Upper Colorado Recovery Program: Mainstem Colorado River 15-Mile Reach

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Upper Colorado River Recovery Program
What does an “Instream Flow Coordinator” do?

• Works with partners to try to maintain enough water in key river reaches of the upper Colorado River basin at the right times to promote endangered fish recovery.

• Monitors basinwide water use and development, and assists with strategies allowing for continued use and development while recovering the endangered fish.
Instream Flow Management Occurs Throughout the Upper Basin

**Aspinall Unit (Gunnison River):**
Cooperators: BOR

**Navajo Reservoir (San Juan River):**
Cooperators: BOR

**Duchesne River Reservoirs:**
Cooperators: CUWCD, BOR

**Elkhead Reservoir (Yampa River):**
Cooperators: CRWCD, City of Craig, TriState Power

**Upper Colorado Reservoirs:** Cooperators: CRWCD, East Slope Water Users (NCWCD, City of Denver, Colorado Springs), West Slope Water Users (Cities of Grand Junction, Palisade), BOR, Grand Valley irrigators

**Flaming Gorge Reservoir (Green River):**
Cooperators: BOR

**Aspinall Unit (Gunnison River):**
Cooperators: BOR

**Navajo Reservoir (San Juan River):**
Cooperators: BOR
Why is the 15-Mile Reach important?

• Considered habitat critical to the recovery of Colorado pikeminnow and razorback sucker

• Clean cobble bars in this reach provide some of the most suitable spawning sites for these two species

• As a result, year-round flow recommendations were developed (Osmundson et al., 1995)
15-Mile Reach Diversion Improvements

Delivery efficiencies

Fish ladders
Why are peak flows important?

• Remove fine sediments from spawning gravels & cobbles, scour pools, mobilize & re-work coarse bed sediments

• Reconnect backwaters and side channels

• Inhibit vegetative encroachment/channel narrowing

• Provide spawning cues
What are the peak flow recommendations?

One-day average cfs exceedance:

- **> 23,500 cfs** (5 in 20 years) – “Wet” years
- **21,750 cfs** (10 in 20 years) – “Wet/Average” years
- **16,700 cfs** (16 in 20 years) – “Dry/Average” years
- **12,900 cfs** (20 in 20 years) – “Dry” years
Green Mtn Reservoir 14,410 AF
Willow Creek Reservoir 7,206 AF
Williams Frk + Moffat Tunnel 5,372 AF
Ruedi Reservoir 4,502 AF
Wolford Mtn Reservoir 4,245 AF

About 2,400 cfs
How often are the peak flow targets achieved?

With ‘Coordinated Reservoir Operations’, good success meeting/exceeding target peak flows in wetter-than-average years; less success in drier years.
Why are **base flows** important?

- Maintain adequate mix of habitat needed by endangered species
- Adequate riffle depths important for fish movement in the river (while reducing vulnerability to avian predation)
- Adequate depth & stability in backwaters and low-velocity channel margins
What are the base flow targets?

Mean monthly CFS, based on the type of hydrologic year:

<table>
<thead>
<tr>
<th>Exceedance</th>
<th>25 percent</th>
<th>50 percent</th>
<th>80 percent</th>
<th>100 percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUG</td>
<td>1,630</td>
<td>1,630</td>
<td>1,240</td>
<td>810</td>
</tr>
<tr>
<td>SEP</td>
<td>1,630</td>
<td>1,630</td>
<td>1,240</td>
<td>810</td>
</tr>
<tr>
<td>OCT</td>
<td>1,630</td>
<td>1,630</td>
<td>1,240</td>
<td>810</td>
</tr>
</tbody>
</table>
Summer 2017 Flows in the 15-Mile Reach of the Colorado River

WITH Reservoir Releases

WITHOUT Reservoir Releases

USFWS Mean Monthly Target

1,240 cfs target

Total 79,038 AF flow augmentation releases from reservoirs
Where do we get augmentation water?

<table>
<thead>
<tr>
<th>Contractor/Contract No.</th>
<th>Amount (AF)</th>
<th>Notes</th>
<th>Period of Use</th>
<th>Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ruedi</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CWCB #0-07-60-W0540</td>
<td>5,000 + 5,000</td>
<td>Signed 2/21/1990 for 40 years w/ renewability</td>
<td>January 1 – December 31</td>
<td>2030</td>
</tr>
<tr>
<td></td>
<td>(4 out of 5 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River District #139D6C0024</td>
<td>5,412.5</td>
<td>West Slope contribution to 10,825 water.</td>
<td>January 1 – December 31</td>
<td>Perpetuity</td>
</tr>
<tr>
<td>Ute Lease CMS #83182 Ute Contract #139D6C0111</td>
<td>6,000 - 12,000</td>
<td>Lease began in 2015 and is authorized until 4/30/2020</td>
<td>July 1 - September 30</td>
<td>2019</td>
</tr>
<tr>
<td><strong>Granby</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Water # 4310J</td>
<td>5,412.5</td>
<td>East Slope contribution to 10,825 water.</td>
<td>August – October</td>
<td>Perpetuity</td>
</tr>
<tr>
<td><strong>Wolford</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998 Wolford Biological Opinion</td>
<td>6,000</td>
<td>Can carry-over 1 year to protect this junior fill right</td>
<td>March 1 - December 1</td>
<td>Until fish are recovered</td>
</tr>
<tr>
<td><strong>Green Mountain Reservoir</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stipulation and Agreement, District Court, Water Division No. 5, State of Colorado, Case No. 91CW247</td>
<td>0 to 66,000</td>
<td>These conditions need to be met: (1) The Orchard Mesa Check is physically operable, (2) There is at least 66,000 acft of water available for HUP, (3) The Shoshone right continues to operate as it has historically.</td>
<td></td>
<td>Perpetuity</td>
</tr>
<tr>
<td>Municipal Recreation Agreement # 14XX650133</td>
<td>see above</td>
<td>With the Town of Palisade, City of Grand Junction, and City of Fruita</td>
<td></td>
<td>12/31/2054</td>
</tr>
</tbody>
</table>
Sources of Water to Augment 15-Mile Reach Base Flows (2014-2016 Averages)

- Green Mtn Reservoir: 55%
- Ruedi Reservoir: 22%
- Palisade Bypass: 13%
- Wolford Mtn Reservoir: 4%
- Granby Reservoir: 5%
CWCB’s Aug-Oct ISF Rights

CWCB has 2 instream flow rights for endangered fish in the 15-mile reach, both for Jul 1 – Oct 31:

- **1992 priority 581 cfs**
  - Equals combined discharge of the Grand Valley Power Plant and OMID hydraulic pumps

- **1994 priority for an additional 300 cfs in the lower two miles**
  - Reflects accretions from irrigation return flows
Achieving monthly targets remains difficult in many years, particularly July-Oct of drier years:

- 17 of 28 ‘Dry Year’ base flow months have been short of 810 cfs ave target
- 14 of 28 ‘Dry/Ave Year’ base flow months short of 1240 cfs

### Table: Monthly Flow Targets and Achievements

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Wet' Year (&lt;25% Exceedance) - Avg Monthly Flow Targets</td>
<td>1,630</td>
<td>1,630</td>
<td>1,630</td>
<td>3,210</td>
<td>10,720</td>
<td>15,660</td>
<td>7,060</td>
<td>1,630</td>
<td>1,630</td>
<td>1,630</td>
<td>1,630</td>
<td>1,630</td>
</tr>
<tr>
<td>2011</td>
<td>1,627</td>
<td>1,642</td>
<td>2,041</td>
<td>3,330</td>
<td>10,320</td>
<td>26,430</td>
<td>16,130</td>
<td>2,879</td>
<td>1,762</td>
<td>1,777</td>
<td>2,221</td>
<td>1,840</td>
</tr>
<tr>
<td>1997</td>
<td>2,179</td>
<td>2,122</td>
<td>2,798</td>
<td>3,402</td>
<td>12,870</td>
<td>20,860</td>
<td>5,213</td>
<td>3,574</td>
<td>2,461</td>
<td>2,560</td>
<td>2,484</td>
<td>2,370</td>
</tr>
<tr>
<td>1995</td>
<td>1,429</td>
<td>1,449</td>
<td>1,749</td>
<td>962</td>
<td>5,415</td>
<td>20,040</td>
<td>16,010</td>
<td>3,897</td>
<td>1,339</td>
<td>1,477</td>
<td>2,373</td>
<td>2,198</td>
</tr>
<tr>
<td>2014</td>
<td>1,703</td>
<td>1,816</td>
<td>2,200</td>
<td>3,892</td>
<td>10,120</td>
<td>13,740</td>
<td>4,435</td>
<td>1,837</td>
<td>1,786</td>
<td>1,945</td>
<td>2,094</td>
<td>1,928</td>
</tr>
<tr>
<td>1993</td>
<td>1,429</td>
<td>1,544</td>
<td>2,015</td>
<td>2,540</td>
<td>14,160</td>
<td>15,830</td>
<td>6,702</td>
<td>1,788</td>
<td>1,287</td>
<td>1,279</td>
<td>1,837</td>
<td>1,873</td>
</tr>
<tr>
<td>2008</td>
<td>1,556</td>
<td>1,813</td>
<td>1,993</td>
<td>2,192</td>
<td>10,300</td>
<td>17,290</td>
<td>6,816</td>
<td>1,877</td>
<td>1,703</td>
<td>1,510</td>
<td>2,127</td>
<td>1,839</td>
</tr>
</tbody>
</table>

| 'Wet/Ave Year (26-50% Exceedance) - Avg Monthly Flow Targets | 1,630 | 1,630 | 1,630 | 3,240 | 14,250 | 5,370 | 1,630 | 1,630 | 1,630 | 1,630 | 1,630 | 1,630 |
| 1996 | 2,093 | 2,416 | 2,787 | 4,837 | 11,820 | 12,360 | 4,105 | 876 | 1,085 | 1,123 | 2,248 | 2,200 |
| 2009 | 1,831 | 1,770 | 1,874 | 3,337 | 11,720 | 11,870 | 4,841 | 1,461 | 1,127 | 1,413 | 1,870 | 1,453 |
| 2015 | 1,747 | 1,756 | 1,990 | 1,61 | 6,096 | 14,980 | 4,621 | 1,245 | 1,241 | 1,237 | 1,827 | 1,520 |
| 1999 | 1,931 | 1,854 | 1,789 | 4,794 | 11,000 | 4,556 | 2,183 | 1,771 | 1,387 | 2,054 | 1,780 |

| 'Dry/Ave Year (51-80% Exceedance) - Avg Monthly Flow Targets | 1,630 | 1,630 | 1,630 | 3,240 | 11,350 | 3,150 | 1,240 | 1,240 | 1,240 | 1,630 | 1,630 |
| 2006 | 1,849 | 1,722 | 2,229 | 4,364 | 9,305 | 6,140 | 2,044 | 1,152 | 1,271 | 1,996 | 2,166 | 1,880 |
| 1999 | 1,931 | 1,854 | 1,789 | 4,794 | 11,000 | 4,556 | 2,183 | 1,771 | 1,387 | 2,054 | 1,780 |

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| 'Dry Year (81-100% Exceedance) - Avg Monthly Flow Targets | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 | 1,240 |
| 1994 | 1,794 | 1,903 | 2,109 | 1,802 | 4,874 | 4,585 | 744.6 | 557.5 | 650 | 843.4 | 1,220 | 1,460 |
| 2001 | 1,322 | 1,352 | 1,476 | 972.7 | 5,149 | 3,764 | 995.3 | 1,133 | 1,014 | 807.1 | 1,573 | 1,345 |
| 1992 | 1,378 | 1,475 | 1,684 | 1,773 | 4,603 | 3,164 | 1,196 | 822 | 800.9 | 628.1 | 1,628 | 1,423 |
| 2004 | 1,322 | 1,300 | 1,597 | 1,066 | 3,297 | 2,976 | 973.5 | 497.6 | 830.3 | 1,079 | 1,801 | 1,487 |
| 2013 | 1,137 | 1,147 | 1,202 | 1,076 | 4,043 | 4,306 | 742.6 | 727.4 | 1,272 | 1,288 | 2,031 | 1,707 |
| 2012 | 1,765 | 1,600 | 2,026 | 1,392 | 1,840 | 1,052 | 615.1 | 454.1 | 371.7 | 528.6 | 1,404 | 1,188 |
| 2002 | 1,405 | 1,268 | 1,396 | 1,010 | 1,016 | 934.9 | 161 | 115.4 | 240.9 | 526.2 | 1,618 | 1,217 |

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- Observed average monthly flow target met
- Observed average monthly flow target not met, but > minimum monthly (810 cfs)
- Observed average monthly flow < 810 cfs

Provisional/Draft analysis subject to change.
Who are the partners who help make this all happen?

- **Colorado Water Conservation Board**
  - Coordinate CROS peak flow augmentation
  - Lease water for 15-Mile Reach base flows
- **Water users in Grand Valley**
  - Operate to maximize fish passage and screening
  - Collaborate to enhance flows when they can
  - Ute Water Conservancy District water leasing
- **Colorado River District**
  - Wolford Reservoir Operations
  - Assistance with water leasing & coordination
- **Bureau of Reclamation**
  - Granby, Green Mountain, and Ruedi Reservoir operations
  - Coordinate Green Mountain Reservoir HUP calls
- **Colorado Water Trust**
- **Others**
  - Roaring Fork Conservancy
Recovery Program Flow Augmentation Provides Additional Benefits

Augmented spring peaks clean gravel substrates that support coldwater and warmwater fisheries.

Augmented spring and summer flow aids rafting and other recreation interests.

Augmented flow to Lake Powell helps upper-basin states meet lower basin delivery obligations under the Colorado Compact.
Discussion? Questions?