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# United States Department of the Interior

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### Memorandum

To: Implementation/Management Committee, Consultants, and Interested Parties

From: Regional Director, Region 6 *Neville E. Walsh*

Subject: 2016—2017 Abbreviated Assessment of Sufficient Progress under the Upper Colorado River Endangered Fish Recovery Program in the Upper Colorado River Basin

In accordance with the Section 7, Sufficient Progress, and Historic Projects Agreement, the U.S. Fish and Wildlife Service (Service) is reviewing 2016—2017 and cumulative accomplishments and shortcomings of the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) in the upper Colorado River basin. Per that Agreement, the Service uses the following criteria to evaluate whether the Recovery Program is making “sufficient progress” toward recovery of the four listed fish species:

1. Actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction;
2. Status of the fish populations;
3. Adequacy of flows; and
4. Magnitude of the impact of projects.

In odd-numbered years beginning in 2017, the Service provides an abbreviated review of Recovery Program accomplishments and shortcomings to evaluate progress toward endangered species recovery and the ability of the Recovery Program to provide Endangered Species Act (ESA) compliance for water projects. A full review, including an overview of species status and review of action items in the 15-Mile Reach, Gunnison, and Yampa River programmatic biological opinions (PBOs) is provided in even-numbered years.

The final March 27, 2017, assessment of accomplishments and shortcomings of the Recovery Program under the Recovery Implementation Program Recovery Action Plan (RIPRAP) from February 1, 2016, through January 31, 2017, is incorporated in the [tables to the RIPRAP](#) found at on the Recovery Program’s website.

Although this memo focuses on the RIPRAP assessment timeframe of February 1, 2016 - January 31, 2017, more recent information has been incorporated where warranted. Previous years' accomplishments and shortcomings are described in [previous "sufficient progress" memoranda](#) and outlined in the RIPRAP itself.

The Service issued its [most recent sufficient progress memorandum](#) on December 20, 2016.

#### **A. Status of the Species in the Upper Basin**

In the upper Colorado and Green river sub-basins (Figure 1, below), Colorado pikeminnow and humpback chub exist as wild populations with no support from stocking hatchery-reared fish. The Recovery Program monitors the adult abundance of both species under a number of independent projects. Adult Colorado pikeminnow abundance in the Colorado River sub-basin increased from 1992 – 2005, but has declined since 2005; similarly, adult abundances in the Green River sub-basin increased from 1991 to 2000 but has declined since 2000. Although populations have declined over the past 10-20 years, this species still supports itself through wild reproduction and recruitment. In the Colorado River sub-basin, recruitment appears adequate to support a sustainable population. However, in the Green River sub-basin, recruitment has declined over the past 15 years and does not appear sufficient to support a sustainable population.

Humpback chub exist in five core populations, three in the Colorado River and two in the Green River (numbered 1 – 5 in Table 2, below). In the Colorado River, adult abundance estimates of the two core populations (Black Rocks and Westwater Canyon) indicate stability since 2007 but remain below recovery criteria levels. The Cataract Canyon population appears stable at low densities. In the Green River, adult abundance estimates in Desolation Canyon indicate stability since 1985, but captures of recruits have been low in recent years. It appears as though humpback chub are extirpated from the fifth population, Dinosaur National Monument (a.k.a. Yampa/Whirlpool), as no individuals have been detected since the early 2000s. The Recovery Program is evaluating the feasibility of and strategies for reintroducing fish to this area via translocation. The 2002 recovery goals require maintenance of all five populations.

Hatchery-produced stocked fish form the foundation for reestablishing naturally self-sustaining populations<sup>1</sup> of razorback sucker and bonytail in the upper Colorado and Green river systems. The Recovery Program has been implementing an integrated stocking plan ([Integrated Stocking Plan Revisions Committee 2015](#)) with the goal of establishing self-sustaining populations of razorback sucker and bonytail in the upper Colorado River basin. The Recovery Program has been largely successful in meeting the plan's annual stocking targets.

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<sup>1</sup> To achieve naturally self-sustaining populations, adults must reproduce and recruitment of naturally spawned young fish into the adult population must occur at a rate to maintain the population at a minimum that meets the demographic criteria identified in the [recovery goals](#). Also, because of their longevity, hatchery produced adult razorback sucker and bonytail (and Colorado pikeminnow in the San Juan River) will contribute toward recovery.

Stocked razorback sucker are surviving in the wild, expanding their range into previously unoccupied areas, and annually reproducing in both the Green and Colorado River sub-basins; wild juvenile razorback sucker (ages 0, 1, and 2) are starting to be captured in small numbers.

Recaptures of stocked bonytail are rarer. However, increasing numbers of bonytail have been detected by stationary passive integrated transponder (PIT)-tag reading antennas and traditional sampling methods throughout the upper Colorado River basin.



Figure 1. Map of the upper Colorado River basin, which includes the areas managed by the Recovery Program and the San Juan River Basin Recovery Implementation Program.

The first reproduction by stocked bonytail was confirmed in floodplain habitats in the Green River in 2015 and again in 2016 (Bestgen et al. 2017). In 2002, the Service developed Recovery Goals (USFWS 2002 a–d) to supplement the individual endangered species recovery plans. The Recovery Goals contain specific demographic criteria to maintain self-sustaining populations and recovery factor criteria to ameliorate threats to the species.

In 2015, the Recovery Program initiated species status assessments (SSAs) for humpback chub and razorback sucker in order to fully summarize the current knowledge and status of these species. In addition, the Recovery Program commissioned a population viability analysis (PVA) for Colorado pikeminnow, which will contribute to an SSA for that species. All three SSAs are scheduled for completion in FY18. The SSA is an analytical tool used by the Service to summarize biological and ecological information that can help inform a variety of decisions and activities under the ESA, including recovery planning, species status reviews, inter-agency consultations, and species reclassifications.

The framework of an SSA considers species needs, species current and future conditions, and species viability. The SSA is not a decision document, but rather a document used to inform future decisions. The Service will use the three SSAs to serve as the basis for the next 5-year Status Reviews to be completed in 2018. The 5-year Status Reviews will include the Service's decision on the need for revision of species' recovery plans and whether the agency will explore a listing re-classification.

Table 1. Summary of Colorado pikeminnow status and trends.

Subbasin	Life Stage	2002 Recovery Goal Downlisting Criteria <sup>2</sup>	Long-term <sup>3</sup> abundance / trend	Short-term abundance / trend; 5 most recent data points	Summary
Colorado River	Adults (≥450 mm TL)	N = >700 individuals.	N = 596.	N = 446.	Population increased from 1999–2005; declined since 2005.
	Recruits (400–449 mm TL)	Estimates exceed annual adult mortality.	Criteria met in roughly 50% of years, consistent with indications of long-term stability in the adult population.	Criteria likely not met in recent years, consistent with recent declines in the adult population.	Criteria appear to have been met in many but not all years, consistent with a fluctuating population that demonstrates general long-term stability.
	Age-0	N/A (no specific recovery goal criteria for this life stage).	Densities dropped in 2001 and remained low through 2008.	Relatively low since mid-1990s, but a record high catch in 2015 and above average in 2016.	Pulses of recruitment may not be frequent enough to support stability in the adult populations in the long term.
Green River	Adults (>450 mm TL)	N = >2,600 individuals.	N = 2,859 (average of 10 point estimates since 2000).	N = 2,267 (average of 5 estimates 2007–2012).	Incorporating earlier CPUE data: population increased 1991–2000; declined since 2000.
	Recruits (400–449 mm TL)	Estimates exceed annual adult mortality.	Number of recruits has fluctuated greatly since 2000, but averages near 400 individuals. Average annual abundances of recruits not sufficient to offset adult		Precision of estimates varies greatly; recruitment appears insufficient to offset overall adult

<sup>2</sup> Please see [Recovery Goals \(USFWS 2002a\)](#) for a complete description of demographic requirements.

<sup>3</sup> “Long-term” refers to all Recovery Program monitoring information, which varies between subbasins and by life stage (discussed in text).

			mortality since 2000.		mortality since 2000, but has done so in a few years.
	<b>Age-0</b>	N/A (no specific recovery goal criteria for this life stage).	Densities in middle Green River precariously low 1994–2008; more stable in the lower Green River.	Densities in middle Green River rebounded in 2009, 2010, and 2015.	Recent analysis demonstrates base flow magnitude is correlated with age-0 survival. Reclamation is incorporating new information into base flow management.

Table 2. Summary of humpback chub status and trends.

	Population	Life Stage	2002 Recovery Goal Downlisting Criteria <sup>4</sup>	Long-term <sup>5</sup> abundance (average) / trend	Short-term abundance (average) / trend; 5 most recent data points	Summary
<b>Colorado River</b>	<b>1. Black Rocks (BR)</b>	<b>Adults (≥200 mm TL)</b>	Point estimates do not decline significantly for 5 years.	N = 579 adults (average of 9 BR-specific point estimates since 1998).	N = 403 (average of 5 WW-specific point estimates 2004–2012).	Steep decline in the late 1990s. Stable at low levels since 2007; adult survival appears stable since 1998.
		<b>Recruits (150–199 mm TL)</b>	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		We assume criterion not met 1998 – 2004 because number of adults dropped over this time period; likely has been met since 2007.
	<b>2. Westwater Canyon (WW)</b>	<b>Adults (≥200 mm TL)</b>	Point estimates do not decline significantly for 5 years.	N = 2,490 (average of 10 point estimates since 1998).	N = 1,426 (average of 5 estimates 2004–2012).	Steep decline in the late 1990s. Stable at low levels since 2007; adult survival appears stable since 1998.
		<b>Recruits (150–199 mm TL)</b>	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		We assume criterion was met sporadically through 2004 because number of adults declined; likely has been met since 2007.
	<b>Core Population<sup>6</sup> - (Black Rocks + Westwater)</b>	<b>Adults (≥200 mm TL)</b>	N = >2,100.	N = 3,124 (average of 9 combined (BR+WW) point estimates since 1998).	N = 1,975 (average of 5 combined (BR+WW) estimates 2004–2012).	Steep decline in the late 1990s; adult numbers appear stable since 2007, but below core criteria level until 2016.
		<b>Adults (≥200 mm TL)</b>	Point estimates do not decline significantly for 5 years.	Population too small to generate reliable mark/recapture point estimates. Monitoring consists of catch / effort (CPUE) metrics.		CPUE since 1991 indicates the population appears stable at low levels.
<b>Green River</b>	<b>4. Desolation Canyon</b>	<b>Adults (≥200 mm TL)</b>	Point estimates do not decline significantly for 5 years.	N = 1,711 (average of 7 point estimates collected 2001–2011). Abundance sampling program has changed over time, complicating long-term comparisons.		CPUE estimates since 1985 indicate long-term stability in adults; captures of recruits have been low in recent years.
		<b>Recruits (150–199 mm TL)</b>	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		
	<b>5. Dinosaur National</b>	<b>Adults (≥200 mm TL)</b>	Point estimates have not declined	From 1998 to 2000, researchers estimated ~400 adults occupied Yampa Canyon. Density has declined below level of detection since		

<sup>4</sup> Please see [Recovery Goals \(USFWS 2002b\)](#) for a complete description of demographic requirements.

<sup>5</sup> “Long-term” refers to all Recovery Program monitoring information, which varies by population (discussed in text).

<sup>6</sup> Core populations must meet minimum viable population criteria metrics (e.g., N = 2,100 adults) as well as demonstrating long-term stability. Non-core populations must demonstrate long-term stability.

	<b>Monument</b>	<b>TL)</b>	significantly for 5 years.	early 2000s. Most recent attempt to estimate population size ( <a href="#">Finney 2006</a> ) did not capture enough fish to generate a population estimate.
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Table 3. Summary of razorback sucker status and trends.

<b>Subbasin</b>	<b>Life Stage</b>	<b>2002 Recovery Goal Downlisting Criteria<sup>1,7</sup></b>	<b>Long-term abundance<sup>8</sup></b>	<b>Short-term abundance; 5 most recent data points</b>	<b>Summary</b>
<b>Colorado River</b>	<b>Adults (≥400 mm TL)</b>	N = >5,800 individuals.	Population of stocked adults increased steadily since 2005.	N = 3,356 adults and juveniles (average of 4 estimates collected 2005–2010).	Estimate for 2014 - 2016 in preparation. Population of stocked adults now expected to exceed 5,800 adults. Observations of spawning congregations have increased in recent years.
	<b>Recruits (300–399 mm TL)</b>	Estimates exceed annual adult mortality.	No wild-produced recruits have yet been detected.		Wild-produced recruits have not been captured. Criterion has not been met.
	<b>Age-0</b>	N/A (no specific recovery goal criteria for this life stage).	Wild-produced larvae have been detected in the Gunnison and Colorado River – new information pending.		Small numbers of wild-produced juveniles (age-2, 3) collected in 2013.
<b>Green River</b>	<b>Adults (&gt;400 mm TL)</b>	N = >5,800 individuals.	Population of stocked adults increased steadily since 2006.	Most recent (preliminary) estimates greatly exceed 5,800 stocked adults.	Stocked adults well distributed throughout subbasin; observations of spawning congregations have increased in recent years.
	<b>Recruits (300–399 mm TL)</b>	Estimates exceed annual adult mortality.	No wild-produced recruits have yet been detected.		Wild-produced recruits have not been captured. This criterion has not been met.
	<b>Age-0</b>	N/A (no specific recovery goal criteria for this life stage).	Larvae consistently captured in middle and lower Green River.	Generally increasing with a record high catch of larvae in 2013 in the middle Green River.	Over-summer survival of age-0 greatly improved since 2012; highest number of fall age-0 documented in 2016.

<sup>7</sup> Please see [Recovery Goals \(USFWS 2002c\)](#) for a complete description of demographic requirements.

<sup>8</sup> “Long-term” refers to all Recovery Program monitoring information, which varies between subbasins and by life stage (discussed in text).

Table 4. Summary of bonytail status and trends.

<b>Subbasin</b>	<b>Life Stage</b>	<b>2002 Recovery Goal Downlisting Criteria<sup>1,9</sup></b>	<b>Long-term<sup>10</sup> abundance</b>	<b>Short-term abundance; 5 most recent data points</b>	<b>Summary</b>
<b>Colorado River</b>	<b>Adults (≥250 mm TL)</b>	N = >4,400 individuals.	N/A	No estimates; beginning to see some return of stocked individuals.	Stocking program began in 1996 on an experimental basis; full stocking program implemented in 2003. Observations of stocked adults increasing since 2013.
	<b>Recruits (150–249 mm TL)</b>	Estimates exceed annual adult mortality.	N/A	N/A	No wild recruitment has been detected.
	<b>Age-0</b>	N/A	N/A	N/A	N/A
<b>Green River</b>	<b>Adults (&gt;250 mm TL)</b>	N = >4,400 individuals.	N/A	No estimates; beginning to see some returns of stocked individuals.	Stocked adults increasing since 2013.
	<b>Recruits (150–249 mm TL)</b>	Estimates exceed annual adult mortality.	N/A	N/A	No wild recruitment has been detected.
	<b>Age-0</b>	N/A	N/A	N/A	Researchers documented successful reproduction in the wild (in floodplain habitats) in 2015 and 2016.

<sup>9</sup> Please see [Recovery Goals \(USFWS 2002d\)](#) for a complete description of demographic requirements.

<sup>10</sup> “Long-term” refers to all Recovery Program monitoring information, which varies between subbasins and by life stage (discussed in text).

**B. Recovery Program Accomplishments, Areas of Concern, and Recommended Action Items**

Recovery Program participants accomplished a number of important objectives in 2016 and early 2017. These accomplishments are described in Table 5 below. (Note: some of these accomplishments reference preliminary findings not yet appropriate to include in Tables 1–4 above). The Service has concerns about shortcomings in the progress of some ongoing and future recovery actions, which are described in Table 6. Table 6 also outlines action items recommended by the Service to address those concerns/shortcomings. The second column in both of these tables identifies *how* Recovery Program accomplishments are meeting or falling short of the criteria used by the Service to evaluate whether the Recovery Program is making “sufficient progress” toward recovery.

More detail about Recovery Program accomplishments and shortcomings can be found in the final March 27, 2017, assessment of accomplishments and shortcomings of the Recovery Program under the RIPRAP from February 1, 2016, through January 31, 2017 (see assessment column in the tables to the [RIPRAP](#)).

Table 5. SIGNIFICANT ACCOMPLISHMENTS (February 1, 2016, through January 31, 2017)

Accomplishment	Sufficient Progress Criteria Affected
<b>General – Upper Basin-wide</b>	
<p>Detections of all PIT-tagged fish continue to increase in number and geographic extent.</p> <p>Humpback chub sampling across the basins shows population stabilization.</p> <p>Razorback adults continue to accumulate throughout the basin (including the Colorado River inflow to Lake Powell) and over-summer (and some over-winter) survival of age-0 fish in managed floodplains on the Green River continues to increase.</p> <p>Wild bonytail reproduction confirmed for the first time in floodplains in 2015 and again in 2016.</p>	<p>2 – Improving status of fish populations.</p>
<p>Recovery Program projects continue to remove all sizes of northern pike, walleye, and smallmouth bass that are encountered. Projects focus on reducing in-river reproduction. Crews now remove nonnative predators in 600+ miles of river annually at a cost of approximately \$1.7 million.</p> <p>Recovery Program stakeholders have increased focus on reservoir escapement based on results of smallmouth bass (<a href="#">Breton et al. 2014</a>) and northern pike syntheses (<a href="#">Zelasko et al. 2015</a>), and consistent walleye catches (see individual sub-basins for specific actions).</p> <p>Colorado Parks and Wildlife (CPW) implemented regulations in April of 2016 to eliminate bag and harvest limits for northern pike and smallmouth bass on Colorado’s western slope.</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p>
<b>Green River</b>	
<p>Reclamation operated Flaming Gorge Dam to exceed Record of Decision and</p>	<p>1 – Improve habitat and reduce threat</p>

<p>Biological Opinion target flows in Reach 2 (as measured at the Jensen, UT gage). The observed average daily peak of 20,500 cfs occurred on June 12, 2016. In the fifth year (2016) of the Larval Trigger Study Plan (LTSP), these LTSP floodplain connection flow targets after larval detection were achieved: 37 days above 8,300 cfs; 22 days above 14,000 cfs; 8 days above 18,600 cfs; and 1 day above 20,300cfs.</p> <p>Average August and September base flows recorded in Reach 2 were 2,156 cfs and 2,145 cfs respectively. These summer flows fell within a preferred base flow range (1,700 - 3,000 cfs; <a href="#">Bestgen and Hill 2016</a>).</p>	<p>of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>Stewart Lake was effectively managed to take advantage of LTSP flows and encourage spawning. A record high catch of 2,110 age-0 razorback sucker, 18 age-1 Colorado pikeminnow and 9 age-0 bonytail, were sampled returning to the Green River during draining of Stewart Lake. This was the second year bonytail spawned in this floodplain.</p> <p>Johnson Bottom was managed to take advantage of LTSP flows and encourage spawning. Razorback sucker larvae were collected in the floodplain in June. A total of 48 bonytail were captured; 43 adults and 5 age-0 fish. Colorado State University confirmed the 5 age-0 bonytail were spawned in Johnson Bottom, which represents the first detection of bonytail spawning at this site.</p> <p>Sheppard Bottom Cooperative Recovery Initiative was funded by the Service in 2016 and construction completed in time for inundation in 2017.</p> <p>Escalante Ranch, Bonanza Bridge, Stirrup, Above Brennan, and Wyasket Lake sites also were inundated in 2016; larval razorback sucker were collected at Bonanza Bridge, Stirrup and Above Brennan.</p>	<p>1 – Improve habitat and reduce threat of extinction; 2 – Improve status of fish populations.</p>
<p>Preliminary estimates of adult razorback sucker abundance in the Green River 2011-2013 average 25,019 individuals, with a range of 24,785–25,221, annually.</p>	<p>2 – Improving status of fish populations.</p>
<p>Recovery Program representatives and Reclamation met with the Green River Canal Company Board and agreed on a concept for fish exclusion. Weir wall and fish screen construction are scheduled for winter of 2018/2019.</p>	<p>1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.</p>
<p>Utah Division of Wildlife Resources (UDWR) replaced illegally introduced walleye at Red Fleet Reservoir with sterile walleye and maintained a temporary escapement screen.</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p>
<p><b>Yampa River</b></p>	
<p>Recovery Program participants provided cost-share using “Section 7” funds to install an automated gate in the Maybell Canal as part of a canal improvement project that included installation of a measuring flume at the canal headgate and check structures in the canal. Cost share funds were provided by the Colorado Water Conservation Board through the Native Species Trust fund. These canal automations improve measuring and shepherding water released from Elkhead Reservoir to improve fish habitat. The check structures will result in more efficient operation, reduction of tail water at the end of the ditch, and will increase flows in the lower Yampa River to benefit endangered fish.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>

<p>CPW and the Recovery Program installed a spillway net at Elkhead Reservoir in September 2016, which performed well through the 2017 runoff. CPW is stocking the reservoir with largemouth bass to replace smallmouth bass and using harvest tournaments to remove smallmouth bass and northern pike. The Colorado Water Conservation Board (CWCB) provided cash prizes for the tournaments which were judged successful, both in number of fish removed and in changing perceptions about northern pike and smallmouth bass.</p> <p>CPW continues to reduce the northern pike population in Lake Catamount. More than 14,000 northern pike have been removed since 2007. The Recovery Program made initial contact with Catamount Metro District to discuss potential for net installation to prevent fish from escaping Lake Catamount and Stagecoach Reservoir.</p> <p>CPW and the Service continue to net riverine backwater habitats to disrupt spawning and remove large reproducing adult northern pike. 469 northern pike were removed via backwater netting in 2016.</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p>
<b>Duchesne River</b>	
<p>UDWR has contained walleye and smallmouth bass escaping via the spillway at Starvation Reservoir. A temporary barrier was installed in 2015. A permanent downstream screen in the stilling basin is planned for construction in fall of 2018.</p> <p>The Service issued permits for a Safe Harbor agreement for fish passage in the lower river so that water bypassed around diversions will benefit Colorado pikeminnow and razorback sucker.</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p> <p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows</p>
<b>Colorado River</b>	
<p>Coordinated Reservoir Operations facilitated the release of 29,374 acre-feet (AF) of water from reservoirs to augment peak flows, causing a peak flow of 18,500 cfs at the Palisade gage (15-Mile Reach).</p> <p>The baseflow target for the 15-Mile Reach was 1,240 cfs. A total of 106,192 AF of releases from the Green Mountain, Ruedi, Wolford, and Granby Reservoirs, generally maintained 15- Mile Reach flows in the range of 750 to 1,400 cfs (average = 1,010 cfs) throughout August – October.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>Recovery Program participants have demonstrated the ability to significantly improve summer base flows conditions in the 15-Mile Reach in all years. CWCB and Ute Water negotiated terms of a short term lease providing up to 12,000 AF from Ruedi Reservoir (with options through 2020). This lease, combined with the other summer augmentation pools, offset the 10,825 AF pool from Ruedi Reservoir which expired in 2012.</p> <p>The Orchard Mesa Irrigation District (OMID) Canal Automation Project provides an additional mechanism to augment summer flows in the 15-Mile Reach. Construction of the OMID regulating reservoir was completed in June 2017. The project will be fully implemented by 2018. The project is estimated to provide 17,000 AF for flow augmentation in the 15-Mile Reach.</p>	<p>3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>The Grand Valley Project fish passageway, in operation since 2004, passed 36 razorback sucker, 44 bonytail, and 1 Colorado pikeminnow in 2016.</p>	<p>1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.</p>
<p>Preliminary results from fall humpback chub sampling in Black Rocks and Westwater canyons (after a 3-year hiatus) provide more evidence that the number of adults has stabilized.</p>	<p>2 – Improving status of fish populations.</p>

<p>CPW removed fertile walleye from Rifle Gap Reservoir and stocked sterile fish as a replacement.</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p>
<p><b>Gunnison River</b></p>	
<p>“Average Dry” conditions for Blue Mesa Reservoir corresponded to a target peak flow at the Whitewater gage of 10 days at half bankfull (8,070 cfs), and an August–December baseflow of 1,050 cfs. A peak of 9,900 cfs was achieved at the Whitewater gage, with 10 days above half-bankfull. Baseflow was maintained above 1,050 for the entire August–December period.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>The Redlands fish passageway passed 33 Colorado pikeminnow (bringing the total captured at this site since 1996 to 180), 1 razorback sucker (bringing the 21-year total to 35), and 33 bonytail (the second highest of any year of operation).</p>	<p>1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.</p>
<p>Stakeholders continue to manage an illegally introduced smallmouth bass population at Ridgway Reservoir. Tri-County Water Conservancy District successfully avoided spills from 2014 through 2017.</p> <p>CPW held smallmouth bass fishing tournaments at Ridgway Reservoir in 2015, 2016, and 2017. CWCB provided funding for prizes, while CPW supplied all necessary staff. The smallmouth bass population appeared depressed after each tournament.</p> <p>A working group focused on installing a nonnative fish escapement solution (likely a net) continues to meet to design, fund, and install a permanent escapement solution.</p> <p>Reclamation continues to lead selenium remediation in the Gunnison River drainage via their Selenium Management Program (funded through the Salinity Program), which has become a model of grass roots support and cooperation</p>	<p>1 – Reduce threat of nonnative predation and competition on endangered and native fish.</p>

Table 6. SERVICE CONCERNS AND RECOMMENDATIONS (focused on February 1, 2016, through January 31, 2017)

Service Concern	Sufficient Progress Criteria Affected	Recommended Action Items
<b>General – Upper Basin-wide</b>		
<p>Current low densities of adult Colorado pikeminnow throughout the upper basin are linked to insufficient recruitment of young fish into the adult population caused by the persistence of nonnative predators and summer habitat base flow conditions (primarily in the Green River).</p> <ul style="list-style-type: none"> <li>● Large-bodied predatory species of concern have spread through large segments of critical habitat, especially Colorado pikeminnow nursery habitats.</li> <li>● A recent summary of 30+ years of fall age-0 pikeminnow monitoring indicates that survival was better when summer base flows in the middle Green River ranged between 1,700 to 3,000 cfs.</li> </ul> <p>Bonytail survival continues to be low.</p> <p>Humpback chub apparently extirpated from Dinosaur National Monument</p> <p>Wild razorback sucker have yet to reach sexual maturity in either sub-basin.</p>	<p>1 – Increases threat of extinction; 2 – Declining status of fish populations.</p>	<p>The persistent and prolonged threat of expanding nonnative fish populations needs to be managed to an acceptable level to benefit all the endangered fishes. Reductions in nonnative fish populations should allow expansion of the range of Colorado pikeminnow, increase survival of pikeminnow of all age classes, and reduce competition for forage for pikeminnow.</p> <p>Reclamation should continue to exercise operational flexibility within their 2006 Flaming Gorge Record of Decision to provide summer base flows in the range of 1,700 – 3,000cfs when possible.</p> <p>The Service encourages continued use of PIT technology as a complement to traditional sampling techniques and one that does not require handling sensitive species. Methodology needs to be developed to incorporate fish monitored using PIA technology into population estimates.</p> <p>Bonytail production has increased under the revised Integrated Stocking Plan. Bonytail should continue to be stocked into floodplain locations to determine if survival will increase.</p> <p>Working group should continue to explore the feasibility of translocating humpback chub into Yampa Canyon to repatriate this population.</p> <p>Recovery Program should continue to create more floodplain habitats and improve survival of age-0 fish, as a means of supporting adequate survival to the adult stages.</p>

<p>New nonnative species continue to appear in the Upper Basin. Gizzard shad populations expanded upstream of Lake Powell during the mid-2000s, invading both the Green and Colorado Rivers. This expansion may be exacerbating the increase in walleye numbers.</p> <p>Larval grass carp were confirmed from Lake Powell in 2015 and again in 2016, representing the first instance of this species reproducing in the upper Colorado River basin. Subsequently, additional diploid grass carp have been collected in the Green and Colorado River.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>Continue to restrict the establishment of new nonnative species in the basin through stocking regulations. All grass carp stocking in the upper basin states is required to be with triploid (sterile) fish. Diploid fish may have come from an illicit internet order or an inadvertent delivery from a supplier who holds both diploid and triploid fish. UDWR and the Service will explore options for additional sampling via light-trapping in 2018.</p> <p>Continue to discuss new nonnative fish findings with state and regional organizations. The Program Director’s office has provided information to Western Association of Fish and Wildlife Agencies and the Fish and Wildlife Council, and the issue also was raised in coordination meetings with the States.</p>
<p>Program stakeholders need to develop strategies for long term flow protection throughout the upper Colorado River basin.</p>	<p>Hampers ability to 1 – Improve habitat through protected/augmented flows.</p>	<p>Continue to identify the ways and means for long term flow protection beyond delisting throughout the upper Colorado River basin (e.g., Green River Water User Acquisition Team, White River Working Group, etc.).</p>
<p><b>Green River</b></p>		
<p>Evaluation and recommended revision of flow and temperature recommendations is behind schedule.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>The Green River Evaluation and Assessment Team has been working since 2015 to complete an evaluation of the <a href="#">Muth et al. (2000) Flow and Temperature recommendations</a>. The Service recommends completion of this document in CY 2017.</p>
<p>Smallmouth bass continue to be a persistent problem in the Green River, especially because of high reproduction in below average flow years.</p> <p>Walleye numbers in middle and lower Green River threaten recovery because of habitat overlap with young Colorado pikeminnow.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>The Service supports development of a smallmouth bass spike flow study by Colorado State University to describe conditions under which a short-duration, high magnitude flow could disrupt smallmouth bass spawning on a reach-wide scale.</p> <p>Continue walleye-specific removal to reduce the number of adult walleye in the system. Reduce continued escapement from upper basin reservoirs.</p>
<p>Cattails continue to encroach at Stewart Lake and other wetland sites compromising the utility of these critically important floodplain nursery habitats for razorback sucker and other endangered fish.</p>	<p>Hampers ability to 1 – Improve habitat through protected/augmented flows.</p>	<p>The Recovery Program should continue working closely with the State of Utah, Reclamation, and the Service to develop and implement long term management plans (e.g. prescribed burning) to reduce cattails.</p>
<p>Understanding effects of and reducing selenium</p>	<p>May hamper ability to 1 –</p>	<p>The Service should complete analysis of selenium levels in</p>

<p>concentrations may still be a concern at Stewart Lake.</p>	<p>Improve habitat.</p>	<p>fish to determine if levels are above what is recommended for recovery. The Service and Reclamation should continue to manage supplemental flows at Stewart Lake to assist in selenium remediation.</p>
<p><b>Yampa River</b></p>		
<p>CWCB has not provided accounting of past depletions for the Yampa River due in 2010, a back-casted baseline of current depletions, or a recommendation and justification addressing projected future depletions and whether or not additional instream flow filings or other flow protections mechanisms should be considered.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>Colorado has placed a high priority on the Yampa and Colorado river basins portion of this work, but has not yet completed it. CWCB contracted the Wilson Water Group to provide updated depletion accounting in the Yampa River after the Colorado River accounting is completed. The Service recommends treating these documents as highest priority until complete, expected in 2017.</p>
<p>Despite significant efforts, smallmouth bass densities in Little Yampa Canyon and other reaches of the Yampa River remain a concern; northern pike remain a concern in upstream reaches. In-river removal efforts are compromised by upstream sources and in-river reproduction.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>The Recovery Program should continue intense smallmouth bass removal, focusing on nest disruption further into the spawning period, adjusting sampling schedules to exploit post-peak flows and look for efficiencies during their control efforts.</p> <p>The Recovery Program should continue to work with the Catamount Metropolitan District on installation of a net/screen to prevent northern pike escapement. Efforts to identify and prevent use of riverine spawning habitat should continue.</p>
<p><b>Duchesne River</b></p>		
<p>Extent of contribution of smallmouth bass or walleye produced in the Duchesne River below Starvation and entering Green River remains unknown. Nonnative fish are not currently being monitored or removed from the Duchesne River due to access issues.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>The Service recommends continued government-to-government consultation with Northern Ute Tribe so that in-river removal nonnative control can be resumed. UDWR in coordination with the tribe was able to reinitiate some sampling in the Duchesne in 2017.</p>
<p><b>White River</b></p>		
<p>The schedule outlined in the approved scope of work for developing the White River Management Plan has slipped. Although behind schedule, the Service is encouraged by recent progress on the development of this management plan. Colorado completed the State Water Plan (December 2015) through a grassroots effort with Roundtables. The Yampa/White Basin Roundtable contracted with Wilson Water Group to convert StateMod from a monthly to a daily model (done).</p>	<p>Hampers ability to 1 – Improve habitat through protected/augmented flows; and 3 – Inadequacy of flows.</p>	<p>Recommendations: 1) extend StateMod to the Green River confluence and incorporate Utah and Northern Ute Tribal water rights; 2) the Recovery Program should finalize White River endangered fish flow recommendations; 3) the draft Management Plan and Biological Assessment should be completed as soon as possible.</p>

<p>Smallmouth bass have been persistent in the White River since 2011, demonstrating consistent reproduction and a downward expansion of range. Bass densities are highest in the section below Taylor Draw Dam. Crews continue to remove smallmouth bass but population declines are not apparent.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>Efforts to reduce the abundance of smallmouth bass are near maximized based on access and effectiveness. Other options besides electrofishing removal should be considered to disadvantage, and reduce or eliminate this established population.</p>
<p><b>Colorado River</b></p>		
<p>CWCB has not provided the depletion accounting report that was due July 1, 2010. The delay in this report is delaying completion of the Service’s 2015 15-Mile Reach PBO review. That review is considered important in that it provides an assessment of ESA compliance for approximately 1 million acre-feet per year of existing depletions and 120,000 acre-feet per year of future depletions.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>CWCB should provide a depletion accounting progress report as per requirement of the 15-Mile Reach PBO as a critical component of the Recovery Program’s review of the PBO in CY 2017. Colorado has placed a high priority on the Yampa and Colorado river basin depletion accounting, but has not yet completed it. CWCB has contracted the Wilson Water Group to provide updated depletion accounting. The Service recommends treating these documents as highest priority until complete, expected in 2017.</p>
<p>2015 15-Mile Reach PBO Review is overdue. A draft was distributed to the BC and WAC in August 2016. That review was revised based on comments received from water user and environmental representatives. Flow recommendations in the 15-Mile Reach have not been met in all years, particularly during dry hydrologies.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>(See above.) Program stakeholders should continue to work with Colorado River water managers to identify opportunities to meet flow recommendations with greater frequency.</p>
<p>The Recovery Program needs to evaluate adequacy of current flow protection. The determination for additional flow protection rests with the Recovery Program and its Water Acquisition Committee (WAC), but will be recorded within the CWCB depletion reports due every 5 years. The WAC discussed this in July and November 2011 and determined that additional permanent protection in the form of instream flow filings was not deemed necessary at that time. It appears unlikely that there have been significant new depletions in the Colorado River. A Long Term Flow Protection workgroup also has been formed to evaluate what kind of flow protection (e.g., conservation agreements) would be appropriate to succeed the Recovery Program.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>The Recovery Program should continue to track depletions and evaluate need for additional flow protection. The Long Term Flow Protection workgroup should begin identifying the ways and means of long term flow protection in the post-delisting period.</p>

<p>Walleye captures in the Colorado River increased from 2010 to 2013 and distribution overlaps with small size classes of both Colorado pikeminnow and razorback sucker.</p> <p>Walleye in the river are primarily reservoir emigrants. Reservoir screening projects and increased removal should reduce walleye numbers.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>The Recovery Program should determine adequacy of efforts to remove walleye from the river and expeditiously implement reservoir screening projects.</p>
<p><b>Gunnison River</b></p>		
<p>The illegally introduced population of smallmouth bass in Ridgway Reservoir represents a major threat to the largely intact native fish community in the Gunnison River downstream. Containing and eliminating this population is of the utmost priority.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>The stakeholder group should continue to implement actions (spill avoidance and angler removal) and design a containment solution, likely a net. Funding an escapement solution should be a high priority for the Recovery Program and its partners. Continued diligence towards a solution is critical.</p>
<p>Understanding effects of and reducing selenium concentrations remain a concern.</p>	<p>May hamper ability to 1 – Improve habitat.</p>	<p>Reclamation and local interests should continue remediation under the Selenium Management Program as well as the Salinity Control Program.</p>
<p><b>Dolores River</b></p>		
<p>Persistence of smallmouth bass in the upper Dolores River raise concern that the species may expand into downstream areas.</p> <p>Sampling in 2017 demonstrated that 94% of fish in Slick Rock Canyon were native species, indicating that the smallmouth bass population is primarily upstream of Disappointment Creek and near the confluence with the Colorado. CPW and the Bureau of Land Management conducted smallmouth bass removal below Snaggletooth Rapid in 2017</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of nonnative fish.</p>	<p>Management actions in addition to electrofishing should be implemented as needed to disadvantage, reduce, and control this population.</p>

### **C. Conclusion on Sufficient Progress**

The Service recognizes significant accomplishments have occurred over the course of the past year, including:

#### *Instream Flow Management*

- 1) Flows were effectively managed in the Colorado River 15-Mile Reach, via:
  - successfully implementing Coordinated Reservoir Operations to augment spring peak flows;
  - CWCB and Ute Water Conservancy District entering another temporary lease of Ute Water's water from Ruedi Reservoir to augment late summer/autumn flows; and
  - making significant progress on the Orchard Mesa Irrigation District irrigation efficiency project.
- 2) Reclamation's Aspinall Unit operations resulted in achieving the Program's spring and base flow targets for the Gunnison River.
- 3) On the Green River, Reclamation's Flaming Gorge Unit operations accomplished objectives of the LTSP in the spring, as well as providing Reach 2 summer base flows in an experimental range.

#### *Status of the Fish*

- 1) Above average production of age-0 Colorado pikeminnow was reported from the Colorado and lower Green Rivers.
- 2) Preliminary reports indicate that adult humpback chub appears to have stabilized (admittedly at historically low levels) in four of five locations.
- 3) Reclamation's LTSP operations and UDWR floodplain management resulted in record high production of age-0 razorback sucker at the Stewart Lake floodplain on the Green River.
- 4) Bonytail spawning was documented for the second consecutive year at Stewart Lake and for the first time at Johnson Bottom.

#### *Nonnative Fish Management*

- 1) CPW, CWCB, and the Recovery Program installed a spillway net at Elkhead Reservoir on September 2016, which performed well through the 2017 runoff. CPW is stocking the reservoir with largemouth bass to replace an undesirable smallmouth bass fishery.

- 2) CPW conducted incentivized harvest tournaments at Elkhead and Ridgway reservoirs to enlist public support with the removal of smallmouth bass and northern pike. CPW implemented revised fishing regulations in April 2016 that allow unlimited bag and possession limits for smallmouth bass, northern pike, and walleye in West Slope Rivers.
- 3) The recent focus on controlling off-channel sources of predatory nonnative species (invasive smallmouth bass, northern pike, and walleye), coupled with the Recovery Program's longer-standing commitment to control these fish in riverine environments, comprise a strategy that the Service thinks is now on track.

Despite good cooperation among Recovery Program partners to implement a comprehensive suite of recovery actions, the Service remains concerned with recent reports of low densities of Colorado pikeminnow adults in the Green and Colorado River subbasins. We also remain concerned over the apparent loss of humpback chub from the lower Yampa River and particularly slow progress toward recovery of bonytail. We advise that the Recovery Program continue to focus on several specific recovery actions in the coming year. We categorize those actions under: 1) nonnative fish management; and 2) flow and habitat management, as follows:

#### *Nonnative Fish Management*

- 1) Maintain current levels of river removal effort, while continuing to look for further efficiencies.
- 2) Maintain the Recovery Program's reservoir screening schedule with a particular focus on the Ridgway Reservoir netting project. The Service is very concerned that smallmouth bass could escape from that reservoir and become established downstream in the Gunnison River, a native species stronghold.

#### *Flow and Habitat Management*

- 1) Depletion accounting reports must be completed by CWCB to ensure compliance with the Yampa and Colorado River PBOs is maintained. The Colorado River report is a long overdue requirement of the 15-Mile Reach PBO.
- 2) Finalize White River endangered fish flow recommendations and develop a White River Management Plan / PBO.
- 3) Over the next few years, the Service encourages the Recovery Program to establish long-term (post-Program and post-delisting) flow protection strategies throughout the basin.
- 4) Adhere to the current schedule of constructing a fish exclusion device in the Green River Canal on the Tusher Diversion during winter 2018/2019.

Finally, in light of the Recovery Program's [Cooperative Agreement](#) expiring in 2023, the Service encourages the Management Committee to begin serious negotiations to define a post-2023 Recovery Program and requisite funding mechanisms.

The Recovery Program has made strong progress in protecting and improving flows and restoring habitat and has demonstrated strong resolve to manage nonnative fishes in recent years. The Service agrees with Recovery Program stakeholders that we need to build on recent momentum in nonnative fish management and related public outreach. The Service will assist and support the Program by identifying accomplishments and important recovery actions that remain as we revise the Colorado River endangered fish recovery plans.

The Service is confident that with continued cooperation by all Recovery Program participants, the Recovery Program will continue to make significant strides toward recovery of the four endangered fishes. Recovery of the endangered fish is taking longer than the Service, and the Recovery Program stakeholders initially envisioned in 1988; however, we have an appropriate sense of urgency amongst stakeholders to achieve success as quickly as possible. The Service remains convinced that the best chance for success, i.e., recovery, rests with this collaborative Recovery Program.

Based on our comprehensive evaluation of the status of the endangered fish, provision of flows (particularly during periods of drought), the magnitude of new depletion impacts (relatively minor in the historical context), the focus on nonnative threats, and cumulative Recovery Program accomplishments and shortcomings, the Service concludes that when implemented as Conservation Measures (i.e., part of the proposed action), the Recovery Program is making sufficient progress to continue avoiding the likelihood of jeopardy resulting from depletion impacts of new projects that have an annual depletion of up to 4,500 AF<sup>11</sup>. Furthermore, that sufficient progress provides a continued avoidance of jeopardy for the water projects and depletions currently provided with ESA compliance by the Program, i.e., 2,122 projects depleting more than 2.8 million acre-feet of water per year. Projects exceeding 4,500-acre-feet or that have direct or indirect effects in addition to water depletions will be evaluated to determine if they jeopardize the species' continued existence on a case by case basis.

This concludes the Service's 2016-2017 "abbreviated" assessment of progress. Specific questions about sufficient progress should be directed to Tom Chart, Recovery Program Director, at 303-236-9885, [tom\\_chart@fws.gov](mailto:tom_chart@fws.gov) or Angela Kantola, Deputy Director, at 303-236-9882, [angela\\_kantola@fws.gov](mailto:angela_kantola@fws.gov).

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<sup>11</sup> The 15-Mile Reach programmatic biological opinion covers an average depletion of up to 1 million acre-feet per year of existing depletions (through September 30, 1995) and up to 120,000 AF of new depletions (since September 30, 1995) in the Colorado River above the confluence with the Gunnison River. The Yampa River programmatic biological opinion covers an average depletion of up to 168,000 AF per year of existing depletions and up to 53,000 AF per year of new depletions. The Gunnison River PBO covers all existing water depletions in the Gunnison River Basin (estimated annual average of 602,700 AF/year) and future depletions up to 3,500 AF basinwide as well as future depletions up to 22,200 AF in the upper Gunnison Basin in accordance with the Upper Gunnison Basin Subordination Agreement and 12,200 AF in the Dallas Creek Project which has been contracted for but is not used at this time.

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