5-YEAR REVIEW

Cui-ui (*Chasmistes cujus*)

I. GENERAL INFORMATION:

Species: Cui-ui (*Chasmistes cujus*)

Date listed: Federally listed as endangered on March 11, 1967

FR citation(s): USFWS (32 FR 4001)

Classification: Endangered

II. BACKGROUND:

Recovery Plan: USFWS. Cui-ui Recovery Plan. Second Edition. 1992.

FR Notice citation announcing this status review: U.S. Fish and Wildlife Service (Service). 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 76 Species in California and Nevada. Federal Register 86 (96): 27462–27464.

III. ASSESSMENT:

Status Review:

A 5-year review has not been conducted for the Cui-ui since its listing. The U.S. Fish and Wildlife Service (Service) Data for this review were solicited from interested parties through a Federal Register notice announcing this review on May 20, 2021 (Service 2021). We also contacted State, Federal, and Tribal partners, stakeholders, private landowners, and species experts to request any data or information we should consider in our review. Additionally, we conducted a literature search and a review of information in our files.

The Service has evaluated existing documents such as the Cui-ui Recovery Plan (Service 1992), reviewed existing publications, and accounted for restoration activities in both the Truckee River and Pyramid Lake. To further the 5-year review recommendations, the Service initiated information inquiries, developed and lead a Cui-ui Technical Workgroup consisting of participants from Pyramid Lake Paiute Tribe (PLPT) Pyramid Lake Fisheries and Pyramid Lake Natural Resources departments, Service staff (both Lahontan National Fish Hatchery (LNFH) and Ecological Services Programs), and researchers from University of California at Davis, Utah State University, and Desert Research Institute (DRI). The Cui-ui Technical Workgroup participated in an exercise to develop recommendations for future actions.

Species Overview:

As summarized from the recovery plan for this species (Service 1992), the endangered Cui-ui is a large, long-lived, highly fecund and omnivorous lakesucker species that occurs in Pyramid Lake and the Truckee River in Nevada. The species was first described by Cope (1883) and is believed to be the last genetically pure member of the lakesucker genus *Chasmistes* (Miller and Smith 1981). The Cui-ui is known to exceed 40 years in age (Scoppettone 1988, Scoppettone *et al*. 2000) and individuals can weigh up to 3.5 kilograms (7.72 pounds) (Miller and Smith 1981).

Distribution and Abundance

The Cui-ui inhabits the Truckee River basin, which includes Pyramid Lake in western Nevada. Until the mid-1930s, Cui-ui also inhabited Winnemucca Lake, which was contiguous with Pyramid Lake. Although Cui-ui are lake dwellers, they are obligate stream spawners. Historically, Cui-ui may have spawned in the lower 65 kilometers (km) (40 miles (mi)) of the Truckee River (Service 1992). The formation of a sediment delta at the mouth of the Truckee River, lowered Pyramid Lake surface elevations, and a large channel incision (head cut) resulting from river flow reductions due to water diversions throughout the system created substantial impediments to Cui-ui upstream passage (Scoppettone *et al*. 1986, U.S. Army Corps of Engineers (USACE) 1995). Dams and other in-river structures constructed in the last century have further limited Cui-ui spawning to the lowermost 20 km (12.4 mi) of the Truckee River.

In order to stop the river head cutting and to enable listed fish to circumvent the often-impassable Truckee River delta, Marble Bluff Dam and the Pyramid Lake Fishway were constructed in 1976 (Scoppettone *et al*. 1986, Rood *et al*. 2003). The Pyramid Lake Fishway is a 4.8 km (3.0 mi) long canal that bypasses the delta, which is supplied with river water diverted at Marble Bluff Dam. Collectively referred as the Marble Bluff Fish Facility (MBFF), this system has been in operation since 1976 and provides assisted upstream passage of spawning Cui-ui to historical spawning habitat. The current accessible Cui-ui spawning habitat in the lower Truckee River extends upstream of the MBFF 13.0 km (8.0 mi) to Numana Dam in most years. This dam has a low-gradient fish ladder (designed to pass salmonids) which allows Cui-ui to pass upstream. However, the lack of fish attraction flows at the downstream ladder entrance can make passage for Cui-ui difficult. The construction of a new structure that will be more conducive to Cui-ui passage is currently being planned. In combination with the successful operation of the fish ladder at Numana Dam during years with larger spawning runs, Cui-ui distribution is anticipated to potentially extend another 43.5 km (27.0 mi) upstream to Derby Dam, similar to, or exceeding their historical spawning distribution.

There are no historical numeric estimates of overall population size or spawning run size for Cui-ui. However, Cui-ui population size declined during much of the 20th century due to decreases in reproduction and recruitment caused by impaired access to their primary spawning habitats. The formation of the Truckee River delta and reduced flows resulted in an 18-year period (1950-1968) with no evidence of Cui-ui reproduction (Scoppettone 1988). At the time of listing in 1967, it was unknown how many year-classes of Cui-ui remained in the population.

Recruitment of Cui-ui through the 1970s continued to be limited (Scoppettone and Rissler 2007). However, after completion of the MBFF in 1976, upstream passage into and within the lower

Truckee River was improved for Cui-ui. Data from 2007 documented the Cui-ui population as having a total of 16 year-classes with 10 reproductive year-classes (Scoppettone and Rissler 2007). The spawning runs of 2005, 2006, 2008, and 2010 each exceeded 200,000 adult Cui-ui (Service 2010). The adult population has increased significantly since listing with estimated abundance ranging between 500,000 and 2,000,000 fish since 1991.

Threats

The following threats to Cui-ui were identified as justifications for federally listing as endangered in 1967 under the Endangered Species Preservation Act (Service 1992):

(1) Upstream storage and diversions of Truckee River water that reduced inflow to Pyramid Lake; (2) timber harvest and irrigated agriculture that altered the quantity and quality of Truckee River runoff; (3) increasing agricultural, municipal, and industrial water demands that altered the volume and timing of river flows which disrupted Cui-ui reproduction; (4) channelization, grazing, and timber harvesting in and along the Truckee River that reduced the riparian canopy and increased bank erosion, intensified by further urban and agricultural development; and (5) restriction of river access and elimination of spawning habitat that decreased the size and frequency of Cui-ui spawning runs and limited the number of year classes.

Cui-ui have been and continue to be impacted by alterations to the natural Truckee River basin hydrologic regime. The entire Cui-ui population resides within Pyramid Lake and the boundaries of the PLPT reservation. Dams and diversions remain a key cause of habitat degradation in the lower Truckee River and Pyramid Lake due to their impacts on annual and seasonal flow variability (volume and timing). Altered flows from water management decisions continue to affect Truckee River water quality and quantity, fluvial geomorphology, riparian ecosystem health, and Pyramid Lake elevation. Increased external demands on the system will continue to affect the geomorphic processes and amplify the level of dynamic instability currently occurring in the lower Truckee River. Ongoing state and Federal litigation has kept the Truckee River Operating Agreement (TROA) on hold since the plan was signed in 2008.

Benefit to Cui-ui from the TROA relies on winter precipitation and successful implementation of the agreement. As of this assessment, political roadblocks continue to be a challenge to the successful implementation of the agreement.

Climate change and increasingly variable annual snowpack has only increased the challenge of successful implementation of the TROA, with a trend of warming in the mountains of western North America expected to decrease snowpack, hasten spring runoff, and reduce summer stream flows (Christensen *et al.* 2007); all effects that have been experienced in the Truckee River basin over the recent past. While we lack sufficient certainty in knowing how and when climate change will affect the species, the extent of average temperature increases in the Sierra Nevada and the Great Basin, or potential changes in water temperatures, flow volume and/or timing, history has proved that alterations in any of these factors has dramatic effect on the Cui-ui population.

IV. RECOVERY CRITERIA

Cui-ui are listed as endangered, therefore the recovery plan contains criteria for reclassification (downlisting) to threatened, as well as criteria for removal from the Federal list (delisting criteria). Downlisting criteria represent a less stringent set of standards and are discussed first.

Downlisting Criteria

The recovery plan (Service 1992) outlines three criteria that may provide the basis for consideration of reclassification of the Cui-ui from endangered to threatened (Service 1992). These three criteria are:

1. The species has a probability of at least 0.85 of persisting for 200 years;

2. Additional annual Truckee River inflow to Pyramid Lake of 45,000 acre-feet or the equivalent benefit have been secured at a minimum rate of 5,000 acre-feet/year; and

3. Estimated numbers of adult Cui-ui and year classes of juveniles and adults has been stable or increasing during the previous 15 years.

Downlisting criterion 1 identifies a specific, quantifiable goal of 85 percent probability of the species' persistence in 200 years. The last model was run in 2003 by the U.S. Geological Survey (USGS) and predicted a 91.1 percent probability of persistence, assuming water management practices as of 1999, as well as reduced diversion rates due to ongoing water acquisition programs (USGS 2003). Although the probability of persistence predicted by this model run exceeds the threshold of 85 percent specified in this criterion, deficiencies were subsequently noted in some of the data used to run the model, which could undermine its robustness. Therefore, although the most recent population model predicts a high probability of Cui-ui persistence, since input data are now in question, we assess this criterion as not fully achieved.

Downlisting criterion 2 requires additional inflow to Pyramid Lake of 45,000 acre feet (af) to be secured at a minimum rate of 5,000 af/year. Since Cui-ui was listed in 1967, there have been considerable improvements in the management and allocation of Truckee River water. However, water inflow increases have so far been sporadic, and it has proven difficult to precisely quantify water amounts specifically conserved for Pyramid Lake through these mechanisms; although it is clear that the amount of water permanently retired is far less than the amount described in the 1992 recovery plan (Service 1992). Therefore, as of this review, this criterion has not been met.

Downlisting criterion 3 requires a stable or increasing trend in numbers of adult Cui-ui, as well as stable or increasing trends in numbers of year classes of juveniles and adults. The estimated adult population of Cui-ui exhibited a slight upward trend between 1992 and 2005; however, direct analytical assessments of adults, larvae and juvenile age classes have not been conducted since 2006. Therefore, as of this review, a stable or increasing trend in all life stages of Cui-ui has not been demonstrated for the 15-year timeframe specified by this criterion.

Since none of the downlisting criteria have been met, the Service does not recommend downlisting at this time. However, as the Recovery Plan may contain outdated or criteria that are

no longer possible to achieve, review and revision of these downlisting criteria should be prioritized.

Delisting Criteria

The recovery plan (Service 1992) outlines eight criteria that may provide the basis for delisting Cui-ui (Service 1992). These criteria are:

1. The species has a probability of at least 0.95 of persisting for 200 years;

2. Additional annual Truckee River inflow to Pyramid Lake of 65,000 acre-feet or the equivalent benefit beyond the amount required for reclassification (equivalent to 110,000 acre-feet) has been secured at a minimum rate of 5,000 acre-feet/year;

3. Estimated numbers of adult Cui-ui and year classes of juveniles and adults have been stable or increasing during the previous 15 years;

4. Lake and river water quality standards have been achieved during the previous 15 years (refer to Appendix A, Table A-1 of the recovery plan);

5. The lower Truckee River floodplain has been rehabilitated;

6. Marble Bluff Fish Facility and Numana Dam Fish Ladder have been modified to pass upstream at least 300,000 adult Cui-ui during a spawning run;

7. Maintenance and operation of various water storage and fish passage facilities for Cui-ui have been secured; and

8. A hatchery refuge for brood stock has been established to protect against catastrophic events.

The first three criteria are either identical to or more stringent versions of the three downlisting criteria discussed above. As of this review, none of these have been met. The remaining five delisting criteria represent additional criteria not addressed by the downlisting criteria. As of this review, only delisting criterion 8 has been met.

Delisting criterion 8 requires establishment of a successful hatchery brood stock to protect against catastrophic events. Based on techniques developed by Koch and Contreras (1973), hatchery propagation of Cui-ui for release into Pyramid Lake began in 1973 (Scoppettone *et al*. 1986). The operation and control of the hatchery program was transferred from the Service to the PLPT in 1977. Production from the hatchery averaged 7 million Cui-ui larvae per year from 1980 to 1984 (Scoppettone *et al*. 1986). Population monitoring indicated that these hatchery fish are contributing very little to the overall recruitment or year classes for Cui-ui (Scoppettone *et al*. 1986, Scoppettone 1988, Scoppettone and Rissler 1995). Therefore, the PLPT has been shifting its focus from larval Cui-ui production to juvenile rearing. Nevertheless, the hatchery program is well established and provides benefits as a successful propagation program to protect Cui-ui in case of a catastrophic event. Therefore, we conclude that this recovery criterion has been met.

Although one of the eight delisting criterion has been met, the Service does not recommend delisting at this time. However, as the Recovery Plan may contain outdated or criteria that are no longer possible to achieve, review and revision of these delisting criteria should be prioritized.

V. CONCLUSION

Although Cui-ui population numbers appear to be stable or increasing based on existing data, this information is outdated and another population study is needed to determine the current population status and whether successful spawning migrations have largely been maintained by the actions of Service's LNFHC, the PLPT, and the continued operation of the MBFF. Impacts to Cui-ui from climate change are not known with certainty at this time, but locally predicted outcomes of climate change have the potential to negatively impact the species through reduction of snowpack, decreased stream flow, shifts in the hydrograph, and increased frequency of extreme events. Population fluctuations of Cui-ui in the past have been linked to streamflow reductions and perturbations of the hydrograph. Although the magnitude and severity of climate change are unclear, these impacts have the potential to exacerbate the current threats to Cui-ui. Furthermore, water management within the Truckee River basin and allocation for Pyramid Lake remains a significant challenge to the continued existence of Cui-ui.

After reviewing the best available scientific information currently available on the status of the species and evaluating threats affecting the species under the factors in 4(a)(1) of the Act, we conclude that the Cui-ui remains an endangered species.

VI. RECOMMENDATIONS FOR FUTURE ACTIONS:

The Cui-ui Technical Workgroup has identified the following recommendations to work toward evaluation for the next 5-year review to aid recovery of Cui-ui:

1. Re-initiate rigorous population monitoring (identified as every 5 years in Recovery Plan) to gain current, reliable population numbers and information regarding the health of the Cui-ui population, including recruitment and year class structure. As the lake continues to drop, monitoring the response of Cui-ui to these conditions will be critical to understand the species risk. A contemporary assessment of the Cui-ui population will be critical to inform a status assessment and development of a revision to the 1992 Cui-ui Recovery Plan. Support monitoring reproduction of Cui-ui when Numana Dam fish passage project is complete and provides unimpeded passage for Cui-ui to access to upstream spawning habitat.

2. Secure freshwater inflow to Pyramid Lake through coordination with the Bureau of Reclamation (BOR) and improved efficiencies on the Carson Division. Pursue strategies to increase instream flow to Pyramid Lake to a minimum level of 3812 towards the sluice gate elevation.

3. Develop research proposals and secure funding to better monitor existing threats such as

increased contaminants (*i.e.,* endocrine disrupting compounds, per- and polyfluorinated alkyl substances, *etc.*) and invasive species (invertebrates and plants) that can negatively impact Cui-ui.

4. Continue coordination with the PLPT water quality department to identify what metrics are being tracked and how those relate to the water quality settlement. Develop a more rigorous water quality monitoring plan (*i.e.* monitoring water quality for climate change impacts and effluent discharge of contaminants) to better evaluate wildfires that can release pulse nutrient loading events (*i.e.* ash and ammonia level increase). Evaluate current climate change impact research results currently being analyzed by various entities within the Truckee River watershed (USGS, BOR, DRI).

5. Continue to restore river function and habitat in the lower Truckee River to enhance water quality and promote and improve Cui-ui spawner migratory access.

6. Continue Cui-ui Technical Team meetings to work toward completion of a Cui-ui Species Status Assessment and/or Recovery Plan revision to update current threats not identified in the 1992 Recovery Plan, such as climate change. Consider adding additional science support expertise such as identifying a panel of outside experts in geomorphology and river function to evaluate the effectiveness of the flow regime and identify opportunities for refinement.

Acting Field Supervisor, Fish and Wildlife Service

Approve JUSTIN BARRETT Digitally signed by JUSTIN BARRETT Date: 2023.08.31 13:54:08 -07'00' Date 08/31/2023

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