‘temporary pool’ water from Elkhead Reservoir (Colorado River District) for Yampa flow augmentation purposes in 2020. This was water in addition to the 5,000 AF Elkhead account already annually available.
- Worked with the Colorado Water Trust to (1) coordinate acceptance of their donation of \$12,500 toward the lease of ‘temporary pool’ water, and (2) coordinate the timing of their releases from their separately-contracted 250 acre-feet pool of Elkhead water.
- Initiated weekly Yampa Flow Coordination calls on July 15, 2020, requesting releases from FWS’s Elkhead Reservoir account for the benefit of endangered fish. Releases were made from August 6 through October 7. A total 5,952 AF was used in 2019 for this purpose, including 250 acre-feet leased by the Colorado Water Trust. Of the ‘temporary pool’ water, approximately 797 acre-feet remains available for use in 2021 (minus evaporative losses). Provisional gage data indicate that daily mean flow at the Yampa-Maybell gage fell below 93 cfs (the dry-year target) on 16 days, and below 134 cfs (the average-year target) on 50 days. (Figure 4)
- Reviewed and provided input on CWCB-SEO transit loss analysis, which was used as basis for establishing new transit-loss assessments for reservoir releases in the Yampa River.
- Participated in the Yampa River Fund’s Advisory Technical Review Committee to help review and make recommendations on their first round of grant proposals.

Figure 4. July-through-October 2020 flows in the Yampa River at the Maybell gage location (USGS #09251000), with and estimated without Recovery Program’s augmentation flow releases from Elkhead Reservoir.



Green River

- Worked with Program Director and Program partners and stakeholders to draft and finalize the 2020 flow request to Reclamation.
- Participated in discussions with NPS regarding the collection and use of data for the

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Green River physical monitoring plan for 2020 and following years, and coordinated the review and approval of the final plan with the Biology and Water Acquisition committees.

- Collaborated with Kevin Bestgen, Tom Chart, and Tildon Jones on finalizing the Green River Experimental Base Flows pikeminnow study plan. (Approved by the technical committees September 2020.)

Price River

- Continued tracking State of Utah and TNC efforts to enhance Price River base flows and habitats to benefit native fish (see Annual Report for Project 171).

White River

- Convened White River Planning Group meeting for coordination with ERO Resources in their development of the White River Management Plan. This included identifying an initial ‘future depletions scenario’ for analysis and resolving the hydrologic modeling strategies and assumptions.

Other/General

- Participated in Dushesne River IBAT/DRWG spring planning meeting & fall review meetings via webinar.
- Chesapeake Conservancy – Coordinated with CWCB to provide data and guidance for the development of a GIS ‘dashboard’ and decision-support tool being developed by the Chesapeake Conservancy for water management in the 15-Mile Reach.
- Bureau of Reclamation – Coordinated with Northern Colorado area office in their development of a real-time decision support tool for 15-Mile Reach flow management.
- Helped staff the Recovery Program’s trade booth at the 9th Annual Upper Colorado River Basin Forum (Grand Junction, November 2019), the Colorado River Water Users Association annual conference (Las Vegas, December 2019), and the annual Colorado Water Congress meeting (Westminster, January 2020).

Additional noteworthy observations:

Ongoing activities independent of the Recovery Program that could provide significant instream flow and/or other habitat benefits for endangered fish in coming years include: individual projects funded by the Yampa River Fund; TNC’s proposal to improve the Maybell Irrigation District diversion dam and passage on the Yampa River; ongoing river flow enhancement efforts championed by the Colorado Water Trust on the Colorado and Yampa rivers; and efforts to develop an integrated watershed management plan in both the Yampa River basin (spearheaded by the Yampa-White-Green Basin Roundtable) and the mainstem Colorado River above Debeque, Colorado (spearheaded by the Middle Colorado Watershed Council).

Recommendations:

We recommend continuation of the current data collection efforts at the established gaging sites. The Program should seek a broader base of funding support over the long-term for establishing and maintaining key streamflow and water quality monitoring locations, consistent with the broad base of interests benefitting from these data. When the PDO’s currently vacant Database Coordinator position is filled, responsibility for river temperature data collection and management should be transferred to that individual to free up more time for the Instream Flow Coordinator. As time allows, additional user-friendly functionality should be added to the Program’s water temperature web page, for example adding the ability to click on maps to access site data.

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Project Status:

Ongoing and on-track.

FY 2020 Budget Status

Funds Budgeted/Provided: \$187,866

Funds Expended: \$187,866

Difference: -0-

Status of Data Submission

N/A

Signed:

Don Anderson

Principal Investigator

December 17, 2020