

Upper Colorado River Endangered Fish Recovery Program

Instream Flow Management for Listed Fish: 15-Mile Reach in 2023



2024 Rivers Edge West
Restoration for the Future
March 6

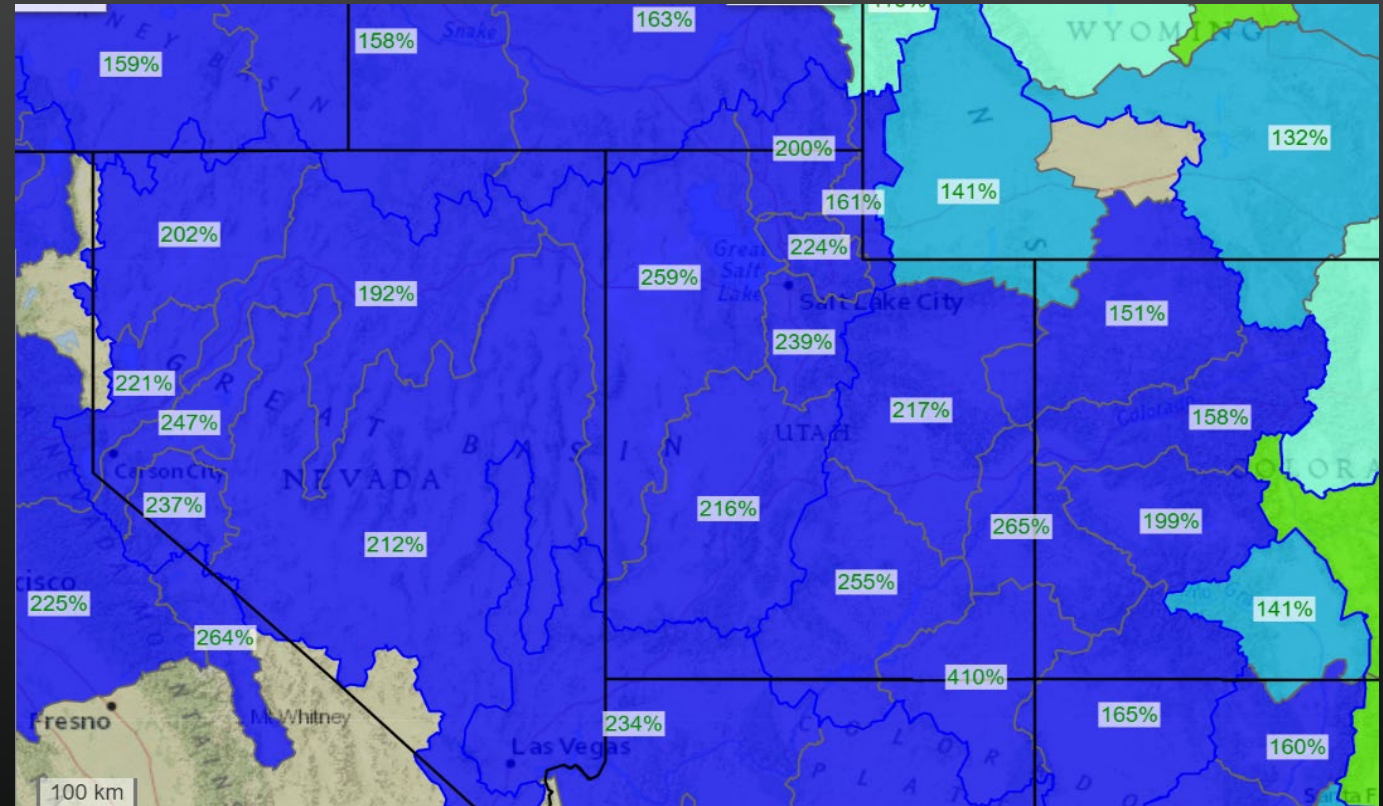
David Graf
Instream Flow Coordinator



2024 Rivers Edge West Restoration for the Future (3/6/24)

Instream Flow Management for Listed Fish: 15-Mile Reach in 2023

- I. Basin Hydrology, 2023
 - a. Lake Powell
- II. Upper Colorado Endangered Fish Recovery Program and the Four Listed Fish
- III. Flow Management in 2023
 - a. CO River - 15 Mile Reach Example
- IV. Water Year 2024 – How Are We Doing?



Snow Water Equivalent – Intermountain West Summary (4/25/2023)



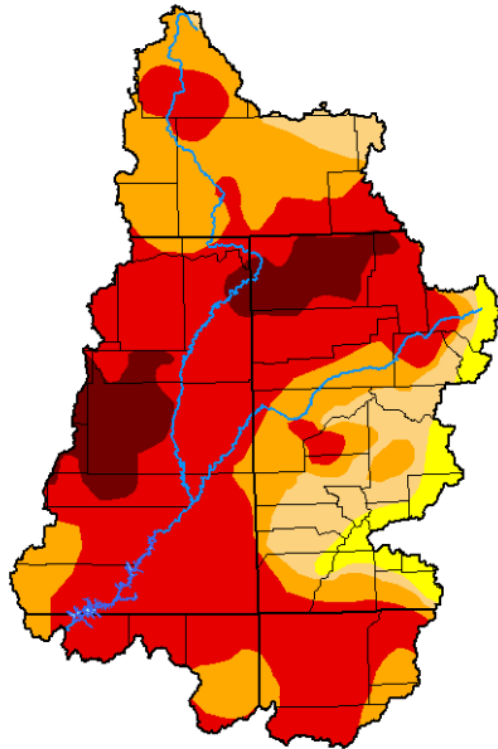
WATER YEAR 2023: I. Basin Hydrology - Two Years of Drought Recovery

Sept. 28, 2021

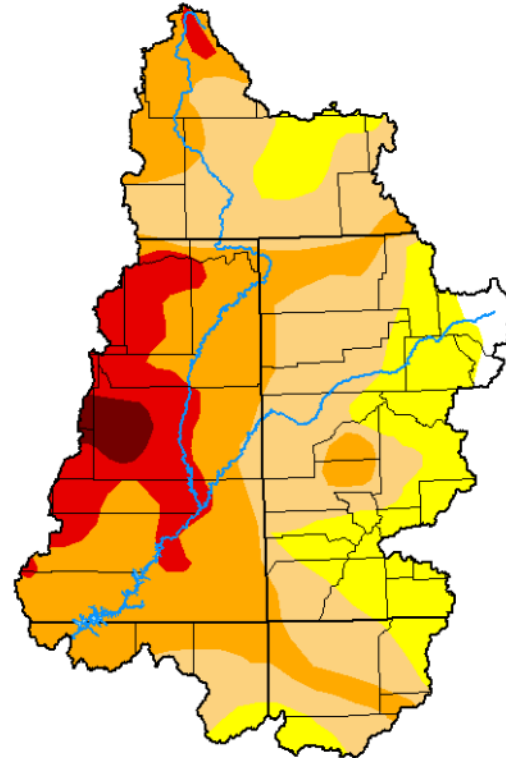
Sept. 27, 2022

Sept. 26, 2023

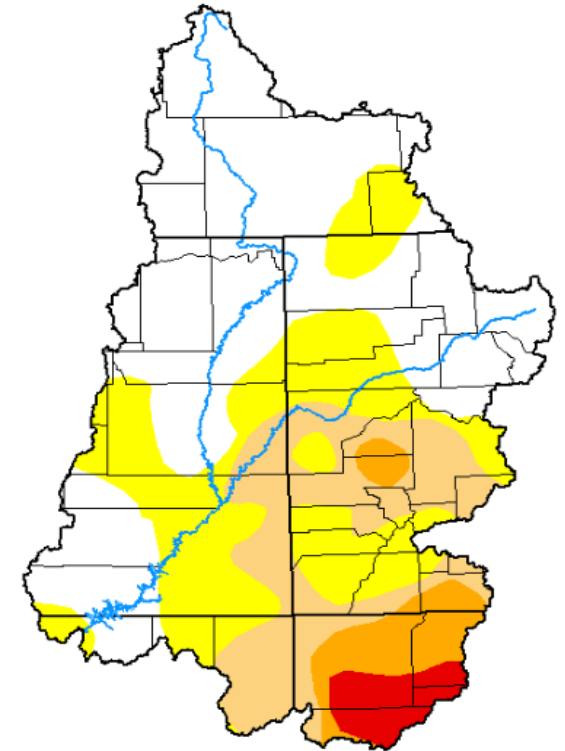
U.S. Drought Monitor
Upper Colorado Watershed



U.S. Drought Monitor
Upper Colorado Watershed



U.S. Drought Monitor
Upper Colorado Watershed



WATER YEAR 2023:

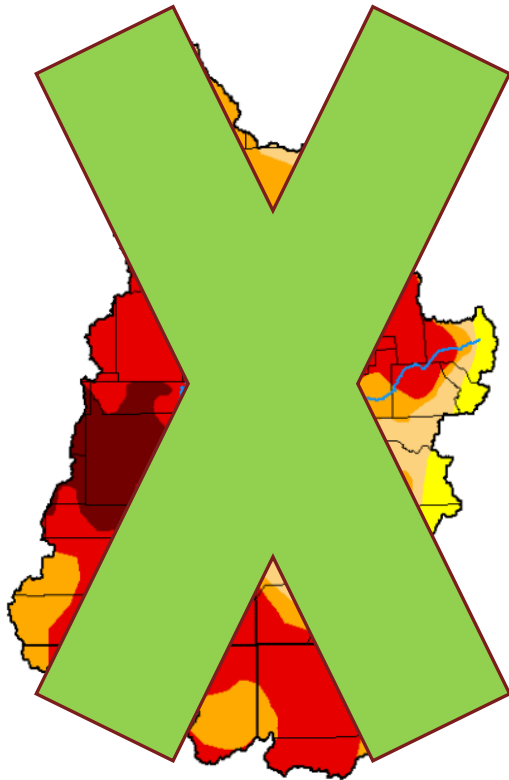
I. Basin Hydrology - Two Years of Drought Recovery

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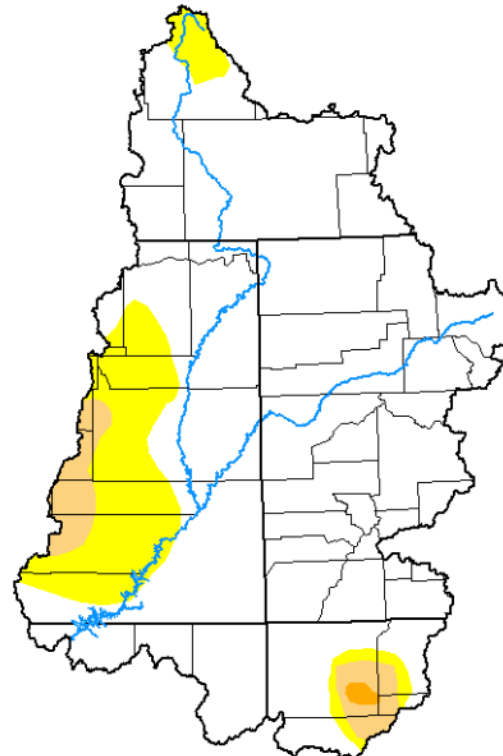
July 11, 2023

Feb. 20, 2024

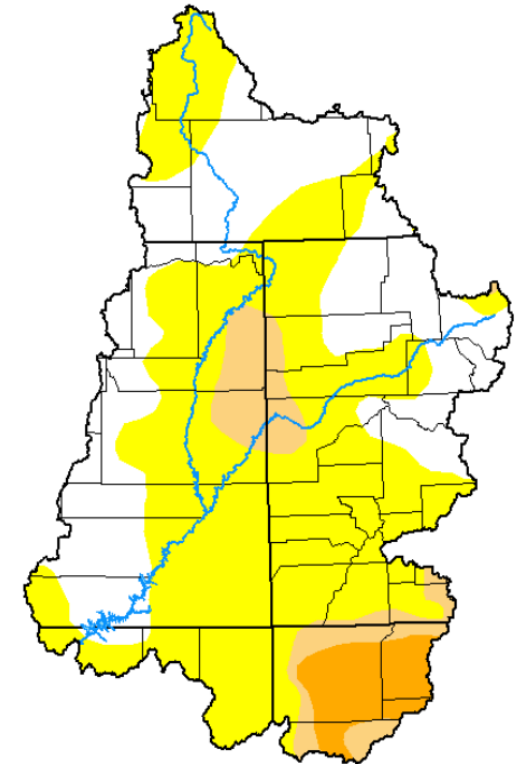
U.S. Drought Monitor
Upper Colorado Watershed



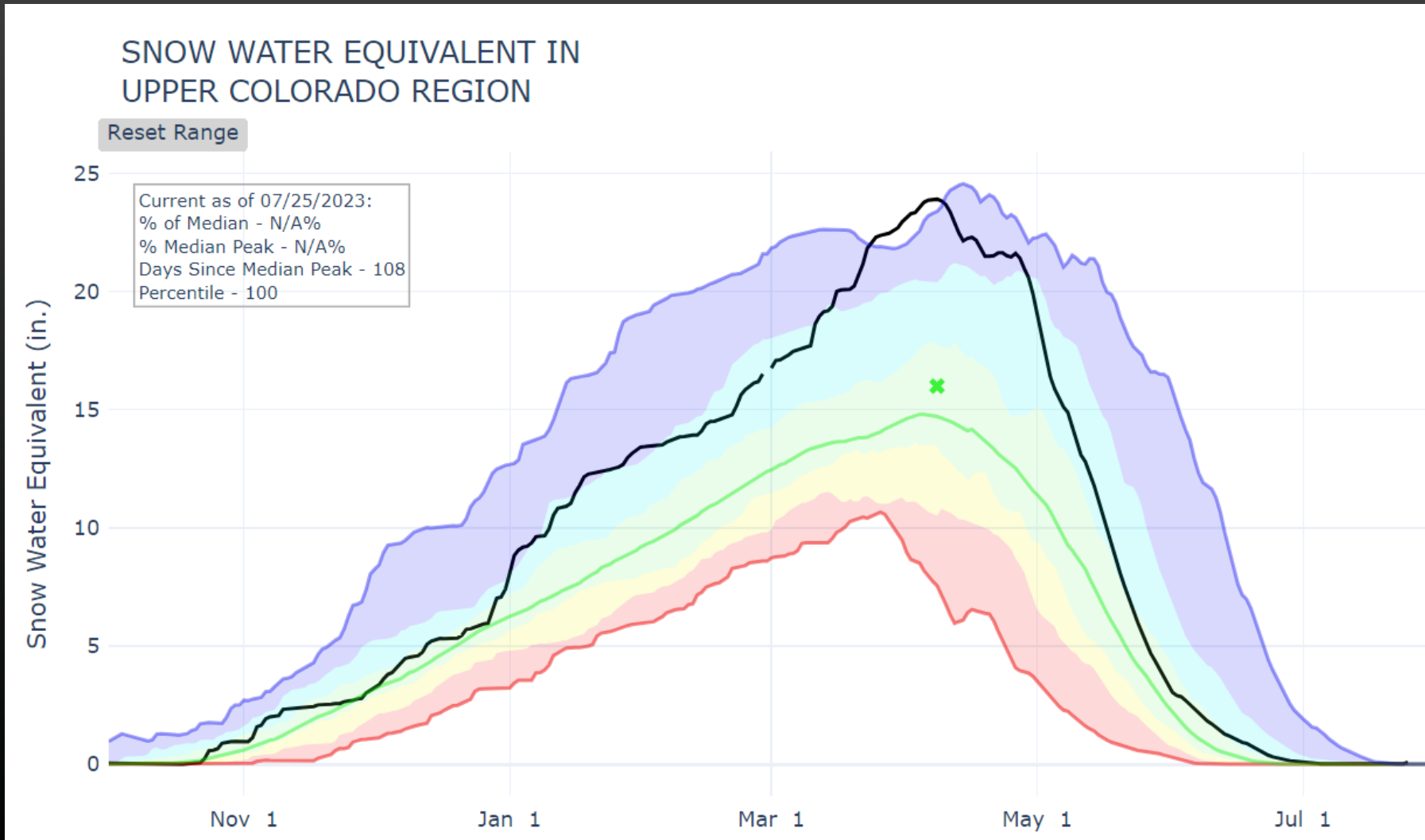
U.S. Drought Monitor
Upper Colorado Watershed



U.S. Drought Monitor
Upper Colorado Watershed



WATER YEAR 2023: Snow Water Equivalent Upper CO Basin above Lake Powell



2023 Summary:

April – July INFLOW = 10.6 MAF
(166% 30-yr AVE)

Total WY2023 INFLOW = 13.6 MAF
(142% 30-yr AVE)



2024 Rivers Edge West Restoration for the Future (3/6/24)

II. The Upper Colorado Endangered Fish Recovery Program and the Four Listed Fish

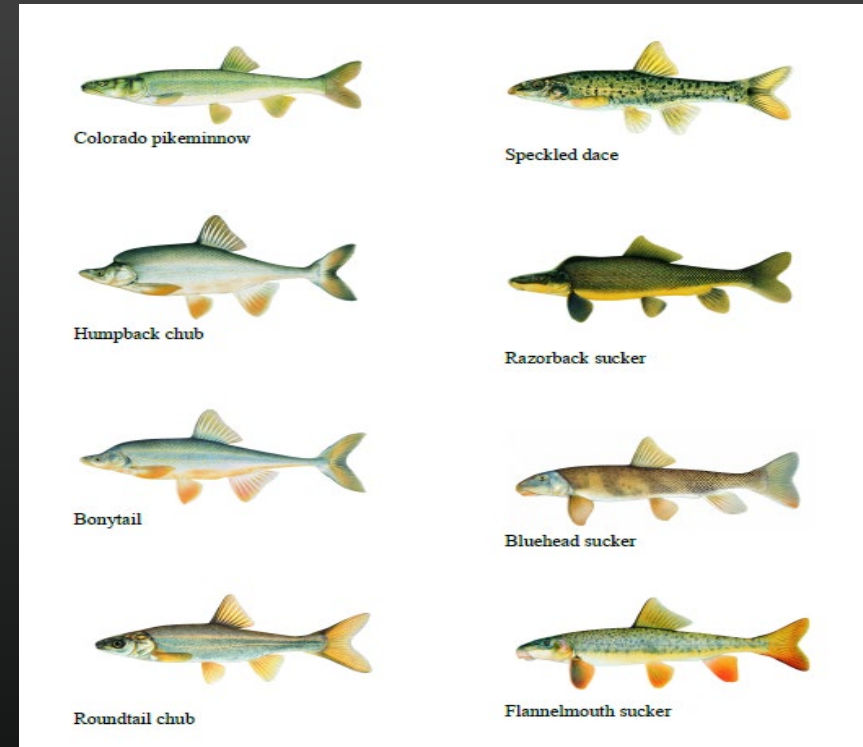
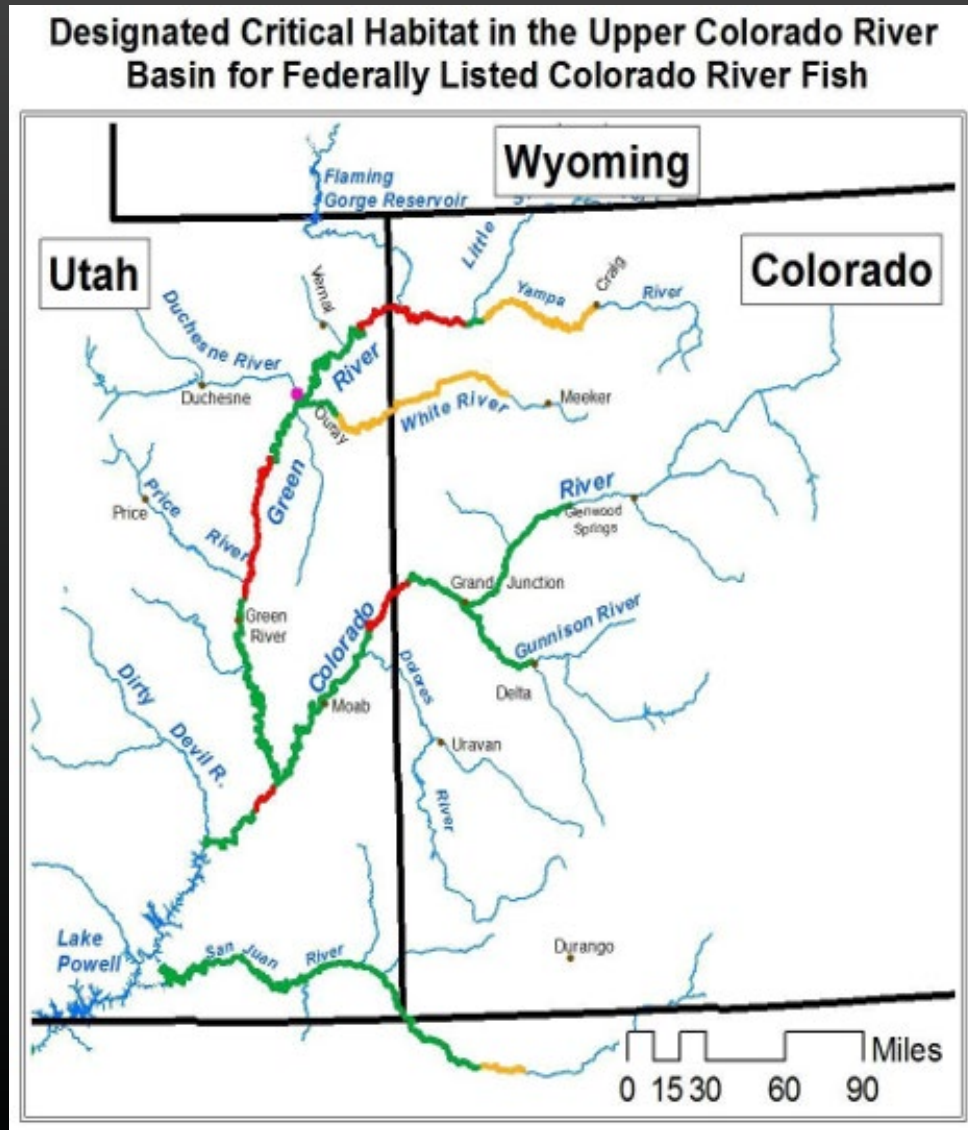
The Four Federally Listed Fish

- Colorado pikeminnow (CPM - *Ptychocheilus lucius*) – listed endangered in 1973
- razorback sucker (RZB- *Xyrauchen texanus*) – listed endangered in 1991 – proposed for reclassification in 2021
- humpback chub (HBC – *Gila Cypha*) – listed endangered in 1973 – reclassified as threatened in 2021
- Bonytail (BT - *Gila elegans*) – listed endangered in 1980

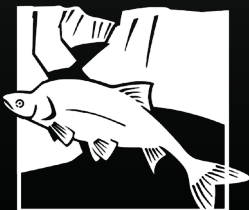
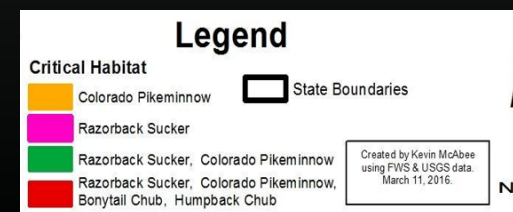


2024 Rivers Edge West Restoration for the Future (3/6/24)

Instream Flow Management for Listed Fish: 15-Mile Reach in 2023

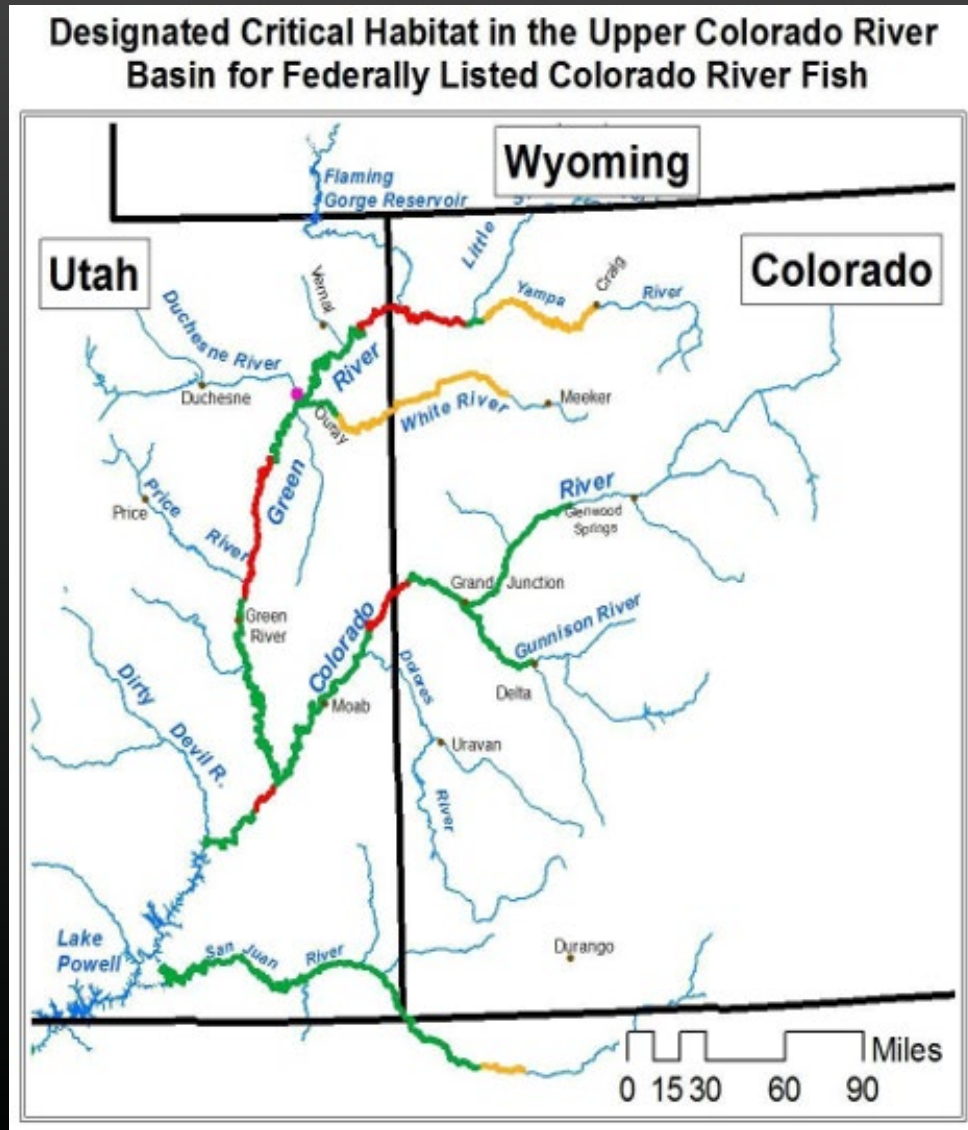


Other Native Fish Include Speckled Dace, Roundtail Chub, Flannelmouth Sucker, and Bluehead Sucker (e.g., '3-Species')



2024 Rivers Edge West Restoration for the Future (3/6/24)

Instream Flow Management for Listed Fish: 15-Mile Reach in 2023



Legend

Critical Habitat

- Colorado Pikeminnow
- Razorback Sucker
- Razorback Sucker, Colorado Pikeminnow
- Razorback Sucker, Colorado Pikeminnow, Bonytail Chub, Humpback Chub

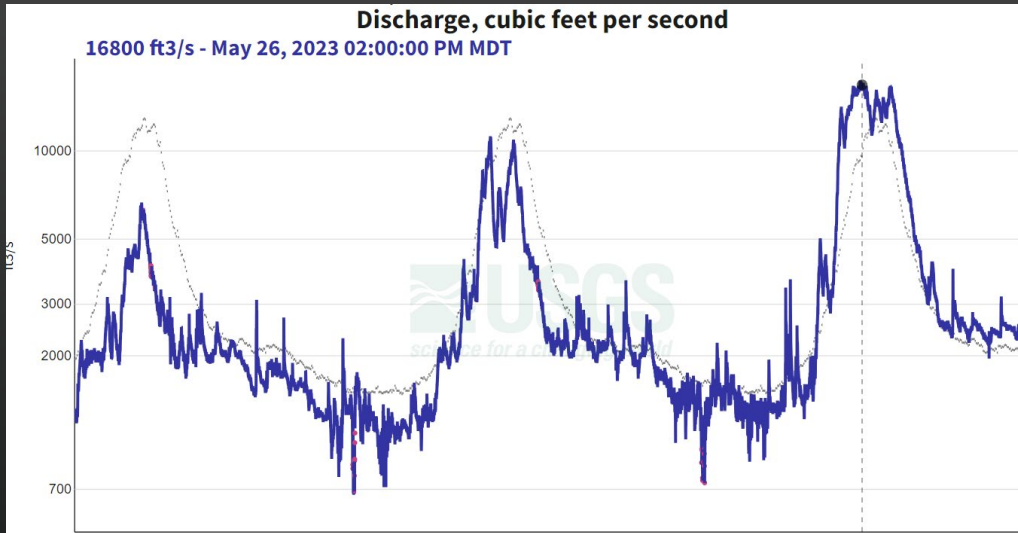
State Boundaries

Created by Kevin McAbee using FWS & USGS data. March 11, 2016.

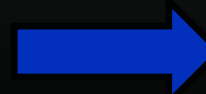


GENERAL LIFE HISTORY NEEDS OF NATIVE FISH in the Upper Colorado Basin:

RECRUITMENT = F(HYDROLOGY + HABITAT – NNF ...)



1. **Spawning Sites** and Optimal Conditions (scoured riffles – ex. 15-Mile Reach)
2. **Fry Drift**, Survival and Growth (productive backwaters)
3. **Young-Of-Year** → Juvenile (micro-niche and habitat structure; multi-thread channels)
4. Juvenile **Survival and Recruitment** (diversity of instream habitat types + water to sustain these)



Growth... Spawn ... Fry
... YOY... Juv ... Growth
... Spawn... Fry ... →



2024 Rivers Edge West Restoration for the Future (3/6/24)
II. The Upper Colorado Endangered Fish Recovery Program

PROGRAM REVIEW



Upper CO River
Endangered Fish
Recovery Program



San Juan
Endangered Fish
Recovery Program



Under the ESA, WATER DEPLETIONS = 'INJURY' TO LISTED FISH

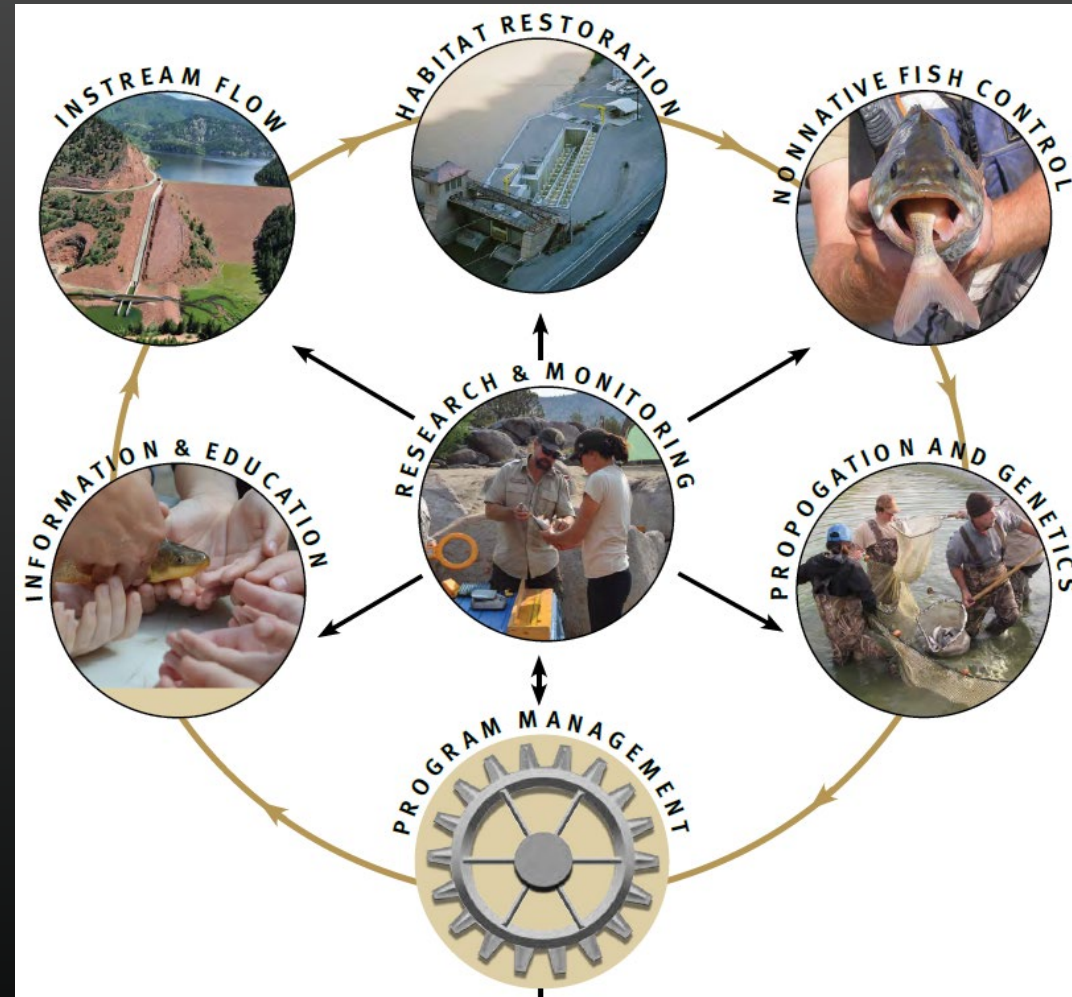
Established in 1988, the Program represented the culmination of years of discussions between USFWS, water users and environmental groups on how to avoid conflict between the ESA and the Law of the River.

Their solution was to recover the fish!



RECOVERY PROGRAM ELEMENTS

- INSTREAM FLOW
- HABITAT
- NONNATIVE FISH CONTROL
- OUTREACH
- PROPOGATION AND GENETICS
- RESEARCH AND MONITORING
- PROGRAM MANAGMENT

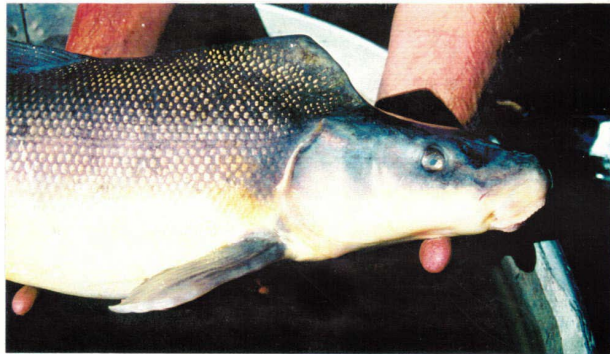
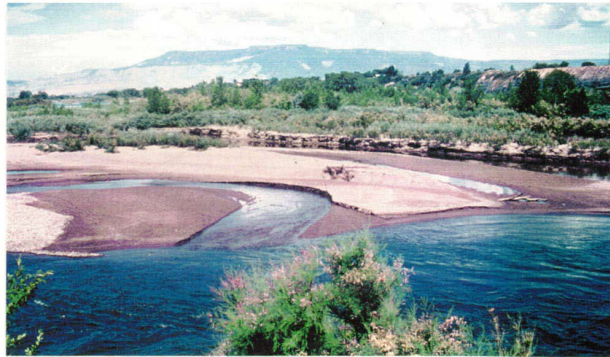


RECOVERY PROGRAM PARTNERS

- State of Colorado
- State of Utah
- State of Wyoming
- Bureau of Reclamation
- Water Users: CO, UT, WY
- Colorado River Energy Distributors Association
- Western Area Power Administration
- The Nature Conservancy
- Western Resource Advocates
- National Park Service
- U.S. Fish and Wildlife Service



IMPORTANCE OF THE '15-MILE REACH' TO COLORADO RIVER POPULATIONS OF ENDANGERED COLORADO PIKEMINNOW AND RAZORBACK SUCKER



“Importance of the ‘15-Mile Reach’ to Colorado River Populations of Endangered Colorado Pikeminnow and Razorback Sucker”
Osmundson, March 2000

The 15-Mile Reach has:

- Unique Geomorphology
- High Productivity
- Diversity of Habitats

$$\text{HABITAT}_i = f(Q_i)$$

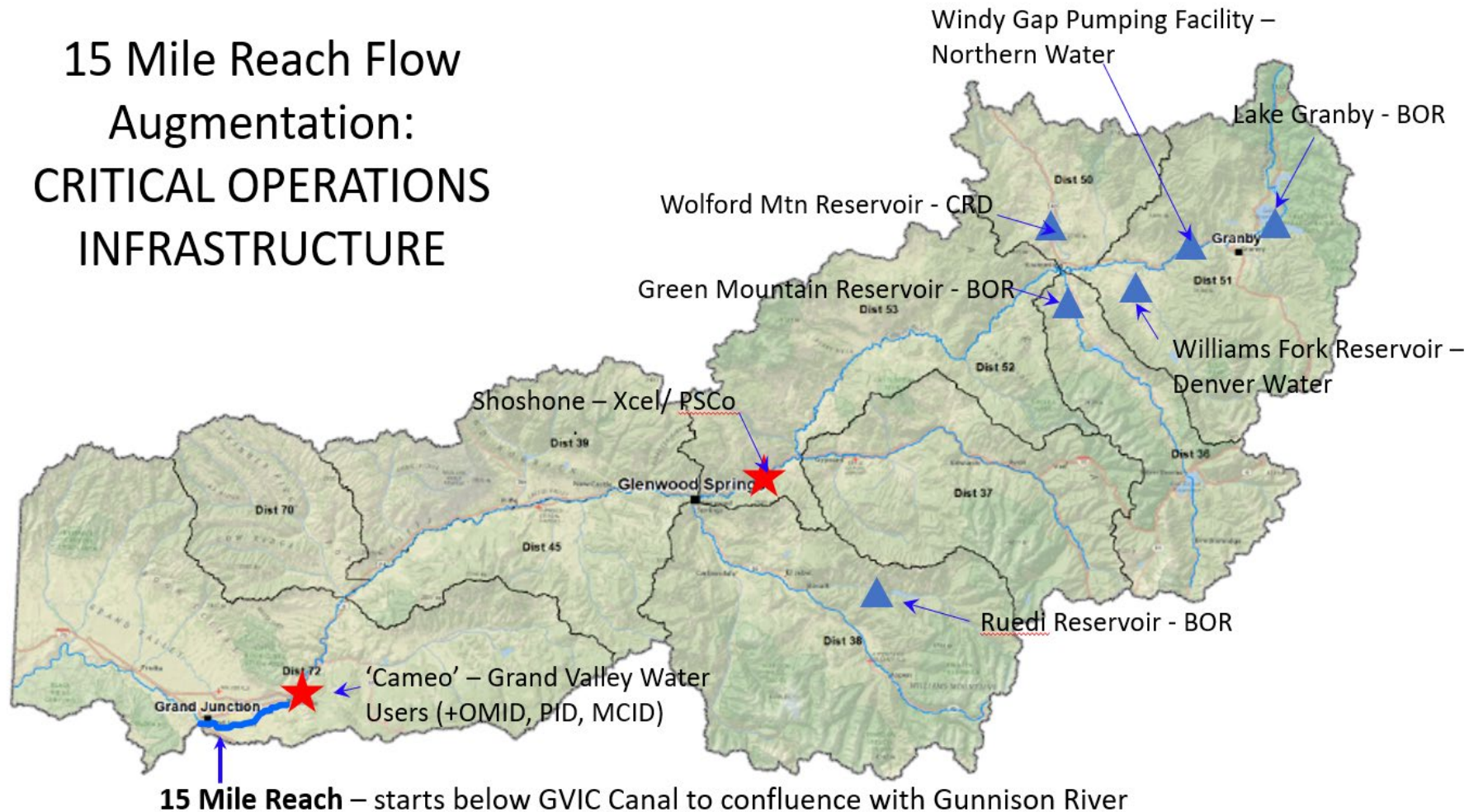


WATER YEAR 2023

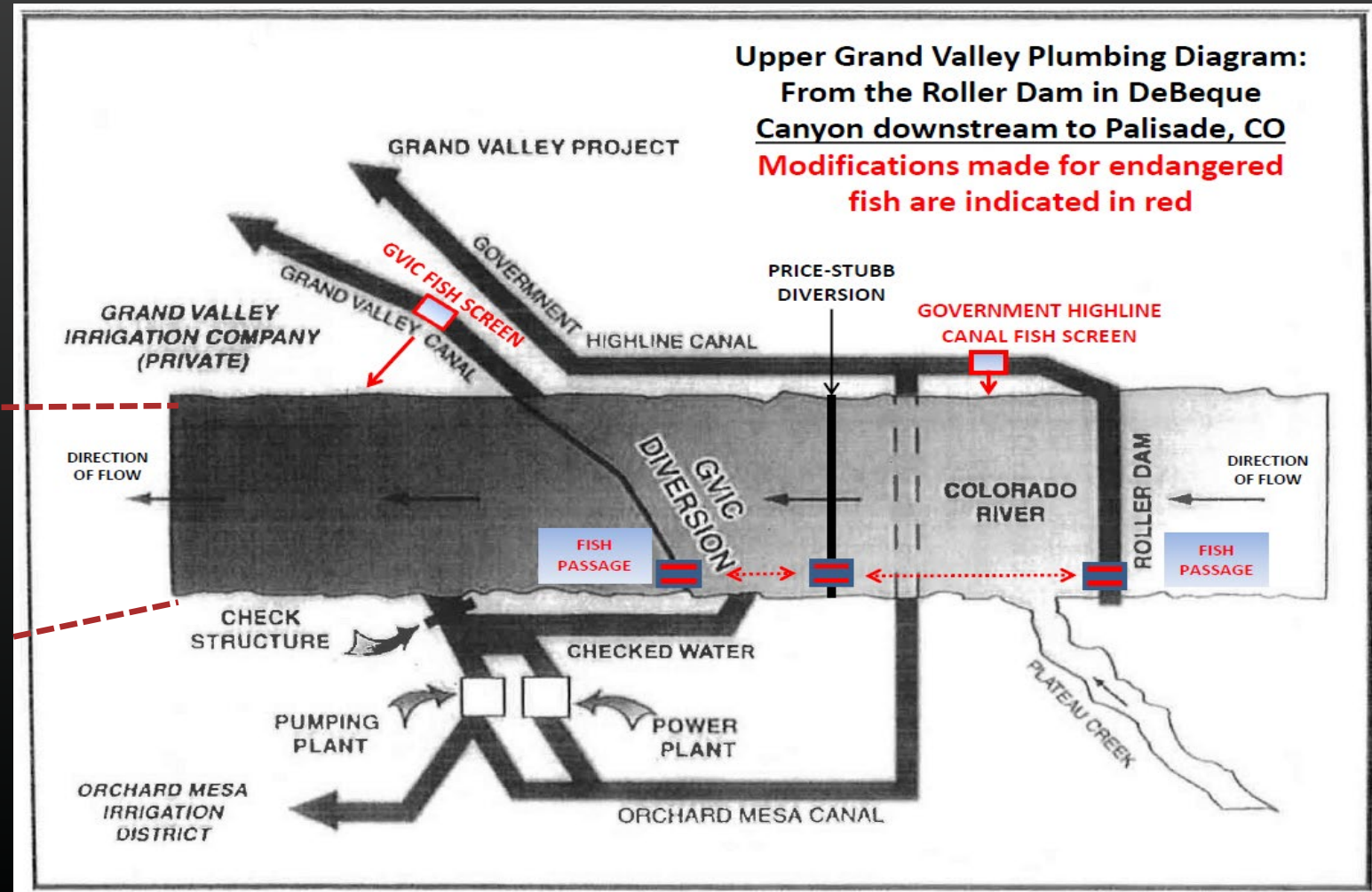
III. Recovery Program Flow Management

Upper CO River - 15 Mile Reach Example

15 Mile Reach Flow
Augmentation:
CRITICAL OPERATIONS
INFRASTRUCTURE



WATER YEAR 2023: Recovery Program Flow Management CAMEO, THE ROLLER DAM, HYDROPOWER AND THE 15 MILE REACH



Head of 15-Mile
Reach



WATER YEAR 2023: Recovery Program Flow Management

Water Sources for the 15 Mile Reach

Recovery Program Water Sources- Upper CO River



- CWCB - UTE
- CWCB - GarCo
- Ruedi - 5000
- Ruedi - 5412.5
- Ruedi - 5000 '4 in 5'
- Granby 5412
- Wolford 6000

SOURCE	AMT (AF)
Ruedi - CWCB - UTE	3000
Ruedi - CWCB - GarCo	225
Ruedi - 5000	5000
Ruedi - 5412.5	5412.5
Ruedi - 5000 '4 in 5'	5000
Granby 5412	5412.5
Wolford 6000	6000
TOTAL AF Available for 15-MR	30050
TOTAL AF Available (firm)	26825



WATER YEAR 2023: Recovery Program Flow Management

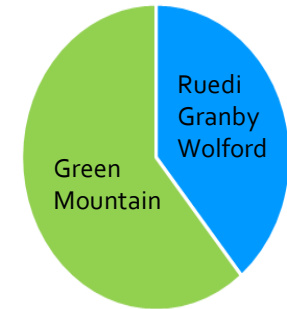
Water Sources for the 15 Mile Reach

15 MR Water Sources - by Reservoir

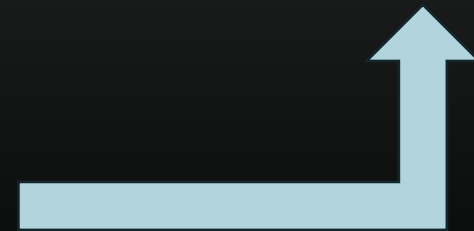


■ Ruedi = 18,637.5 AF ■ Granby = 5,412.5 AF ■ Wolford = 6,000 AF

15 Mile Reach: Program and HUP Surplus Water
(2023 Estimated)



■ All Program Sources = 30,050 AF ■ HUP SURPLUS = 46,923 AF

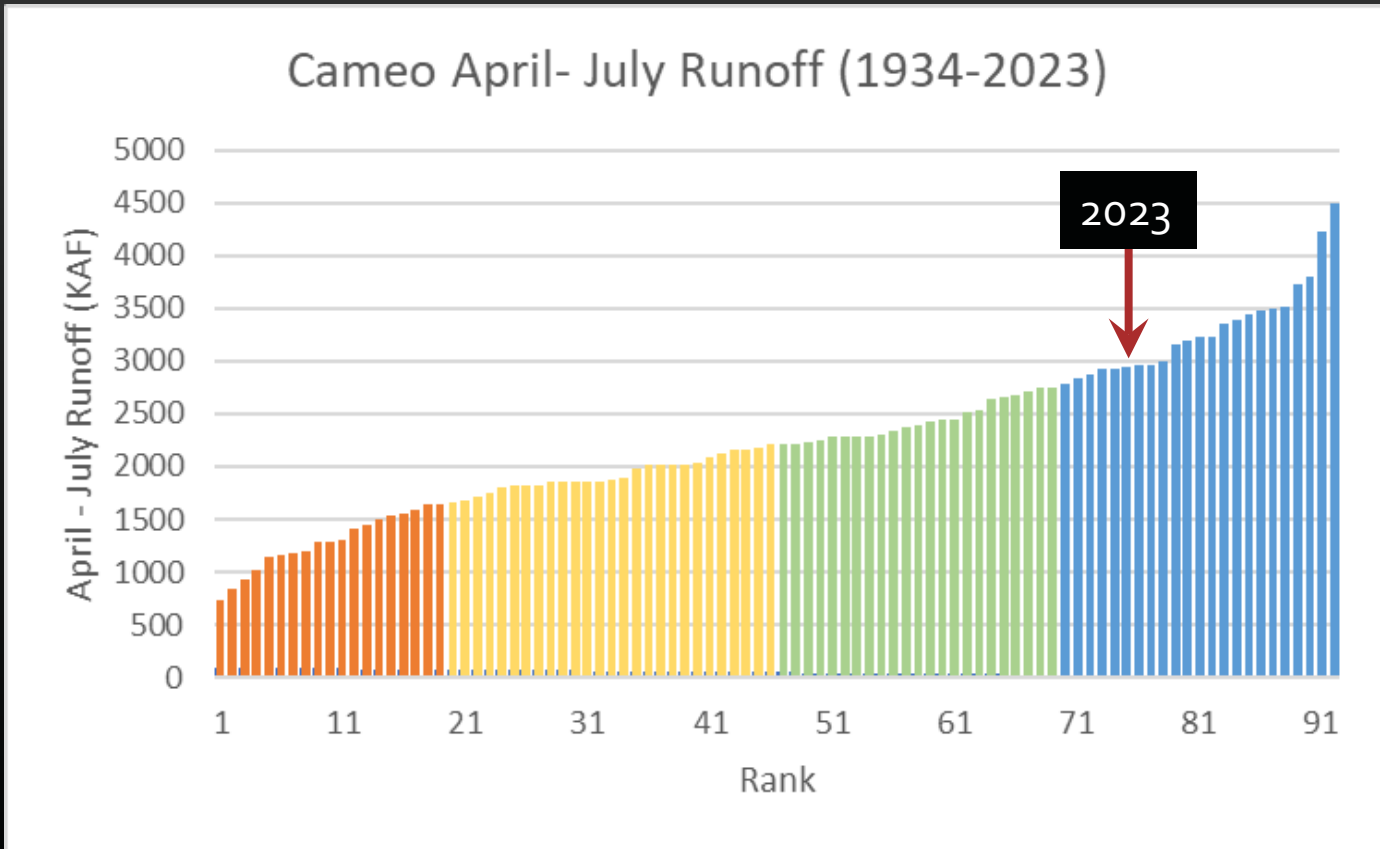


WATER YEAR 2023: Recovery Program Flow Management

15 Mile Reach - Year Type and Flow Targets

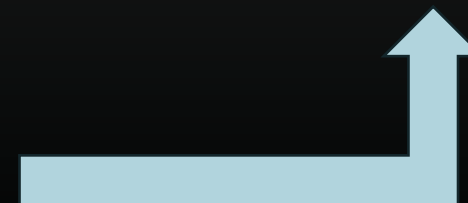
April – July Cameo Runoff: 2,930 KAF = WET YEAR

Colorado River PBO – Monthly Ave Flow Targets



EXCEEDANCE RATE	25 PERCENT	25 PERCENT	30 PERCENT	20 PERCENT
	25 PERCENT	50 PERCENT	80 PERCENT	100 PERCENT
JAN	1630	1630	1630	1240
FEB	1630	1630	1630	1240
MAR	1630	1630	1630	1240
APR	3210	2440	2260	1860
MAY	10720	9380	7710	7260
JUN	15660	14250	11350	6850
JUL	7060	5370	3150	1480
AUG	1630	1630	1240	810
SEP	1630	1630	1240	810
OCT	1630	1630	1240	810
NOV	1630	1630	1630	1240
DEC	1630	1630	1630	1240
	WET	WET/AVG	DRY/AVG	DRY

CFS in Monthly Average Flows



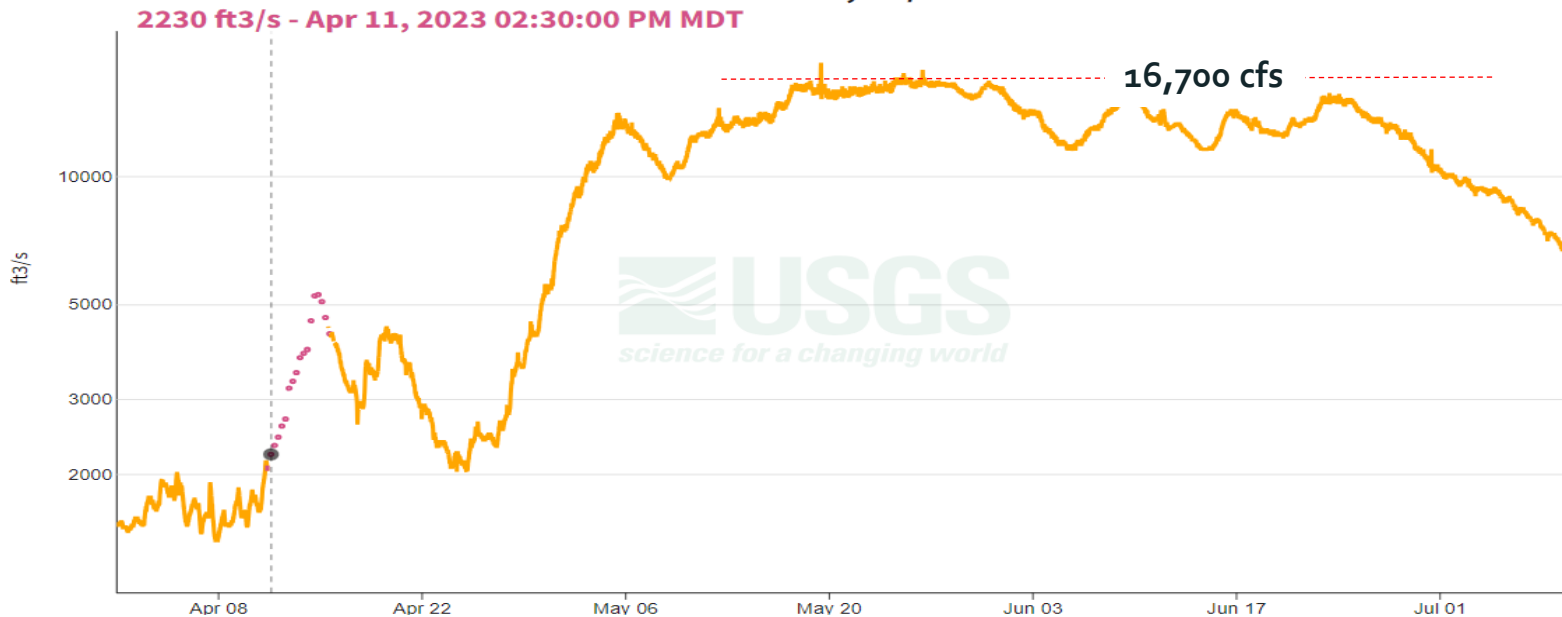
WATER YEAR 2023: Recovery Program Flow Management

15 Mile Reach - Peak Flow Targets

Colo River Below Grand Valley Div NR Palisade, CO - 09106150

April 1, 2023 - July 9, 2023

Streamflow, ft³/s ⓘ



ONE DAY PEAK FLOW TARGETS

- >23,500 CFS (WET)
- >21,750 CFS (AVE-WET)
- >16,700 CFS (AVE-DRY)

PEAK in 2023 = 16,900 on May 26

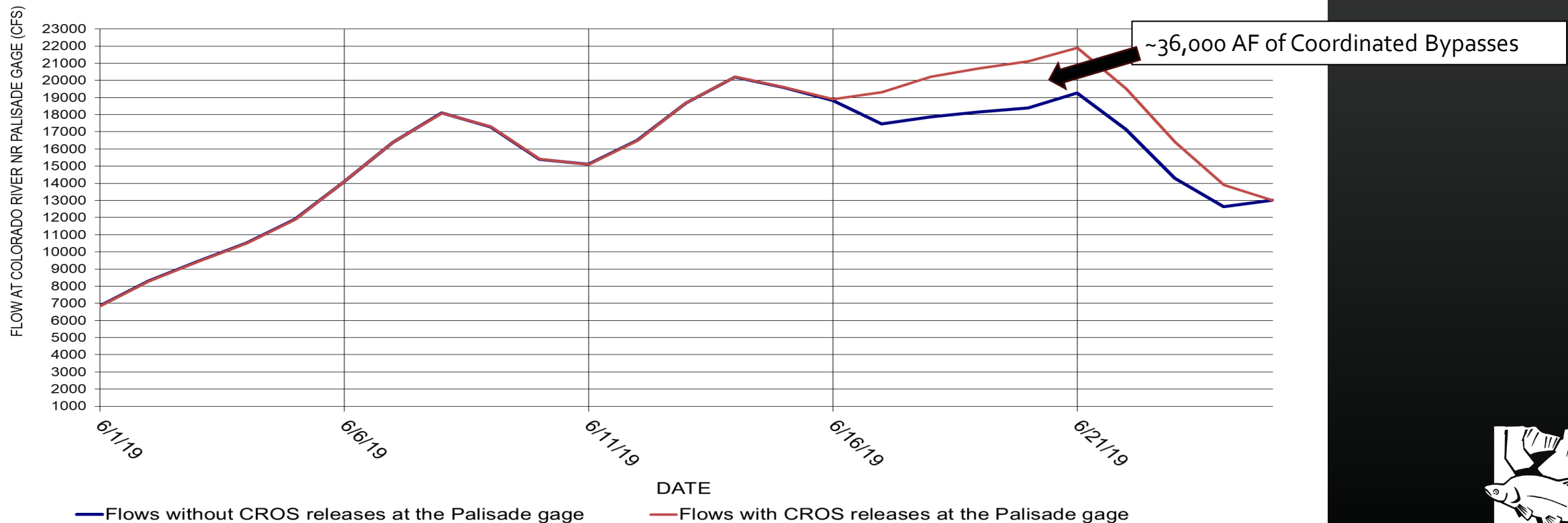
**NO COORDINATED RESERVOIR OPERATIONS (CROS) FOR
PEAK FLOW ENHANCEMENT IN 2023**



WATER YEAR 2023: Recovery Program Flow Management

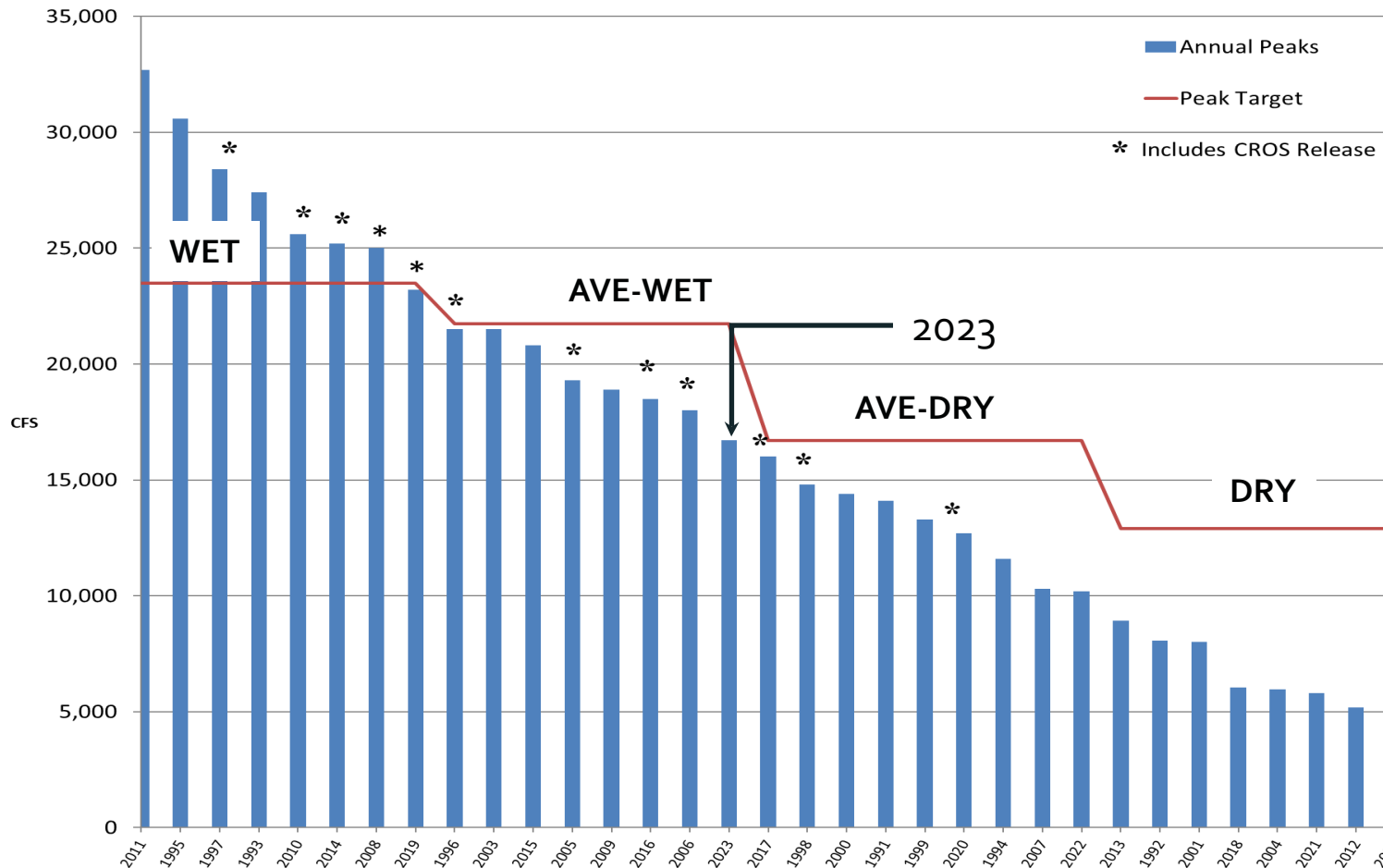
15 Mile Reach – Example: 2019 CROS Operations

IMPACT OF EARLY SEASON RESERVOIR RELEASES IN THE GRAND VALLEY
(As Measured at the Colorado River near Palisade Gage)
2019 CROS RELEASE



WATER YEAR 2023: Recovery Program Flow Management 15 Mile Reach - History of Peak Flows, Targets, and CROS Operations

Annual Peak Flow @ Palisade, CO 1991-2023 vs. Long-Term Targets



Meeting Peak Flow Targets Affected by Other Factors, e.g.:

- CROS Operations
- Downstream Flooding
- Gunnison Flows
- YR-1..., Yr +1...



WATER YEAR 2023: Recovery Program Flow Management *15 Mile Reach – August thru October Low Flow Targets*

Colo River Below Grand Valley Div NR Palisade, CO - 09106150

August 1, 2023 - October 6, 2023
Discharge, cubic feet per second

851 ft³/s - Sep 29, 2023 08:15:00 PM MDT



**PBO Aug-Oct Target
Flows & Year Type**

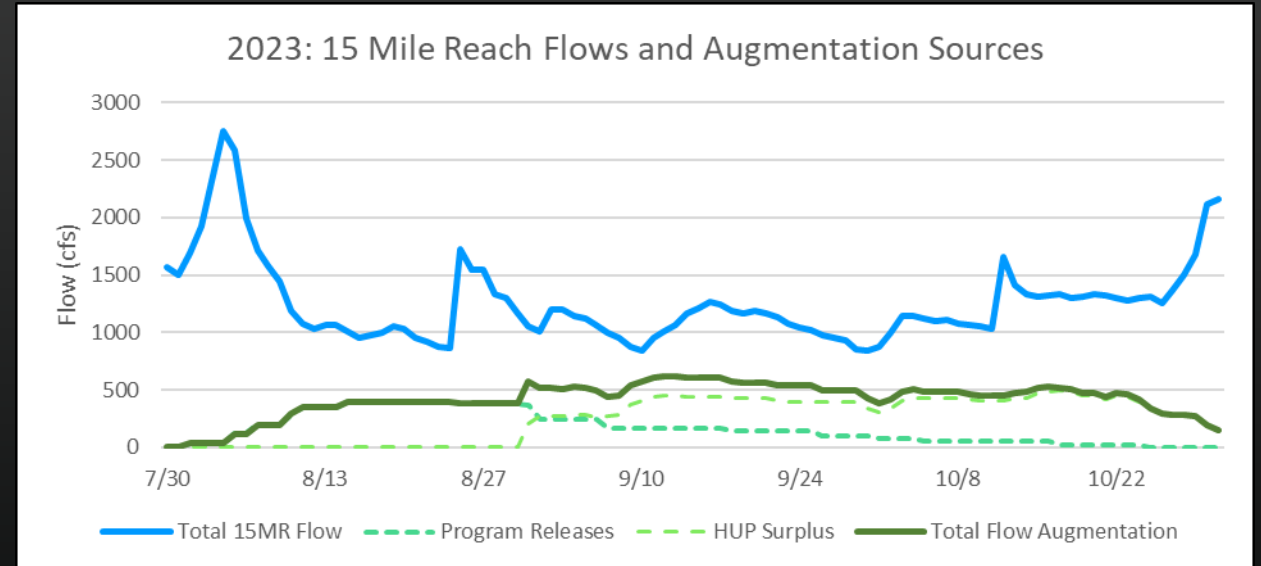
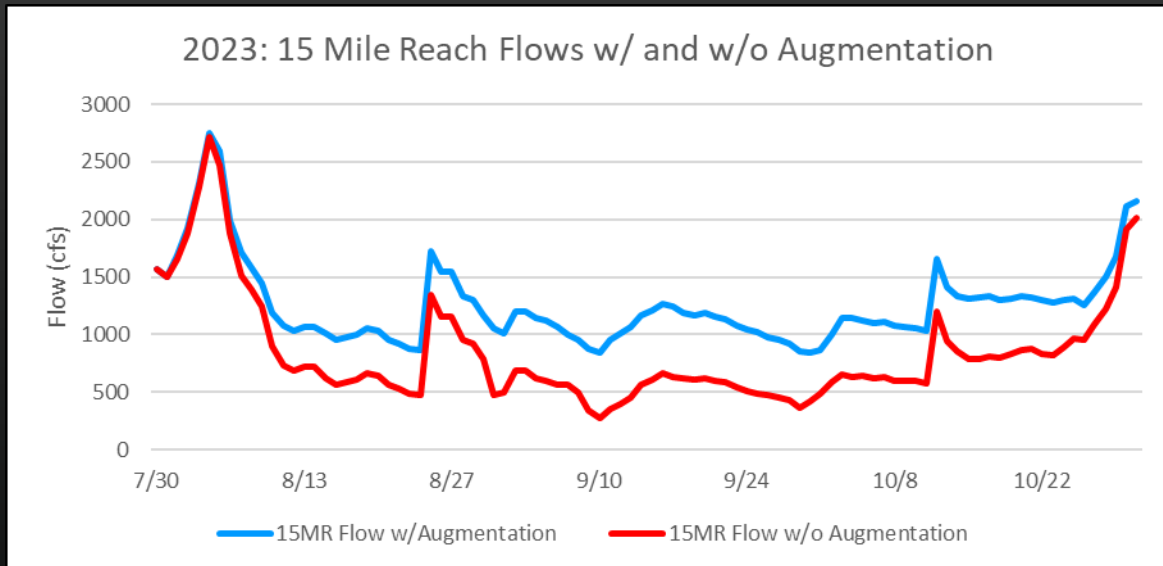
1,630 cfs – WET & AVE WET

1,240 cfs – AVE DRY

810 cfs - DRY



WATER YEAR 2023: Recovery Program Flow Management 15 Mile Reach SUMMARY - Benefits and Sources of Flow



BENEFITS



SOURCES



WATER YEAR 2023: *Upper Colorado River Recovery Program – Meeting Flow Targets in the 15 Mile Reach*

April – July Cameo Runoff: 2,930 KAF = WET YEAR

	2023 Flows	WET Target	AVE-Wet Target	AVE Dry Target	DRY Target
JAN	1505	1630	1630	1630	1240
FEB	1294	1630	1630	1630	1240
MAR	1714	1630	1630	1630	1240
APR	2781	3210	2440	2260	1860
MAY	13890	10720	9380	7710	7260
JUN	13320	15660	14250	11350	6850
JUL	5089	7060	5370	3150	1480
AUG	1377	1630	1630	1240	810
SEP	1062	1630	1630	1240	810
OCT	1210	1630	1630	1240	810

 Target Met
 Target NOT Met

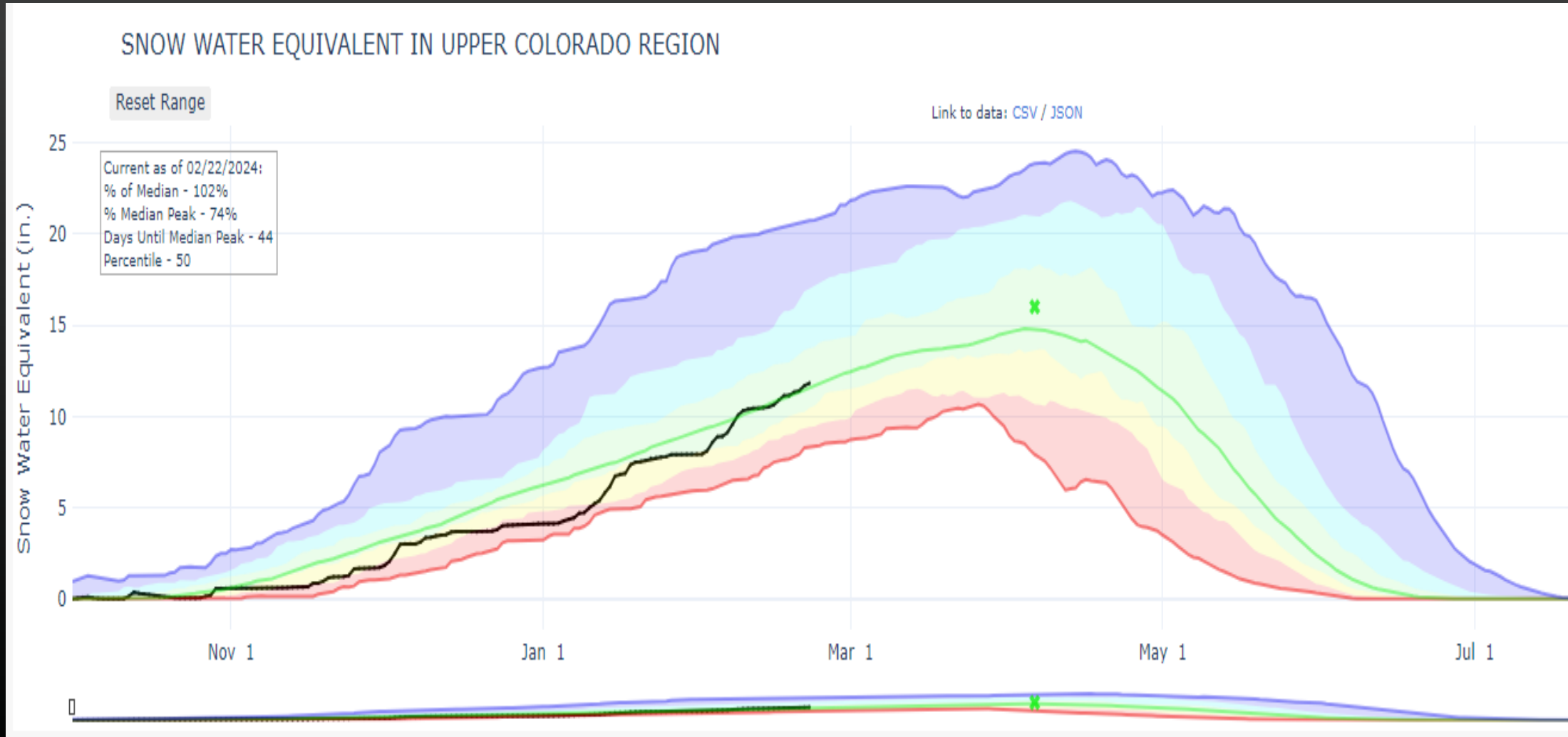


Hydrology and Instream Flow Updates

IV. Water Year 2024 – How Are we Doing?

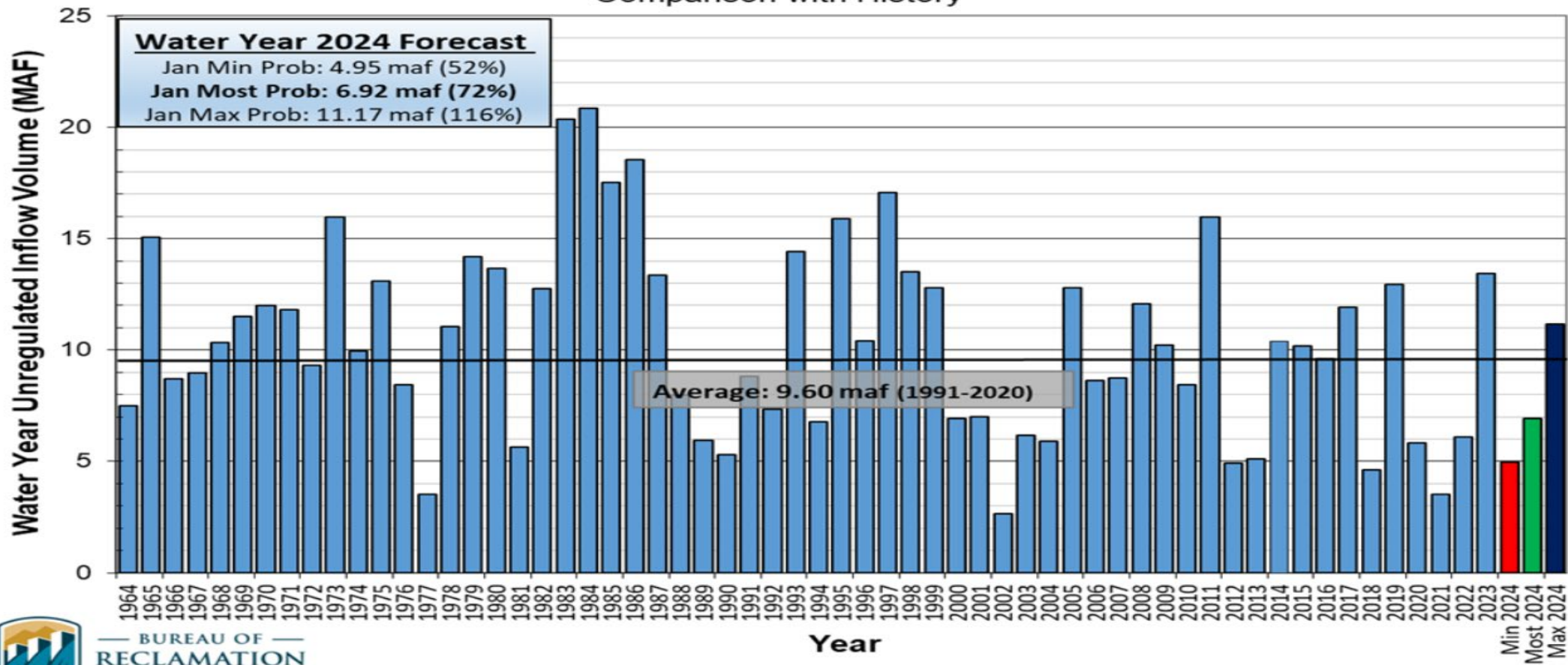
'Above Lake Powell' Snow Water Equivalent

CBRFC April – July Runoff: 79% AVE (2-23-24)



WATER YEAR 2024: How Are We Doing?

Lake Powell Unregulated Inflow Water Year 2024 Forecast (issued January 4) Comparison with History

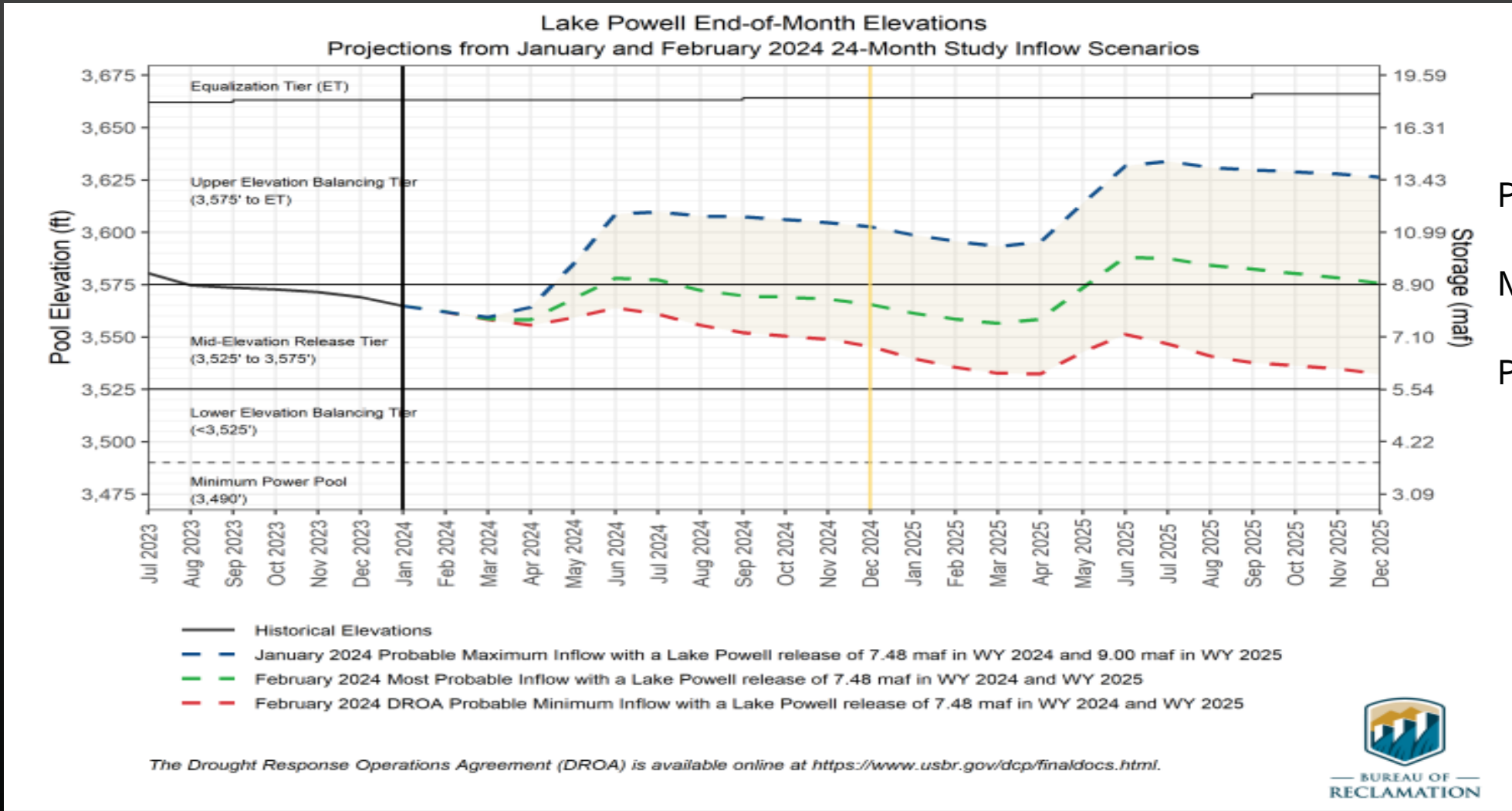


BUREAU OF RECLAMATION



WATER YEAR 2024: How Are We Doing?

Lake Powell 24-Month Study



Probable MAX (10%) ---

Most Probable (50%) ---

Probable MIN (90%) ---

CURRENT (2/20/2024): ELEV: 3563.2'; STORAGE = 8.059 Million AF; 33% Full

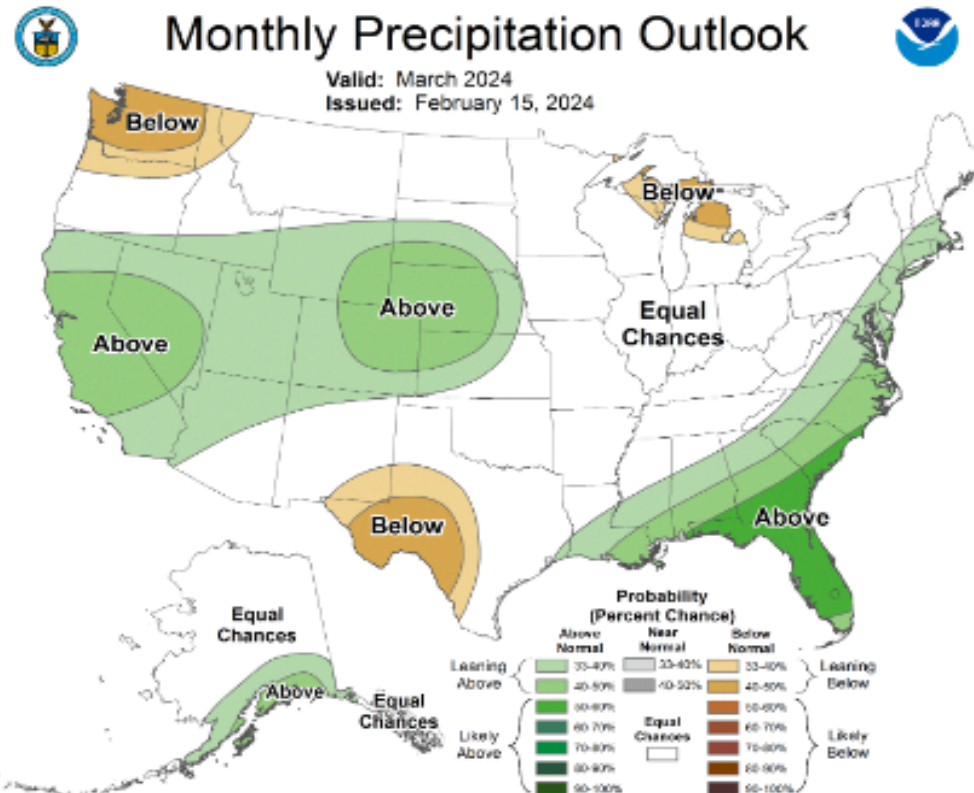
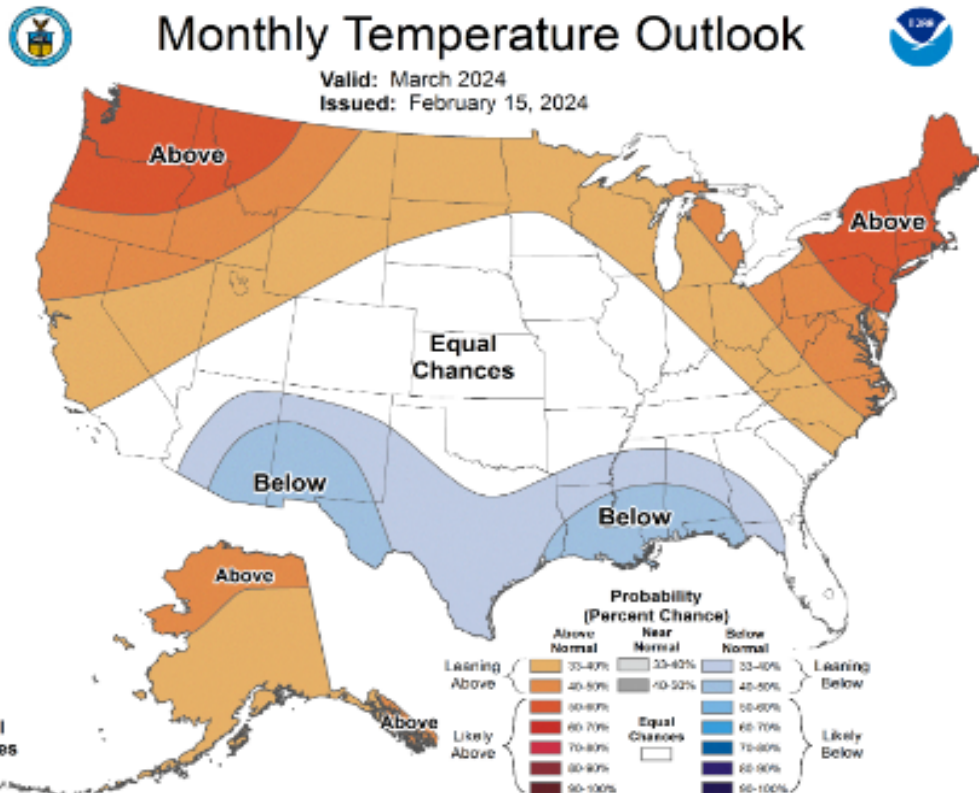


WATER YEAR 2024: How Are We Doing?

Official 30-Day Forecast (2/15/24)

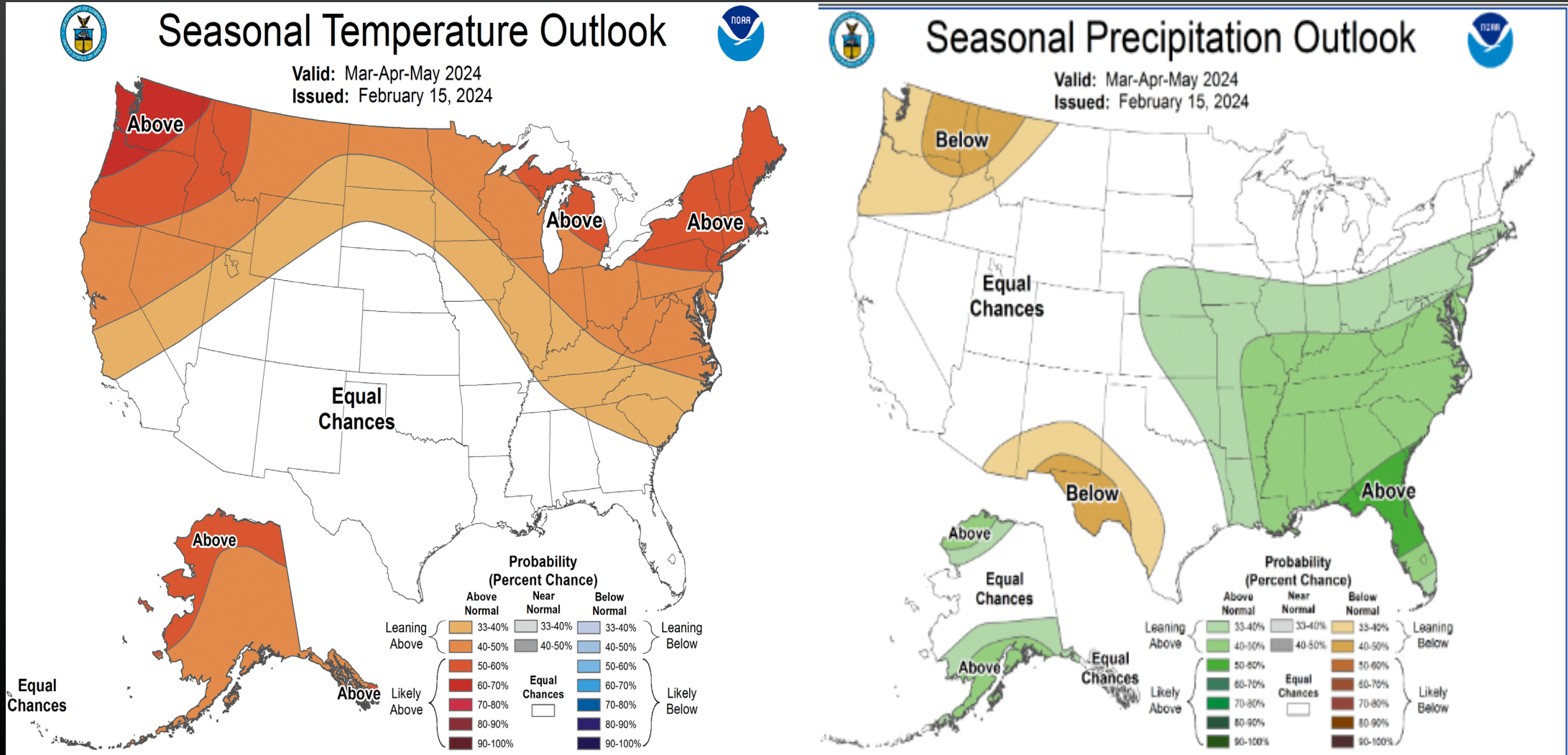
OFFICIAL 30-Day Forecasts

Issued: February 15, 2024



WATER YEAR 2024: How Are We Doing?

Official 3-Month Outlook (2/15/24)

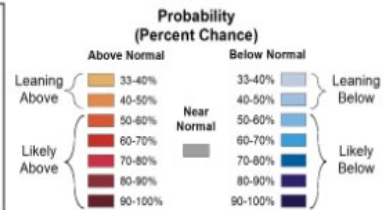
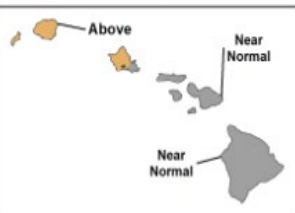
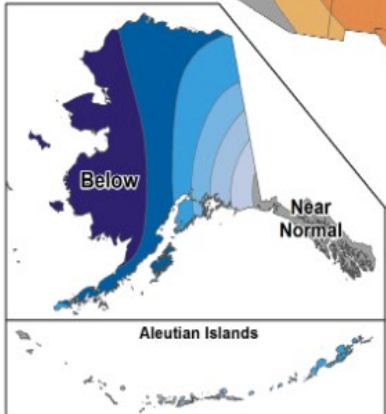
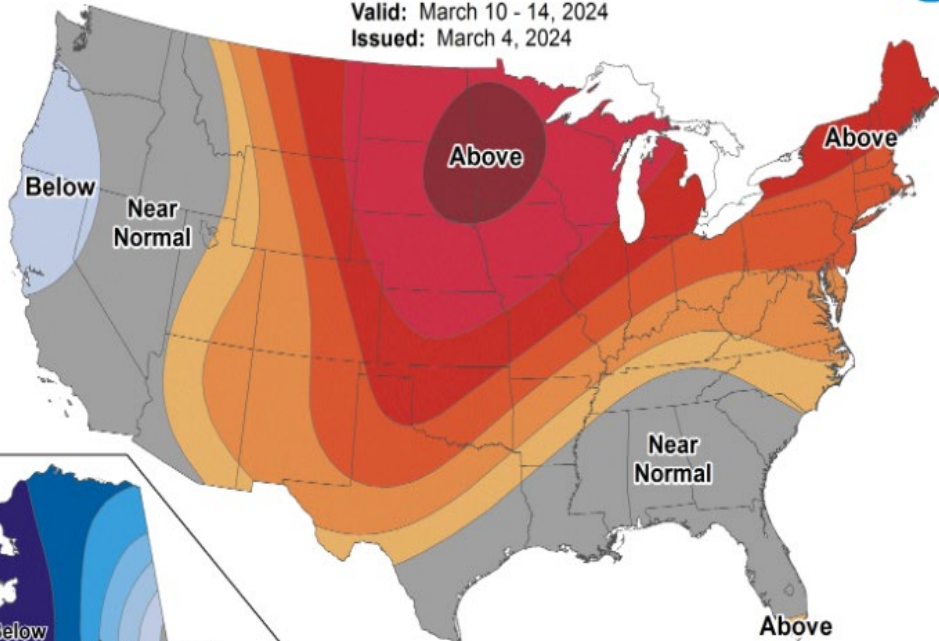


WATER YEAR 2024: How Are We Doing? (better news?) 6-10 Day Forecast

Temperature Probability

6-10 Day Temperature Outlook

Valid: March 10 - 14, 2024
Issued: March 4, 2024



6-10 Day Precipitation Outlook

Valid: March 10 - 14, 2024
Issued: March 4, 2024

