



United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Memorandum

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

From: Regional Director, Interior Regions 5 and 7 *Neveen E. Walsh*

Subject: 2018—2019 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 2018—2019 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. The magnitude of the impact of projects.

This review of Recovery Program accomplishments and shortcomings serves as our basis for an evaluation of progress toward endangered species recovery and the ability of the Recovery Program to provide Endangered Species Act (ESA) compliance for water projects. As the Service completes Species Status Assessments for the federally listed fish, we encourage partners and interested parties to refer to those documents¹ for a more thorough review of this

¹ Species Status Assessments can be found at: <http://www.coloradoriverrecovery.org/documents-publications/foundational-documents/recovery-goals.html>

INTERIOR REGION 5
MISSOURI BASIN

KANSAS, MONTANA*, NEBRASKA, NORTH DAKOTA,
SOUTH DAKOTA

*PARTIAL

INTERIOR REGION 7
UPPER COLORADO RIVER BASIN

COLORADO, NEW MEXICO, UTAH, WYOMING

This Sufficient Progress memo contains a summary of depletion accounting reports² recently submitted by the States of Colorado and Wyoming as called for in the Yampa River PBO. Those reports also describe updated depletion accounting methodologies developed by the States of CO and WY. The Service's Western Colorado Ecological Services Office recently approved those reports and the updated methodologies as an acceptable alternative to the methods described in the 2005 Yampa PBO Appendix B.

The final May 4, 2019, assessment of accomplishments and shortcomings of the Recovery Program under the Recovery Implementation Program Recovery Action Plan (RIPRAP) from February 1, 2018, through January 31, 2019 ([UCREFRP 2019](#)), 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, 2018 - January 31, 2019, 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 19, 2018.

A. Status of the Species in the Upper Basin

In the Upper Colorado and Green river subbasins (Figure 1, below), Colorado pikeminnow and humpback chub exist as wild populations with no support from 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 subbasin increased from 1992 – 2005, but has declined since 2005; similarly, adult abundance in the Green River subbasin increased from 1991 to 2000 but has declined since 2000 (Table 1). Although populations have declined over the past 10-20 years, this species has supported itself through wild reproduction and natural recruitment to sexual maturity. In the Colorado River subbasin, recruitment appears adequate to support a sustainable population of approximately 450 individuals. However, in the Green River subbasin, recruitment has declined over the past 15 years and researchers now question if recruitment is sufficient to support a sustainable population. The Recovery Program's Biology Committee (BC) is currently considering augmentation in the Green River. A Species Status Assessment³ (SSA) for Colorado pikeminnow is in draft and scheduled for completion in early 2020. In support of the SSA, the Recovery Program completed a population viability analysis (PVA) for Colorado pikeminnow

² Colorado and Wyoming's 2019 Yampa River depletion accounting reports can be found at: <http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/yampa-river-pbo.html>

³ A Species Status Assessment (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.



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.

(Miller 2018), which will greatly assist in describing the future condition and viability of the species.

Humpback chub exist in four populations in the Upper Basin, three in the Colorado River and one in the Green River (Table 2). A fifth population in Dinosaur National Monument (Green and Yampa rivers) is now considered extirpated; humpback chub have not been collected in this location for over a decade. In the Colorado River, adult abundance estimates of the Black Rocks and Westwater Canyon populations, which comprise an Upper Basin core population, indicate stability over the past decade (USFWS 2018a); the most recent work preliminarily estimates 425

to 450 adults in Black Rocks (Francis 2018) and 2,800 adults in Westwater (Hines 2017). The Cataract Canyon population, located below the confluence of the Green and Colorado rivers, appears stable at low densities, estimated as fewer than 500 adults; monitoring in 2017 documented the highest catch rates to date and also documented the highest number of young-of-year chubs (Ahrens 2017). Using estimates from 2006 to 2015, the adult abundance estimates for Desolation and Gray canyons show no conclusive pattern because estimates are too variable (USFWS 2018b, p. 109). Abundance estimates for the Desolation and Gray canyons population were approximately 1,750 adults in 2014 and 2015 (Howard and Caldwell 2018, p. 18). Humpback chub appear to have been declining in the Dinosaur National Monument population since the construction of Flaming Gorge Dam. By 1998, humpback chub were absent or rare in habitats where the species was likely common in the 1940s (Tyus 1998); the last confirmed humpback chub was captured in this population in 2004. The Recovery Program is evaluating the feasibility of and strategies for re-introducing humpback chub to Dinosaur National Monument. The 2002 recovery goals recognize the importance of maintaining all five populations.

An SSA for humpback chub was completed in March 2018. Based, in part, on the resilience of the Upper Basin populations, a large, stable population in the Little Colorado River portion of Grand Canyon (Lower Basin), and expansion of the species in western Grand Canyon, the Service recommended (via a 5-year review signed in March 2018) (USFWS 2018a) reclassification of humpback chub as a threatened species (i.e., downlist from endangered status). A proposal to downlist humpback chub (including a 4(d) rule) was published in the Federal Register in January of 2020. The proposed rule is open for a 60-day public comment period after publication. This proposal represents the first action to reclassify one of the listed Colorado River fish species.

Hatchery-produced stocked fish form the foundation for reestablishing naturally self-sustaining populations⁴ of razorback sucker (Table 3) and bonytail (Table 4) in the Upper Colorado and Green river subbasins. 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 and Green river subbasins. The Recovery Program has been largely successful in meeting the plan's annual stocking targets.

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 subbasins. Wild, juvenile razorback sucker (ages 0, 1, and 2) have recently been captured in small numbers in a variety of Upper Basin locations. An SSA for razorback sucker was finalized in August 2018 (USFWS 2018d). Based on one self-sustaining population in the Lower Basin and expanding, reproducing populations of stocked adults in the San Juan, Colorado, and Green river subbasins (including individuals captured in Lake Powell), the Service decided (via a 5-year

⁴ To achieve naturally self-sustaining populations, adults must reproduce and their young must recruit to the adult life stage in numbers sufficient to meet the demographic criteria identified in the current version of the recovery goals (USFWS a–d). In addition, because of their longevity, hatchery produced adult razorback sucker and bonytail (and Colorado pikeminnow in the San Juan River) will contribute toward recovery.

review signed in September 2018) (USFWS 2018c) to pursue reclassification of razorback sucker as a threatened species.

Recaptures of stocked bonytail are rare, especially recaptures that demonstrate long-term survival of stocked individuals. However, increasing numbers of bonytail have been detected by the stationary passive integrated transponder (PIT)-tag antennas and traditional sampling methods throughout the Upper Colorado River basin. The first reproduction by stocked bonytail was confirmed in floodplain habitats in the Green River in 2015, in 2016 (Bestgen *et al.* 2017) and most recently in 2017. Based on lack of consistent survival of stocked bonytail and no wild populations of the species, the Service recommended maintaining bonytail as an endangered species (via a [5-year review](#) signed in June 2019) (USFWS 2019).

In 2002, the Service developed Recovery Goals (USFWS 2002 c–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 Tables 1-4, we review the demographic criteria for the four listed species and the status with respect to meeting the criteria. In the recent 5-year reviews for humpback chub and razorback sucker (USFWS 2018 a,c), the Service recommended that the recovery goals for those two species be revised to incorporate new information. However, the Service did not recommend revising the recovery plan for bonytail at this time (USFWS 2019). A decision on revision of the Colorado pikeminnow recovery goals will be made after the 5-year review is completed, which is anticipated in 2020.

Table 1. Summary of Colorado pikeminnow status and trends.

Subbasin	Life Stage	2002 Recovery Goal Downlisting Criteria ⁵	Long-term ⁶ abundance / trend	Short-term abundance / trend; 5 most recent data points	Summary
Colorado River	Adults (≥450 mm TL)	N = >700 individuals	N = 596.	N = 449. (average of 5 estimates collected 2009 - 2015)	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 persistence.
	Age-0	No specific recovery goal criteria for this life stage.	Densities dropped in 2001 and remained low through 2008.	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 = 1,998 (average of 10 point estimates since 2003).	N = 1,377 (average of last 5 estimates 2012 – 2018). Estimates collected 2016-2018 are preliminary.	Incorporating earlier CPUE data: population increased 1991–2000; declined since 2000. BC now considering the need to stock.
	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 mortality since 2000.		Precision of estimates has varied greatly through time. Since 2000, recruitment appears insufficient to offset annual adult mortality.
	Age-0	No specific recovery goal criteria for this life stage.	Densities in middle Green River precariously low since the mid-1990s.	Densities in middle Green River rebounded in 2009, 2010, and 2015 but historically low in most years. Science supports revised summer base flow targets.	Reclamation is incorporating new information into their base flow management (using flexibility in their 2006 ROD) to improve survival of this life stage.

⁵ Please see Recovery Goals (USFWS 2002a) for a complete description of demographic requirements.

⁶ “Long-term” refers to all Recovery Program monitoring information, which varies between subbasins and by life stage.

Table 2. Summary of humpback chub status and trends.

	Population	Life Stage	2002 Recovery Goal Downlisting Criteria ⁷	Long-term ⁶ abundance (average) / trend	Short-term abundance (average) / trend; 5 most recent data points	Summary
Colorado	1. Black Rocks (BR)	Adults (≥200 mm TL)	Point estimates do not decline significantly for 5 years.	N = 553 adults (average of 9 BR-specific point estimates since 1998).	N = 410 (average of 5 point estimates 2008–2017).	Steep decline in the late 1990s. Stable at low levels since 2008.
		Recruits (150–199 mm TL)	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		We assume criterion was not met from 1998 – 2004 because number of adults declined; likely has been met since 2007.
	2. Westwater Canyon (WW)	Adults (≥200 mm TL)	Point estimates do not decline significantly for 5 years.	N = 2,547 (average of 12 point estimates since 1998).	N = 1,915 (average of 5 estimates 2008–2017).	Stable at low levels since 2007; Preliminary model averaged estimate for 2017 is 3,655 (95% CI = 1,177-6,133)
		Recruits (150–199 mm TL)	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		We assume criterion was not met through 2004 because number of adults declined; likely has been met since 2007.
	Core Population ⁸ - (Black Rocks & Westwater combined)	Adults (≥200 mm TL)	N = >2,100.	N = 3,151 (average of 11 combined (BR+WW) point estimates since 1998).	N = 2,326 (average of 5 combined (BR+WW) estimates 2008–2017).	Adult numbers appear stable since 2007. The core population appears to have rebounded to > 2,100 adults in 2016 and 2017.
	3. Cataract Canyon	Adults (≥200 mm TL)	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.		In 2017, Utah Division of Wildlife Resources(UDWR) reports their highest CPUE since sampling began in 1991
Recruits (150–199 mm TL)		Estimates exceed annual adult mortality.				
Green River Subbasin	4. Desolation Canyon	Adults (≥200 mm TL)	Point estimates do not decline significantly for 5 years.	N = 2,141 (average of 5 extrapolated point estimates collected since 2006). Researchers continue to investigate methodologies to accurately estimate population size in this canyon.		In 2018, the proportion of first year adult humpback chub captured was 13% of the total catch; the highest proportion since 2003.
		Recruits (150–199 mm TL)	Estimates exceed annual adult mortality.	Not enough mark / recapture information to estimate abundance of recruits.		
	5. Dinosaur National Monument	Adults (≥200 mm TL)	Point estimates do not decline significantly for 5 years.	From 1998 to 2000, researchers estimated ~400 adult occupied Yampa Canyon. Density declined below level of detection in the early 2000s; the population is now considered extirpated. Most recent attempt to estimate population size (Finney 2006) did not capture enough fish to generate a population estimate.		

⁷ Please see Recovery Goals (USFWS 2002b) for a complete description of demographic requirements.

⁸ 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.

Table 3. Summary of razorback sucker status and trends.

Subbasin ⁹	Life Stage	2002 Recovery Goal Downlisting Criteria ¹⁰	Long-term abundance ⁶	Short-term abundance; 5 most recent data points	Summary
Colorado River	Adults (≥ 400 mm TL)	N = >5,800 individuals.	Population of stocked adults increased steadily since 2005.	N = 4,482 adults <u>and</u> juveniles (average of 6 estimates collected 2008–2015).	Abundance of hatchery produced adults increased steadily since 2005. Observations of spawning congregations in known and new locations have increased in recent years.
	Recruits (300–399 mm TL)	Estimates exceed annual adult mortality.	No wild-produced recruits have been detected yet.		Wild-produced recruits have not been captured. Criterion has not been met.
	Age-0	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 periodically.
Green River	Adults (>400 mm TL)	N = >5,800 individuals.	Population of stocked adults increased steadily since 2006.	Current estimate of hatchery produced adults in Green and Yampa rivers is ~36,000 individuals.	Demographic criterion appears to have been achieved since 2011. Observations of spawning congregations in known and new locations have increased in recent years.
	Recruits (300–399 mm TL)	Estimates exceed annual adult mortality.	No wild-produced recruits have been detected.		Wild-produced recruits have not been captured. This criterion has not been met.
	Age-0	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.

⁹ The Lake Powell inflow areas were not considered as potential population centers in the 2002 Recovery Goals. Researchers now report that hatchery produced razorback sucker are commonly collected there, and spawning has been detected in the lake. The information summarized above was collected upstream of Lk Powell. The Service will consider individuals captured in Lake Powell as contributing to recovery in the revised recovery plan.

¹⁰ Please see Recovery Goals (USFWS 2002c) for a complete description of demographic requirements.

Table 4. Summary of bonytail status and trends.

Subbasin	Life Stage	2002 Recovery Goal Downlisting Criteria ¹¹	Long-term ⁴ abundance	Short-term abundance; 5 most recent data points	Summary
Colorado River	Adults (≥ 250 mm TL)	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 / detections of stocked adults increasing since 2013, but still rare.
	Recruits (150–249 mm TL)	Recovery goal recommends estimates exceed annual adult mortality.	N/A	N/A	No wild recruitment has been detected; no recruits have ever been documented.
	Age-0	No specific recovery goal criteria for this life stage.	N/A	N/A	N/A
Green River	Adults (>250 mm TL)	N = >4,400 individuals.	N/A	No estimates; beginning to see some returns of stocked individuals.	Observations / detections of stocked adults increasing since 2013.
	Recruits (150–249 mm TL)	Recovery goal recommends estimates exceed annual adult mortality.	N/A	N/A	No wild recruitment has been detected; no recruits have ever been documented.
	Age-0	No specific recovery goal criteria for this life stage.	N/A	N/A	Researchers documented successful reproduction in the wild (in floodplain habitats) in 2015, 2016, and 2017.

¹¹ Please see Recovery Goals (USFWS 2002d) for a complete description of demographic requirements.

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

The Recovery Program accomplished a number of important objectives in 2018 and early 2019. We describe these accomplishments in Table 5 below. (Note: some of these accomplishments reference preliminary findings that we did not include in Tables 1–4 above). The Service has concerns about shortcomings in the progress of some ongoing and future recovery actions, which we describe 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 May 4, 2019, RIPRAP ([UCREFRP 2019](#)), which assesses actions from February 1, 2018, through January 31, 2019 (see assessment column in the RIPRAP tables).

Table 5. SIGNIFICANT ACCOMPLISHMENTS (February 1, 2018, through January 31, 2019)

Accomplishment	Sufficient Progress Criteria Affected
General – Upper Basin-wide	
<p>Detections of all PIT-tagged fish continue to increase in number and geographic extent, (in part due to greater deployment of PIT detection arrays)</p> <p>A SSA for humpback chub was completed in March 2018. Based on that SSA, on March 19, 2018, the Service’s Regional Director signed a 5-year review, which recommended that a proposal to downlist humpback chub be prepared. During the reporting period, Program Director’s Office (PDO) staff drafted a proposed downlisting rule (PDL) including a 4(d) rule, which has cleared multi-regional review and has been submitted to Headquarters for publication in the Federal Register. When published the PDL + 4(d) rule will be open for public comment. In the fall of 2017, researchers reported an increasing number of juvenile humpback chub in Westwater and Cataract canyons and in Black Rocks on the Colorado River. In the fall of 2018, researchers reported the highest catch of first year adult humpback chub in Desolation Canyon on the Green River since 2003.</p> <p>Razorback sucker adults (stocked fish) continue to accumulate throughout the basin (including the Colorado and San Juan river inflows to Lake Powell). Over-summer (and some over-winter) survival of age-0 fish, primarily ones that benefited from managed floodplains on the Green River, greatly improved since 2012. However, dry conditions in 2018 resulted in minimal floodplain connections and few age-0 razorback captures in the fall 2018.</p>	<p>2 – Improving status of fish populations.</p>

<p>Wild bonytail reproduction was confirmed for the first time in Green River floodplains in 2015 and was documented again in 2016 and 2017.</p>	
<p>Recovery Program continues to adjust nonnative fish actions to those deemed most effective and efficient. Catch rates of adult smallmouth bass and northern pike declined in many locations, despite variable catches of younger fish, demonstrating a removal effect. Crews now remove non-native predators in 600+ miles of river annually at the cost of approximately \$1.7 million.</p> <p>Recovery Program stakeholders have increased focus on eliminating reservoir escapement based on results of smallmouth bass (Breton <i>et al.</i> 2014) and northern pike syntheses (Zelasko <i>et al.</i> 2015), and consistent walleye catches (see individual subbasins for specific actions).</p> <p>Colorado Parks and Wildlife (CPW) and Recovery Program participants continued to meet as a Nonnative Fish Workgroup to enhance nonnative fish control in Colorado. During this year, the group committed to holding focus groups of anglers and relevant community members to help frame next steps for outreach about nonnative fish.</p> <p>East and West Slope water organizations have distributed articles and bill stuffers to more than 200,000 customers explaining the need for non-native fish control and the benefits of protecting/recovering native and endangered fish.</p>	<p>1 – Reduce threat of non-native predation and competition on endangered and native fish.</p>
<p>Non-federal stakeholders responded to a 2018 Office of Management and Budget (OMB) directive, which cancelled the use of hydropower revenues for the Colorado River environmental programs in FY19, by requesting Congress pass legislation to provide appropriations to replace hydropower funding. Congress passed the legislation late in the year. Congress revised PL 106-392 reauthorization language with respect to the OMB directive. The resulting bill (PL 116-9), signed by the President on March 12, 2019, secured annual funding via annual appropriations in FY18 and hydropower funding was then allocated through FY23. The bill requires that stakeholders work with the SOI to submit a Report to Congress (deadline end of FY21) that identifies recovery actions and costs post- 2023.</p>	<p>4 – Reduce magnitude of project impact.</p>
<p>Outreach is a powerful way to provide our message to local communities; engagement with local citizens is generally very positive and citizens learn a lot from our presentations and handouts. Partners and volunteers provide a substantial workforce to staffing these outreach events. In 2018, the Program was an active presence at the following gatherings and meetings: Colorado Water Congress, Utah Water Users, Colorado Water Workshop, American Water Resources Association Western Seminar, Rocky Mountain Coal Mining Institute Annual Conference, Colorado River Water Users Association, Ute Water’s Children’s Water Festival, Endangered Species Day (May 2018 at the</p>	<p>Increase awareness of Recovery Program actions to: 1 – reduce threat of non-native predation and competition on endangered and native fish; 2 – improve status of fish populations;</p>

<p>Denver Aquarium), Palisade Farmers’ Market, and the Palisade Peach Festival.</p>	<p>3 – improve flows; and 4 – reduce magnitude of project impact.</p>
<p>Green River</p>	
<p>In 2018, unregulated Apr-July flow into Flaming Gorge Reservoir was approximately 114% of the 1981-2010 average. Flaming Gorge releases were ramped-up to power plant capacity (~4600 cfs) on May 22-23 in order to boost larval razorback sucker entrainment into Stewart Lake and other floodplain wetlands. In response to a supplemental Recovery Program flow request, an additional 2,000 cfs of bypass release (~6,600 total) was provided on May 29-30 for the same purpose, resulting in Reach 2 peak flow of ~12,600 cfs.</p> <p>Average August and September baseflows recorded in Reach 2 were 2,299 cfs and 2,215 cfs respectively. These flows fell within the experimental base flow range recommended to increase Colorado pikeminnow recruitment (2,000-2,600 cfs; Bestgen and Hill 2016).</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>In April 2018, UDWR coordinated a controlled burn to reduce cattail encroachment at the Stewart Lake floodplain prior to Reclamation’s Larval Triggered Study Plan (LTSP) operations. When the floodplain was drained in mid- to late August, ten age-0 razorback sucker were collected.</p> <p>Other than Stewart lake, no other Green River floodplains connected in 2018 either due to low spring peak flows or as a management action to leave the wetlands dry to control cattails (e.g., Johnson Bottom).</p>	<p>1 – Improve habitat and reduce threat of extinction; 2 – Improve status of fish populations.</p>
<p>Estimates of adult razorback sucker abundance in the Green River subbasin 2011-2013 ranged from N=25,482 in 2011 to N=36,355 in 2013. Low capture probabilities explain high variability associated with these estimates. Catch rates of adults in 2018 remained high.</p>	<p>2 – Improving status of fish populations.</p>
<p>With capital funds appropriated for the Recovery Program Reclamation constructed a fish exclusion project (a screened weir wall) in the Green River Canal during the winter of 2018/2019, which was completed prior to the start of the 2019 irrigation season. The Recovery Program has recognized the need for some solution to the loss of endangered fish in this canal system for decades. It was not until a PIT antenna was recently installed in the canal that we learned just how dire that need was. This project is expected to have a measurable positive impact on survival of endangered fish in the Green River subbasin.</p>	<p>1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.</p>
<p>The USFWS Ouray National Wildlife Refuge was successful in renewing their lease with the Uintah and Ouray Ute Tribe, which restores Program access to the Old Charley managed floodplain.</p>	<p>1 – Improve habitat and reduce threat of extinction</p>
<p>In 2018, Utah Division of Wildlife Resources (UDWR), The Nature Conservancy (TNC), and the Price Municipal Corporation secured more than \$1.3M from the National Resource Conservation Service for</p>	<p>1 – Improve habitat and reduce threat of extinction</p>

<p>ecosystem restoration in the Price River drainage. The Recovery Program and others have documented seasonal use of this tributary by endangered Colorado River fish and a relatively low use by predacious nonnative species.</p>	
<p>Yampa River</p>	
<p>Colorado Water Conservation Board (CWCB) and the State of Wyoming provided draft depletion accounting for the Yampa River in the Spring 2019. Those reports were subsequently accepted in final form by the Western Colorado Ecological Services office as satisfying the PBO reporting requirements.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>Observations of low-flow hydrology in 2018 led the State of Colorado Division 6 Engineer to provisionally reduce transit losses assessed on Elkhead Reservoir releases from 0.5% per mile to 0.1%, and to initiate an evaluation of historic data to potentially permanently adjust this value. Reduced transit loss assessments allow substantially more Program water released from Elkhead to be protected from diversion downstream.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows;</p>
<p>CPW, with financial support from the CWCB, held the third Elkhead Classic harvest tournament in 2018. Anglers removed over 300 northern pike and over 500 smallmouth bass in 9 days.</p>	<p>1 – Improve habitat and reduce threat of extinction; 2 – Improving status of fish populations.</p>
<p>CPW completed a rotenone treatment of Chapman Reservoir in November 2018 to eliminate an illegally introduced population of nonnative northern pike.</p>	<p>1 – Improve habitat and reduce threat of extinction; 2 – Improving status of fish populations</p>
<p>CPW and FWS removed 203 northern pike in five weeks of netting in Yampa River backwater habitats in 2018. This project has shown yearly declines in total catch (including electrofishing downstream of Craig, CO) since 2015 when this project began in earnest. CPW continues to expend significant effort (using non-Program funding) annually to remove northern pike from Catamount Res.</p>	<p>1 – Reduce threat of non-native predation and competition on endangered and native fish.</p>
<p>White River</p>	
<p>On July 19, 2018, Rio Blanco Water Conservancy District (RBWCD) conducted a flow spike (90-minute release of 1,100 cfs from Kenney Reservoir). The primary purpose of the flow spike was to dislodge algae from the channel margins. The flow spike resulted in a 3.07 foot rise in river stage at the Town of Rangely diversion structure. While this spike flow did not produce a clear effect on smallmouth bass reproduction, it demonstrated that flow manipulations for specific management purposes are possible. Program partners will continue to coordinate with RBWCD and try to determine if these flows can be timed to also disrupt smallmouth bass spawning, i.e. for mutual benefit.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>

The White River Planning Team continues to make progress toward establishing a PBO for this drainage in CO and UT.	1 – Improve habitat and reduce threat of extinction; 3 – Improve flows
Duchesne River	
In October 2018, the Duchesne River Working Group reported completion of a draft a 5-year update to their water management report. Water delivery continues to supply base flows at a much improved rate, but available volumes and delivery constraints continue to preclude consistently meeting base flows during the summer period in drier years. Since 2004, flows have fallen short of the 50 cfs late-summer target an average of 46 days/year (maximum 109 days in 2013). Additional sources of water should continue to be investigated.	1 – Improve habitat and reduce threat of extinction; 3 – Improve flows
Since 2015, UDWR has maintained a temporary barrier below the Starvation Reservoir spillway to contain escaped walleye and smallmouth bass. Construction of a permanent screen in the stilling basin is planned for fall 2020.	1 – Reduce threat of non-native predation and competition on endangered and native fish.
Colorado River	
As dire as flow conditions became in the 15-Mile Reach during the 2018 irrigation season, they would have been much worse if not for the exceptional cooperation and contributions of Program stakeholders. Colorado Water Conservation District (CRWCD) coordinated with the Program to provide 18,812 acre-feet of Wolford Reservoir maintenance releases timed to benefit the 15-Mile Reach during low base flows. In addition, ExxonMobil subsidiary XTO Energy freed-up 5,000 acre-feet of contract water in Ruedi Reservoir that became available for endangered fish releases. Reclamation played an important role in facilitating the contributions, exchanges, and deliveries.	1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.
In each year since 2015, CWCB and Ute Water have implemented a short term lease that provides an additional 6 KAF to 12 KAF of flow augmentation from Ruedi Reservoir. This lease supplements the other longer-term Ruedi Reservoir agreements that provide fish water for the 15-Mile Reach. The Ute lease provided 6,000 AF of augmentation water in 2018.	3 – Improve flows; 4 – Reduce magnitude of project impact.
Operation of the Grand Valley Water Users Association (GVWUA) fish screen in 2018 began on Apr 16 and terminated Oct 29. These screens operated 86% of days during the irrigation season (213 days total), with some interruptions for minor operational needs and low-flow challenges.	1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.
Northern pike numbers are declining in Mamm Creek Pit#1 in response to CPW’s continued removal using the Merwin Trap and other sampling techniques. No northern pike were collected in Pits #2 or #3.	1 – Reduce threat of non-native predation and competition on endangered and native fish.

<p>Per the Rifle Gap Reservoir Lake Management Plan, 2018 was the second year of three for fertile walleye removal paired with sterile walleye stocking. CPW removed 57 females (87 in 2017).</p>	
<p>78 age-0 Colorado pikeminnow were collected in Colorado River nursery habitats during ISMP sampling, which yielded the 6th highest catch rate since sampling began in 1986.</p> <p>Ten age-0 razorback sucker (TL= 45-81mm) were collected in July between RMI 54-32 (the Matheson Preserve floodplain is located at RMI 62). This is the second time age-0 RZBs have been collected in the lower Colorado River; the first time was in 2012.</p>	<p>2 – Improving status of fish populations.</p>
<p>Gunnison River</p>	
<p>The May 1, 2018, forecast Apr-Jul inflow to Blue Mesa Reservoir was a "Dry" 350 KAF, resulting in a 2018 peak flow target of only 900 cfs for the Whitewater gage. The observed mean daily peak flow at Whitewater was 2,030 cfs (May 13). Base flow was maintained above the minimum 750 cfs target for the entire Aug-Dec period, with supplemental flows exceeding 890 cfs provided through Nov 26, which helped maintain flows for the Redlands fish ladder and screens in excess of the ~750 cfs typically diverted at Redlands.</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 grassroots support and cooperation. The USGS five-year selenium report assessing dissolved selenium concentrations and loads in the lower Gunnison River basin was published in 2018. It concludes that selenium concentrations in the Gunnison River at Whitewater decreased to the state standard in 2016. While this is encouraging, the authors of the report recommend continued monitoring and data analysis to confirm this apparent trend.</p>	<p>1 – Improve habitat and reduce threat of extinction; 3 – Improve flows; 4 – Reduce magnitude of project impact.</p>
<p>In 2018, the Redlands fish passageway was operational from 18 April to 27 September for the 23rd year of operation. A record 39 Colorado pikeminnow were captured, 21 of which were previously untagged. In total, 201 Colorado pikeminnow have used the passage, 25 have used it in more than 1 year. Two razorback sucker and eight bonytail also used this passage structure during this reporting period.</p>	<p>1 – Improve habitat and reduce threat of extinction; 4 – Reduce magnitude of project impact.</p>
<p>Tri-County Water Conservancy District successfully avoided spills from Ridgway Reservoir and thereby have contained invasive smallmouth bass from 2014 through 2018, even with substantial runoff in 2017.</p> <p>CPW has conducted a harvest tournament for smallmouth bass at Ridgway Reservoir each summer since 2015. Tournament participants removed over 1,400 smallmouth bass in three weeks in 2018. CPW estimates that the combined effect of 4 years of fishing tournaments has reduced the smallmouth bass population by 58%.</p>	<p>1 – Reduce threat of non-native predation and competition on endangered and native fish.</p>

Table 6. SERVICE CONCERNS AND RECOMMENDATIONS (focused on February 1, 2018, through January 31, 2019)

Service Concern	Sufficient Progress Criteria Affected	Recommended Action Items
General – Upper Basin-wide		
<p>Current densities of Colorado pikeminnow throughout the Upper Basin are low. Preliminary population estimates of adult Colorado pikeminnow in the Green River basin have declined from ~4,000 individuals in the year 2000 to less than 1,000 adults in 2018. A recent Population Viability Analysis for this species summarized threats as follows:</p> <ul style="list-style-type: none"> ● Large-bodied predatory species of concern (smallmouth bass, northern pike, and walleye) have spread through large segments of critical habitat, including Colorado pikeminnow nursery habitats. ● 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. ● Potentially significant losses of all life stages of Colorado pikeminnow have occurred at the Green River Canal, near Green River, UT, particularly in years of dry hydrology. 	<p>1 – Increases threat of extinction; 2 – Declining status of fish populations.</p>	<p>The persistent and prolonged threat of expanding non-native fish populations needs to be managed to an acceptable level to benefit all the endangered fishes. Reductions in non-native 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. The Service recommends that the Program continue to seek efficiency in their riverine removal program and strive to complete off-channel reservoir screening projects as expediently as possible.</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 – 3,000 cfs when possible. The Recovery Program should experiment with this full range of revised base flows as soon as possible and monitor response of endangered and non-native fish as well as channel form and vegetation encroachment.</p> <p>The Service recognizes the recent completion of a fish barrier in the Green River Canal as a significant contribution to the conservation of all native Colorado River fishes.</p>

<p>For the first time, the Biology Committee is discussing the need to augment the Green River population with hatchery produced Colorado pikeminnow. However, we have recently learned the genetic diversity of the existing Colorado pikeminnow broodstock at Southwestern Native Aquatic Resources and Recovery Center (SNARRC) should be improved before augmentation can occur.</p> <p>The sixth rotation of Colorado pikeminnow population estimates on the Colorado River did not commence in 2018 as planned due to administrative problems with hiring Service seasonal employees in a timely manner.</p> <p>Bonytail survival continues to be low.</p> <p>Humpback chub is considered extirpated from Dinosaur National Monument (DNM).</p>		<p>The Recovery program should make every effort to supplement the genetic diversity of the Colorado pikeminnow broodstock held at SNARRC.</p> <p>The Service will work towards an administrative solution; population estimates will resume in 2019.</p> <p>Bonytail production has increased under the Revised Integrated Stocking Plan. Bonytail should continue to be stocked into floodplain locations to determine the importance of this habitat to the species and to see if survival of stocked fish will increase. The Service encourages experimentation with alternative feed for bonytail that could result in healthier fish being stocked in the wild.</p> <p>A working group was convened in 2017 to develop a humpback chub translocation or reintroduction strategy (focus on DNM). That working group should strive to draft a white paper for Biology Committee review in 2020.</p>
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<p>Wild produced razorback sucker have yet to reach sexual maturity in either the Colorado River or Green River subbasin.</p>		<p>The Service agrees with the Recovery Program that floodplain management appears to be on a fruitful track. The Recovery Program should continue to modify and manage floodplain habitats and control non-native predators in floodplain habitats to improve survival of wild age-0 and juvenile razorback sucker.</p> <p>The Service encourages continued use of PIT antenna technology as a complement to traditional sampling techniques and one that reduces stress associated with handling sensitive species. Methodologies should be developed to incorporate detections of endangered fish at these antennas into population estimates.</p>
<p>New non-native species continue to appear in the Upper Basin. Gizzard shad, a preferred food item of non-native walleye, expanded upstream from Lake Powell during the mid-2000s. Predacious walleye seem to be following this forage species into the lower Green and Colorado rivers. Fertile grass carp have been documented in the lower portions of the Green and Colorado rivers. In 2017, 13 non-native yellow perch were collected in Stewart Lake – a new occurrence.</p> <p>Nonnative northern pike were collected in Kenney Reservoir on the White River for the first time.</p> <p>The capture of larval grass carp was confirmed from Lake Powell in 2015 and again in 2016, representing the first instances of this species reproducing in the Upper Colorado River basin. Subsequently, additional diploid (i.e., fertile) grass</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>Continue to restrict the establishment of non-native species in the basin through stocking regulations and reservoir screening. 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.</p> <p>The Recovery Program should work closely with CPW to implement appropriate control measures as quickly as possible.</p> <p>Because this issue has ramifications beyond this Recovery Program, the Service recommends that the Program Director’s office continue to share information and raise concern with state and regional organizations. The Program Director’s office has</p>

<p>carp have been collected in the Green and Colorado rivers. All three grass carp collected in the Green River in 2017 were diploid.</p> <p>Reservoir screening project schedule should be continually pursued. The risk of escapement of non-native predators (e.g., smallmouth bass from Ridgway Reservoir) remains high.</p>		<p>provided information to the Colorado River Fish and Wildlife Council, where this issue was raised in coordination meetings with the States.</p> <p>The Program Director’s Office (PDO), States, and Reclamation need to work opportunistically to complete screening projects at Ridgway, Starvation, Red Fleet, and Catamount reservoirs prior to 2023. Ridgway Reservoir screen is scheduled to be installed in 2020.</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, Duchesne River Working Group, White River Working Group, etc.). The PDO’s post-2023 planning workshops with basin water stakeholders in early 2019 identified promising instream flow protection strategies for each major subbasin.</p>
<p>Despite remarkable accomplishments since the Recovery Program’s inception in 1988, it is clear that recovery of the four endangered fish will not be accomplished by 2023 when the Cooperative Agreement expires. A post-2023 solution (e.g., an extension of the existing Recovery Program) must be developed.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish; Improve habitat through protected/augmented flows;</p>	<p>Current funding re-authorization legislation (PL 116-9) requires a Report to Congress in FY21, which will describe actions, projected costs, and institutional/funding arrangements post-2023. The Service encourages Program partners to assist the Secretary in developing a solution that builds on 30 years of programmatic experience, continues to provide ESA coverage for historical and future water depletive projects, and leads to recovery of the endangered fish. The Service recommends that the partners’ complete a draft report by the end of FY2020 thereby leaving adequate time for DOI bureau and departmental review.</p>

<p>A number of specific projects were not completed in late FY18 / early FY19 because funding uncertainties caused by the OMB directive which prevented the use of hydropower revenues for Colorado River environmental programs. For example, fall walleye removal in the Green and Colorado Rivers and late season smallmouth bass removal in the middle Green did not take place.</p>		<p>The Service recognizes that the temporary lapse in some threat removal activities last fall was beyond Recovery Program control. We applaud the efforts of the non-federal partners in reaching a legislative solution prior to the end of FY18 that restored FY19 annual funds at full funding levels.</p>
<p>Green River</p>		
<p>Evaluation and recommended revision of Green River flow and temperature recommendations (Muth <i>et al.</i> 2000) are behind schedule.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>During the reporting period, considerable effort was made by the Green River Evaluation and Assessment Team (GREAT) to complete this task. [In May 2019, the primary authors and the GREAT submitted a draft final report entitled, <i>Evaluation and Suggested Revision of Flow and Temperature Recommendations for the Endangered Fish in the Green River Downstream of the Flaming Gorge Dam</i> the GREAT for technical committee review. After the primary authors revise the report in response to technical and peer review comments the report will be submitted to the Management Committee for final Recovery Program approval].</p>

<p>General spring and summer flow management met the desired objectives as discussed in Table 5 above. However, despite dam selective withdrawal operations intended to meet temperature objectives at the confluence of the Green and Yampa rivers, the latter were not entirely achieved during the 2018 base flow period. Bestgen and Speas reported that in 2018, in the period when Colorado pikeminnow larvae were present (20 June to 3 August), the Green River was cooler than the Yampa River by 5°C or more (i.e., exceeding the maximum difference recommended in Muth <i>et al.</i> 2000) on 17 days. Mean water temperature difference in that period was 4.6°C, with a maximum of 7.1°C.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>The Service recommends that the Program and Reclamation continue to coordinate / communicate through the development and implementation of the Recovery Program’s annual flow and temperature requests. It will be important to use adaptive management to monitor and understand how higher summer base flows in drier hydrologies (Bestgen and Hill 2016) can affect temperature gradients at the confluence and biological ramifications of this trade-off</p>
<p>Recovery Program and Reclamation staff and the water user representative spent considerable amounts of time responding to concerns (impacts to landowner and tailrace trout guides stemming from spring releases from Flaming Gorge dam) of the Green River Stakeholders.</p>		<p>The Service supports the approach that staff from Reclamation, Service, WAPA, water users, and the PDO are taking to address the concerns of this public interest group.</p>

<p>Catch rates for all life stages of smallmouth bass (SMB) increased in 2018 over those observed in 2017. With respect to young of year SMB, this was not unexpected as we have learned that SMB reproduce better in drier years.</p> <p>Walleye numbers in middle and lower Green River threaten recovery because of habitat overlap with young Colorado pikeminnow. Four bonytail and one Colorado pikeminnow were identified in the stomach contents of walleye in the lower Green River.</p> <p>In 2017, record high catches of age-0 northern pike were reported in the Browns Park reach of the Green River following the high and extended spring flow releases from Flaming Gorge. A return to lower spring dam releases in 2018 resulted in no age-0 northern pike captures and fewer captures of endangered fish.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>In addition to ongoing non-native fish control activities, the Service supports experimentation with flow spikes (e.g., short-duration, high magnitude (up to 4,600cfs) dam releases) as per Recovery Program approved study plans to 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 and control escapement from Upper Basin reservoirs where needed and feasible.</p> <p>Continue to monitor fish community in this reach of the river to understand the benefits and consequences of high, extended dam releases on the entire fish community. Continue to eliminate any northern pike captured during monitoring efforts.</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. In 2018, UDWR coordinated and conducted a controlled burn at Stewart Lake to control cattails.</p>

<p>Understanding the effects of and reducing selenium concentrations may still be a concern at Stewart Lake.</p>	<p>May hamper ability to 1 – Improve habitat.</p>	<p>The Service completed analysis of selenium levels in razorback sucker and surrogate species during LTSP operations. The Service recommended Stewart Lake continues to be used to rear razorback sucker, despite the levels of selenium uptake and stakeholders efforts to continue to manage supplemental flows at Stewart Lake to assist in selenium remediation.</p>
<p>The Tusher Diversion fish passage has been clogged with debris for much of the time since it was installed in 2016.</p>	<p>May hamper ability to 1 – Improve habitat.</p>	<p>The Recovery Program needs to continue to work with the Green River Canal Co. to successfully implement the recent O&M contract as it relates to this fish passage facility and the new fish barrier constructed in their irrigation canal.</p>
<p>Yampa River</p>		
<p>Despite significant efforts, smallmouth bass densities in Little Yampa Canyon and other reaches of the Yampa River remain a concern; northern pike remains a concern in upstream reaches. In-river control efforts are compromised by unscreened upstream sources and in-river reproduction.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native 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 control efforts.</p> <p>The Recovery Program should continue to work with the Catamount Metropolitan District on the installation of a net/screen to prevent northern pike escapement. In the meantime, we encourage CPW to continue their northern pike control efforts at this reservoir. Efforts to identify and prevent the use of riverine spawning habitat should continue.</p>
<p>Duchesne River</p>		
<p>The extent of the contribution of smallmouth bass or walleye produced in the Duchesne River below Starvation and entering Green River remains unknown.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>UDWR, in coordination with the Northern Ute tribe, was able to reinitiate some sampling in the Duchesne in 2017. This should be continued to determine the extent of the problem and identify any needed control measures.</p>

<p>Construction of a permanent fish containment screen below Starvation Reservoir was postponed in 2018 because of late arising questions of design and location.</p>		<p>Reclamation, Central Utah Water Conservation District (CUWCD), UDWR redesigned the Starvation Res. fish screen project by relocating the screen below the Primary Jurisdiction Zone. The new plan has been approved by the stakeholders. The Service encourages the responsible parties to construct the screen in 2021.</p>
<p>White River</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. The White River Planning Team assisted CWCB in soliciting proposals to prepare the Management Plan and is helping define possible future development scenarios to model and evaluate.</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 (done) and incorporate State of Utah and Ute Indian Tribe of the Uintah and Ouray Reservation water demands; 2) the Recovery Program should finalize White River endangered fish flow recommendations; 3) a Management Plan and Biological Assessment should be drafted as soon as possible.</p>
<p>A dense population of smallmouth bass has established in the White River below Taylor Draw Dam. Spawning adults are densest near the clear releases from Taylor Draw Dam and continue downstream to Douglass Creek. Catch rates in Utah demonstrate increasing abundance downstream, especially of smaller size classes. Spawning is successful even during higher water years. Additional removal activities are complicated by river access, safety, and potential negative effects on native fish. Non-mechanical removal actions (e.g., flow spikes) may be needed to protect this native fish community.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>Efforts to reduce the abundance of smallmouth bass are maximized based on access and effectiveness. Other options (e.g., flow spikes from Taylor Draw Dam) besides electrofishing removal should be considered to disadvantage, and reduce or eliminate this established population.</p>

<p>CPW discovered the first northern pike in Kenney Reservoir in October 2018. The upper end of this reservoir appears to offer prime spawning habitat for this species. Containing and eliminating this population is of the utmost priority.</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>The Service commends CPW for their rapid response (additional netting) to this finding, but this represents another discouraging development in the nonnative fish front. The Recovery Program should work closely with CPW to implement appropriate control measures as quickly as possible. [Note – more northern pike were collected in the reservoir in 2019].</p>
<p>Colorado River</p>		
<p>The 15-Mile Reach Depletion Accounting Report was due December 31, 2011. The delayed submittal of this report has delayed completion of the Service’s 2015 15-Mile Reach PBO review. That review provides one component of assessing ESA compliance for approximately 1 million ac-ft. per year of existing depletions and 120,000 ac-ft. per year of future depletions.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>CWCB submitted a draft of the 15-Mile Reach Depletion Accounting Report in early November 2019. The report was subsequently sent to the Water Acquisition Committee for technical review. Under this analysis, new depletions in this basin upstream of the 15-Mile Reach have not reached the 120,000 AF/year maximum allowed under the PBO, nor the 60,000 AF/yr “first block”. As mentioned above, CWCB has recently completed their depletion accounting report for the Yampa River. Through that process they have revised their depletion accounting methodology (approved by the Recovery Program and the Service), which was applied to the 15-Mile Reach accounting. The Recovery Program should finalize this report for consideration by the Western Colorado Ecological Services office as soon as possible.</p>
<p>The ‘2015’ 15-Mile Reach PBO Review is overdue awaiting final approval and technical review of the depletion accounting report. A draft was distributed to the BC and WAC in August 2016, and is being s 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</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>CWCB provided raw depletion accounting information in late FY18, and submitted a draft 15-Mile Reach Depletion Accounting Report in early November 2019. The report was subsequently sent to the Water Acquisition Committee for technical review. That information should be incorporated into the PBO Review as soon as possible. Recovery Program stakeholders should continue to work with Colorado</p>

<p>hydrologies. However, the PBO recognizes that flow recommendations will not be met in all years.</p>		<p>River water managers to identify opportunities to meet flow recommendations with greater frequency.</p>
<p>The Recovery Program needs to evaluate the adequacy of current flow protection. The determination for additional flow protection rests with the Recovery Program and its Water Acquisition Committee (WAC) and will be recorded within the report that includes depletion data provided by CWCB every five years. The WAC discussed this in July and November 2011 and determined that pursuing additional instream flow filings was not prudent at that time. It appears there have been no significant new depletions in the Colorado River.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>The Service recognizes that as dire as flow conditions became in the 15-Mile Reach during the 2018 irrigation season, they would have been much worse if not for the exceptional cooperation and contributions of Program stakeholders. (For example, calculations show that flows would have dropped to zero for about 8 days in September and October.) Continue to identify the ways and means for long-term flow protection. The PDO’s post-2023 planning workshops with basin water stakeholders in early 2019 identified promising instream flow protection strategies.</p>
<p>In spite of substantial releases to augment flow in 2018, monthly mean flows in the 15-Mile Reach fell short of the 810 cfs dry-year target August through October: Aug 642 cfs; Sep 265 cfs; and Oct 764 cfs (provisional USGS data). Flows in the 15-Mile Reach fell below 200 cfs for 12 days in Sept-Oct.</p>	<p>Hampers ability to 3 – Determine adequacy of flows.</p>	<p>The Service recognizes that as dire as flow conditions became in the 15-Mile Reach during the 2018 irrigation season, they would have been much worse if not for the exceptional cooperation and contributions of Program stakeholders. (For example, calculations show that flows would have dropped to zero for about 8 days in September and October.)</p>
<p>In 2018, high catches of nonnative walleye from a reach of the Colorado River immediately below Westwater Canyon (a humpback chub population) causes concern.</p> <p>In 2017, more than 2800 gizzard shad (33-475mm) were removed from the Colorado River in Colorado and Utah, which may be the reason for an increase</p>	<p>Hampers ability to 1 – Reduce threat of extinction by decreasing numbers of non-native fish.</p>	<p>Reservoir screening projects and increased removal should reduce walleye numbers. The Recovery Program should determine the adequacy of efforts to remove walleye from the river and expeditiously implement reservoir-screening projects or other strategies to reduce / eliminate access to Critical Habitat.</p>

<p>in walleye numbers. Gizzard shad are a preferred food item of walleye.</p> <p>Two adult grass carp collected and removed from the Colorado River in 2017 were found to be fertile fish, despite regulations that require all grass carp stocked in the Upper Basin States to be triploid (sterile) fish. No grass carp were collected on the Colorado River in 2018, but three striped bass were.</p>		<p>The States and the Service should review stocking protocols to see if stronger regulations are warranted. Program sampling crews should continue to remove all grass carp whenever / wherever encountered.</p>
Gunnison River		
<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 non-native fish.</p>	<p>The stakeholder group should continue to implement actions (spill avoidance and angler incentivized harvest) and implement the screen on Ridgway as soon as possible. Funding an escapement solution should be a high priority for the Recovery Program and its partners. Continued diligence towards a solution is critical. CWCB has identified a substantial cost share for this project.</p>
Dolores River		
<p>Persistence of smallmouth bass in the upper Dolores River raises 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 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 non-native fish.</p>	<p>Management actions in addition to electrofishing should be implemented as needed to disadvantage, reduce, and control this population.</p> <p>In 2017, Reclamation coordinated with CPW to provide two days of flows of 400-500 cfs primarily to support boat electrofishing to remove adult smallmouth bass. It was hoped that this release would also disadvantage young-of-year smallmouth bass, but preliminary analysis of 2019 sampling data suggests this did not occur. The Recovery Program should continue to assess the non-native fish threat on the Dolores River to determine if resources should be directed there.</p>

C. Conclusion on Sufficient Progress

Significant Accomplishments

The Service recognizes significant accomplishments have occurred over the course of the past year.

Instream Flow and Habitat Management

The Service recognizes that the severe drought of 2018 presented water managers with extremely challenging conditions to meet the flow needs of the endangered fish throughout the Green and Colorado River subbasins. And yet:

- 1) Significant efforts were made by water users and Reclamation to prevent dewatering in the Colorado River 15-Mile Reach,
 - A total of 52,077 acre-feet (AF) was made available from existing fish pools (and other voluntary sources) in Green Mountain Reservoir, Lake Granby, Wolford Mountain Reservoir, and Ruedi Reservoir. Although flows dropped below the Service's average monthly base flow target (dry year target = 810cfs) in August through October, conditions would have been significantly worse if not for the cooperation of stakeholders.
- 2) Reclamation's Aspinall Unit operations resulted in achieving the Service's dry year spring and base flow targets for the Gunnison River.
- 3) On the Green River, Reclamation implemented a short duration larval triggered peak of 6,600 cfs, which resulted in an instantaneous peak flow of 12,600 cfs on May 30, 2018 near Jensen, UT (below the confluence of the Yampa River). Summer base flows were managed within the Recovery Program's revised (preferred; Bestgen and Hill 2016) range.
- 4) Reclamation's Western Colorado Area Office completed construction of a fish barrier in the Green River canal, which will reduce the loss of native and endangered fish in the lower Green River. The Service recognizes this as an important accomplishment that the Recovery Program has been working toward for decades.
- 5) The Recovery Program exercised the option to lease the full, short-term fish pool in Elkhead Reservoir in 2018, which increased available storage to 7,000AF. The entire fish pool was utilized during the summer / fall months. Importantly in 2018, the Colorado Division 6 Engineer reduced the transit loss assessed to the Elkhead Reservoir releases, which resulted in more efficient delivery of water to the endangered fish habitats in the lower Yampa River.

The States of Colorado and Wyoming submit Yampa River Depletion Accounting Reports as per the Yampa River Programmatic Biological Opinion

Depletions Accounting and Reporting

In their 2005 Yampa River PBO (Appendix D) the Service requires that “every 5 years, beginning in Water Year 2010, the States of Colorado and Wyoming will report to the Program estimated average annual volumes of depletions from the Yampa and Little Snake Rivers and their tributaries.” New depletions are those above the PBO baseline depletion volumes calculated for 1975-1998. New depletions are tracked against a projected amount of future depletion (53 KAF) covered by the PBO.

In 2019, the Recovery Program received depletion accounting reports from both States that covered water use through 2015. Colorado’s report accounts for new depletions over two five-year periods: 2006-2010 and 2011-2015. Wyoming’s report accounts for depletions from 2011-2015; Wyoming had previously submitted an accounting that covered the earlier period. In the reports the States describe updated and improved depletion accounting methodologies (unique to each state), which differed from the methodologies the Service had described in Yampa PBO Appendix D. Colorado’s methodology differed only slightly; while Wyoming’s methodology presented a very different approach. The States felt the revised methodologies provided a more accurate assessment of the PBO baseline depletions (1975 – 1998).

To summarize, the recent depletion accounting analyses indicated that for the 2006-2010 and 2011-2015 periods average annual depletions in the Yampa River drainage decreased relative to the 1975-1998 baseline period in both states. Wyoming notes that the decreases are likely attributable to the relatively dry basin hydrology over the last 20 years compared to the entire baseline period. Nevertheless, in both states it is apparent that consumptive water uses are well below the maximum coverage provided for new and expanded depletions under the 2005 Yampa PBO.

On September 6, 2019, the Recovery Program’s Water Acquisition Committee (WAC) approved the findings of these reports as well as the revised depletion accounting methodologies. On October 3, 2019, Service personnel in the Western Colorado Ecological Service’s Office also accepted these reports as meeting the requirements of Yampa PBO Appendix D. However, Service personnel relied heavily on the technical expertise of the WAC with respect to their acceptance of the revised depletion accounting methodologies.

In Appendix I of this memorandum, the Recovery Program Director’s Office provides a more thorough summary of the major findings of those reports and descriptions of the revised depletion accounting methodologies.

Status of the Fish

- 1) Preliminary reports indicate that adult humpback chub populations in Westwater and Black Rocks canyons appeared to have stabilized and rebounded above the 2002 Recovery Goal Core Population criterion of at least 2,100 adults.
- 2) The Service has proposed to reclassify the humpback chub as a threatened species, based on the persistence of four Upper Basin populations and the resiliency of the largest population in the Grand Canyon near the confluence with the Little Colorado River.
- 3) Similarly, the Service is drafting a proposed rule to reclassify the razorback sucker as a threatened species, based on reestablishing tens of thousands of hatchery produced adults in four population centers in the Upper Basin (including in Lake Powell) and three smaller groups of fish in the Lower Basin. The Lake Mead population in the Lower Basin is the only known self-sustaining population, although hatchery adults are reproducing in all other locations.
 - Since 2012, Reclamation's Larval Triggered Study Plan operations at Flaming Gorge Reservoir coupled with improved Green River floodplain management practices have periodically resulted in good production of wild, age-0 razorback sucker.
- 4) Bonytail spawning has been detected in Green River floodplains in 2015, 2016, and in 2017.

Non-native Fish Management

- 1) The Service believes that the recent focus on controlling off-channel sources of predatory non-native species (invasive smallmouth bass, northern pike, and walleye), coupled with the Recovery Program's longer-standing commitment to conduct targeted removal of spawning adults in riverine environments represents an effective strategy.
- 2) Field crews continue to implement the most effective and efficient nonnative removal project in riverine habitats, focusing on:
 - Disrupting smallmouth bass spawning through a multi-agency, coordinated effort in key reproduction areas, such as Little Yampa Canyon and Island Park;
 - Targeting northern pike pre-spawn in Yampa River backwaters, thus reducing the species capacity for population expansion; and
 - Targeting walleye in early and late season removal efforts, maximizing individuals removed.
- 3) Recovery Program partners continue to pursue reservoir containment solutions to prevent nonnative fish from reaching endangered fish habitats:
 - CPW, CWCB, and the Recovery Program installed a spillway net at Elkhead Reservoir on September 2016, which performed well through the 2017 and 2018 runoff. CPW is stocking the reservoir with largemouth bass to replace an undesirable smallmouth bass fishery.

- Bureau of Reclamation completed a design for an in-reservoir screen to prevent smallmouth bass from escaping Ridgway Reservoir. Tri-County Water Conservancy District has prevented a spill at the reservoir since 2012.
 - Downstream screens at Red Fleet and Starvation Reservoirs are designed and awaiting construction.
- 4) CPW continued to organize incentivized harvest tournaments at Elkhead and Ridgway reservoirs to enlist public support with the removal of smallmouth bass and northern pike. CPW is now offering a bounty for northern pike removed by anglers from Green Mountain Reservoir; the Colorado River Water Conservancy has had a similar program in place for several years at Wolford Mountain Reservoir.

Despite good cooperation among Recovery Program partners to implement a comprehensive suite of recovery actions, the Service shares concern over recent reports of low densities of Colorado pikeminnow adults in the Green and Colorado River subbasins. The Service strongly encourages that the next 3-yr adult Colorado pikeminnow population estimation project in the Colorado River starts in 2019 (originally scheduled to start in 2018). We also remain concerned over extirpation of humpback chub from the lower Yampa River and particularly slow progress toward recovery of bonytail.

Priority Actions Looking Forward

We advise that the Recovery Program continue to focus on several specific recovery actions in the coming year. We categorize those actions under: 1) non-native fish management; and 2) flow and habitat management, as follows:

Non-native Fish Management

- 1) Maintain current levels of river removal effort, while continuing to look for further efficiencies and greater effectiveness.
- 2) Maintain the Recovery Program's current reservoir screening schedule with a particular focus on the Ridgway Reservoir screening project. The Service is very concerned that smallmouth bass could escape downstream into the Gunnison River, a native species stronghold.
- 3) Continue to investigate more landscape level control activities, such as flow-spikes, to increase the effectiveness of control actions.
- 4) With particular consideration of the recent introduction of invasive northern pike into Kenney Reservoir, the stakeholders should continue public outreach efforts to clearly describe the detrimental and costly effects (monetary and ecological) of illicit stocking.

Flow and Habitat Management

- 1) The 15- Mile Reach depletion accounting report must be approved and finalized to ensure compliance with the Colorado River 15-Mile Reach PBO.
- 2) Finalize White River endangered fish flow recommendations and develop a White River Management Plan / PBO.
- 3) The Service encourages the Recovery Program to establish long-term (post-Program and post-delisting) flow protection strategies throughout the basin. These strategies are necessary to achieve recovery, to maintain recovery in the post-recovery period, and should consider the best available information on climate change.
- 4) The Service applauds Reclamation's progress constructing a fish exclusion device in the Green River Canal, located near Green River, UT, during winter 2018/2019 and recommends continued monitoring to determine effectiveness, as well as condition of fish returned to the river through the return chute.

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

Finally, in light of the Recovery Program's [Cooperative Agreement](#) expiring in 2023, the Service encourages the Recovery Program to continue discussions and negotiations to define your post-2023 future. More specifically, the Service applauds the non-federal partners for including language in PL 116-9 (which reauthorized funding for the programs for FY2020-2023) that commits the Secretary of the Interior to submit a Report to Congress in FY2021. The intent of that report will be to describe and predict progress to species recovery, summarize the amount of funds expended to date, describe necessary recovery actions and associated projected costs post-2023, and recommended institutional/funding arrangements.

And, similarly, the Service recognizes the efforts of non-federal partners to secure full funding solution for the Recovery Program in FY2019 in light of the Office of Management and Budget directive which required that hydropower revenues for this and other Colorado River environmental programs that year to be returned to the Treasury. Recovery of these endangered fish has been and continues to be expensive. However, continued implementation of the successful recovery activities, through a sustained funding commitment has factored heavily into the Service's determination of sufficient progress in the past as well as our recommendation to pursue reclassification of humpback chub and razorback sucker.

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, the Service is convinced that the best chance for success, i.e., recovery, rests with this and other collaborative Recovery Programs. Our recent decision to pursue reclassification of humpback chub and razorback sucker from endangered to threatened status is a testament to sufficient progress.

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), non-native 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 AF¹². 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., 2,169 projects depleting more than 2.86 million acre-feet of water per year. Projects exceeding 4,500 acre-feet or that have direct or indirect effects in addition to water depletion will be evaluated to determine if they jeopardize the species' continued existence on a case-by-case basis.

This concludes the Service's 2018-2019 "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 or Julie Stahli, Deputy Director, at 303-236-4573, Julie_Stahli@fws.gov.

¹² 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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Conservation Planning Specialist Group *In consultation with* The Colorado Pikeminnow PVA Technical Team. *Prepared for* U.S. Fish and Wildlife Service, Upper Colorado Endangered Fish Recovery Program, Post Office Box 25486, DFC, Denver CO 80225

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Appendix I

**The Recovery Program Director Office's Summary of the Major Findings and Methodologies presented in the States of Colorado and Wyoming Yampa River Depletion Accounting Reports
this Summary was provided to:**

**the Recovery Program's Water Acquisition Committee
and to
the Service's Western Colorado Ecological Services Office
to assist in their review of the States' Reports**

Discussion Notes on Colorado & Wyoming Yampa Basin Depletion Analyses

Don Anderson, Recovery Program Instream Flow Coordinator

13 August 2019

Background:

- Appendix D of the 2005 Yampa River PBO states that “every 5 years, beginning in Water Year 2010, the States of Colorado and Wyoming will report to the Program estimated average annual volumes of depletions from the Yampa and Little Snake Rivers and their tributaries.” Average depletions are compared to the PBO accounting period of 1975-1998.

Periods evaluated:

- **Colorado’s** analysis addresses both the 2006-2010 and 2011-2015 periods.
- **Wyoming’s** analysis addresses 2011-2015.

Methodologies used:

- **Colorado** used the StateCU model. They incorporated an elevation adjustment for crop coefficients for the Modified Blaney-Criddle crop evapotranspiration (ET) estimates. This adjustment increases estimated ET and is believed to result in more accurate consumptive use estimates. Further, Colorado re-quantified the baseline depletion estimate using the same methodology to determine whether depletions have increased or decreased relative to the pre-1998 baseline.
- **Wyoming** used a satellite-image-based methodology called METRIC that directly measures ET from irrigated lands on multiple dates over the course of the irrigation season for years 2011 and 2015. ET estimates using more traditional crop ET estimating methods that apply the Penman-Monteith equation using local weather station data were adopted for the other years, and also used cross-check the METRIC results. The ET comparisons aligned well.
- Appendix D of the 2005 Yampa PBO identifies two different modeling methods using Colorado’s Decision Support Systems (CDSS) to evaluate changes in depletions. The first uses the CDSS water rights planning model, StateMod. The second uses the CDSS consumptive use model, StateCU. A Recovery Program technical workgroup in 2008 reviewed Colorado’s use of the StateCU model for the 15-Mile Reach depletions analysis (see Appendix C of Colorado’s depletion report), and found use of that model alone acceptable given indications that total depletions either declined or did not substantially increase. Based on that precedent, FWS considers use of this methodology for the Yampa analysis to be acceptable, but WAC input was invited in a technical session (conference call) on September 6, 2019.
- Use of the METRIC methodology by Wyoming is a clearly a completely new approach that was not contemplated in Appendix D of the Yampa PBO. The Program Director’s Office was tentatively satisfied with Wyoming’s analytical approach, but also requested

input from the WAC on September 6 regarding potential concerns associated with the methodology.

- In its September 6 conference call, the WAC reviewed, discussed, and recommended that FWS accept the methodologies used by both CO and WY as being acceptable.

Results of the analyses:

- **Colorado** reports that during the period of 2006-2010, depletions decreased by an average of 5,884 acre-feet/year compared to 1975-1998 (4% decrease). During the period of 2011-2015, depletions decreased by an average of 6,213 acre-feet/year (5% decrease). There was no noticeable trend in year-to-year depletions from 2006-2015. The greatest variation in year-to-year values is associated with variations in agricultural use.
- **Wyoming** reports that during the period of 2011-2015, Snake River depletions averaged 37,234 acre-feet per year, ranging from a high of 48,341 in 2013 to a low of 29,749 in 2015. The 37,234 average is nearly 6,000 acre-feet less than the 2005 PBO current use baseline. Most consumptive use in the Little Snake Basin is associated with irrigated agriculture, however year-to-year variations are associated primarily with differences in water exported from the basin by the City of Cheyenne. Wyoming estimates that irrigated acreage in the basin during the study period varied between 14,335 and 16,023 acres, averaging 15,289 acres.

Implications of using these methodologies when comparing to the 1975-1998 baseline:

- **Colorado** used their elevation-adjusted crop coefficient Modified Blaney-Criddle methodology to re-quantify depletions during the 1975-1998 base period, applying 1998 water demands to the 1975-1998 hydrology (backcasting). The result was estimated total depletions during the baseline period of 135,318 acre-feet/year (versus 125,271 acre-feet/year of “current” depletions cited in the Yampa PBO). This 135,318 acre-feet/year figure was used for comparison purposes to identify net new depletions (or lack thereof) in the accounting period of 2006-2015, and it is considered to be a more accurate estimate of total depletions occurring in the Yampa River basin of Colorado from 1975-1998. Additionally, in order to allow for a comparison to Appendix D of the PBO, Colorado ran the StateCU model with and without the elevation-adjusted crop coefficients; results are presented in Attachment A of their Report.
- **Wyoming’s** analysis, as noted above, suggests that total Snake River depletions from 2011-2015 were roughly 6,000 acre-feet/year less than the baseline historic use in the PBO. Wyoming asserts that “this is not an indication of methodology or other differences”, but primarily reflects a decrease in water use by the City of Cheyenne over these years.

Consultations on depletive projects in the Yampa River Basin through 2015:

The Recovery Program maintains a list of all projects that have been consulted on since the Program was initiated in January 1988:

<http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/sec7/5-Yampa%20PBO%20Table%20through%2031Dec18x.pdf>

Since establishment of the Yampa PBO in 2005, 93 projects in the Yampa River basin (both pre-dating and post-dating the PBO) have consulted with the USFWS and received ESA coverage under the PBO, 87 in Colorado and 6 in Wyoming. Collectively these represent an estimated 5,236 acre-feet/year of new depletions in Colorado and 9,064 acre-feet/year of new depletions in Wyoming (14,300 acre-feet total).

Note that many of these water uses are not yet fully developed. Thus this list is not an accurate reflection of new depletions actually occurring. In contrast, the depletion accounting reports do evaluate the impact of actual depletions.

Conclusions and Recommendations:

As described above, the analyses of total depletions in the Yampa River basin by the states of Colorado and Wyoming for the 2006-2010 and 2011-2015 periods suggest that average annual depletions decreased during these periods relative to the 1975-1998 baseline in both states. Wyoming notes that the decreases likely are attributable, in large part, to the relatively dry basin hydrology over the last 20 years compared to the baseline period, and in Wyoming by the lower-than-normal exports by City of Cheyenne. Nevertheless, in both states it is apparent that consumptive water uses are well below the maximum coverage provided for new and expanded depletions under the 2005 Yampa PBO.

Based on the above, the Recovery Program Director's Office proposes accepting both reports as satisfying the states' obligations under Appendix D of the Yampa PBO through 2015, and as confirmation that water uses in the Yampa River basin in both states remain well within the total depletions amount eligible for Endangered Species Act coverage under the Upper Colorado River Endangered Fish Recovery Program.