Shortnose sucker (*Chasmistes brevirostris*)

5-Year Review: Summary and Evaluation

U.S. Fish and Wildlife Service
Klamath Falls Fish and Wildlife Office
Klamath Falls, Oregon
2024

5-YEAR REVIEW
Shortnose Sucker/*Chasmistes brevirostris*

GENERAL INFORMATION

Species: Shortnose Sucker (*Chasmistes brevirostris*)
Date listed: July 18, 1988
FR citation(s): 53 FR 27130
Classification: Endangered
Critical habitat: 77 FR 73740 – December 11, 2012

Methodology used to complete the review

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess the status of threatened or endangered species to determine if it has changed, and whether the species is classified appropriately. A team of U.S. Fish and Wildlife Service (Service) employees from the Klamath Falls Fish and Wildlife Office (KFFWO) evaluated the status of the shortnose sucker to inform this 5-year review. This team included subject matter experts from KFFWO, the Klamath Falls National Fish Hatchery (KFNFH), and regional staff. The team reviewed the 2019 Species Status Assessment (SSA), the 2019 5-year review, and incorporated the newest scientific information into this review to conclude our determination of the current status of the species. This review represents our evaluation of the best available scientific information, including resource needs and current and future condition of the species.

FR Notice citation announcing the species is under active review: 88 FR 56042

REVIEW ANALYSIS

Recovery Plan: U.S. Fish and Wildlife Service. 2012. Revised recovery plan for the Lost River sucker and shortnose sucker (*Deltistes luxatus and Chasmistes brevirostris*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California.

Recovery Criteria: The recovery criteria comprise a combination of measures that must occur to ameliorate or eliminate threats to the species for each recovery unit to achieve numerical demographic targets. These are found in detail in the Revised Recovery Plan (USFWS 2012). In order to downlist shortnose sucker to threatened status, the following must be achieved:

A.1 Current spawning and rearing habitat is maintained, and improved access ensures annual use.

A.2 A range-wide Spawning and Rearing Enhancement Plan has been developed and implemented. This plan shall identify and prioritize areas of potential spawning and rearing habitat for enhancement and/or restoration, including areas which are degraded or unavailable due to lack of connectivity or passage.

A.3 Connectivity and access is assured to habitats that provide refuge to suckers to avoid poor water quality (particularly Pelican Bay) during the months of July, August, and

September – Upper Klamath Lake (UKL) Recovery Unit. Natural vegetated wetland areas are restored, including in-stream, wetland, and riparian areas around the mouth of Willow Creek where it meets Clear Lake Reservoir and throughout its drainage – Clear Lake Reservoir Management Unit.

A.4 Natural vegetated wetland areas are restored, including in-stream, wetland, and riparian areas around the mouth of Willow Creek where it meets Clear Lake Reservoir and throughout its drainage – Clear Lake Reservoir Management Unit.

C.1 Newly identified or clarified effects of predation and disease are minimized through implementation of recommendations from ongoing scientific research which clarifies the interaction of Lost River sucker and shortnose sucker with predators and pathogens.

E.1 An Entrainment Reduction Plan has been developed and implemented. This plan shall identify and prioritize screening of diversions throughout upper Klamath Basin, including the Klamath Project, and propose strategies for efficient reduction of entrainment.

E.2 (This action only applies to the Lost River sucker and so is omitted here).

E.3 Development and implementation of a plan to assess, monitor, and improve juvenile and sub-adult vital rates and demography, including threats and negative impact reduction. This plan shall also designate specific demographic or vital rate targets, and strategies for achieving these targets, important for downlisting and delisting.

E.4 The effects of detrimental water quality have been minimized through implementation of recommendations from ongoing scientific research which clarifies the relationship of these factors with sucker mortality – Upper Klamath Lake Recovery Unit.

In order to delist shortnose sucker the following additional criteria must be met:

B.1 The States of Oregon and California and the Klamath Tribes, collaboratively or separately, should prepare and finalize population management plan(s) for the shortnose sucker.

E.5 After 25 years, the average annual rate of population change is greater than one and the number of spawning individuals is greater than what was present in the baseline years for the Upper Klamath Lake River and Upper Klamath Lake Spring Management Units. See Appendix II of the Revised Recovery Plan for descriptions and estimation procedures of these measures. Twenty-five years equates to approximately three average adult life spans for shortnose sucker. This period will enable assessment of the species' response to cyclical threats, such as periodic die-offs and drought. The baseline year for shortnose sucker is 2001, since this is the first year in which estimates of this type are statistically valid for the species.

Of these criteria, only A.3 has been realized through the Interim Plan for Klamath Project Operations 2023 Biological Opinion (USFWS 2023). The Biological Opinion provides guidance to the Bureau of Reclamation that ensures access to areas in Upper Klamath Lake, such as Pelican Bay, under normal operating conditions. Nevertheless, this requires regular reevaluation as conditions and operations change. However, criteria C.1, regarding effects of predation and disease on suckers, continues to be investigated by partner organizations through analysis of PIT tags detected on avian colonies and research into eye fluke parasitism in UKL (Evans et al. 2022, J.

Lovy personal comm. 2024).

UPDATED INFORMATION

The brief summary below incorporates updates since the last 5-year review in 2019 that accompanied the SSA (USFWS 2019). Reports on juvenile sucker survival in UKL and Clear Lake remain consistent with little to no recruitment in UKL and high annual variability in Clear Lake (Bart et al. 2020, Martin et al. 2022.). Updated reports were prepared on non-lethal aging techniques, survival, growth, health, and condition of listed juvenile suckers in Upper Klamath Lake and Clear Lake Reservoir, with no changes realized in the past five-years (Bart et al. 2020, Burdick et al. 2020, Markle et al. 2020, Burdick et al. 2021, Hewitt et al. 2021, Martin et al. 2022, Martin et al. 2023).

Multiple mesocosm studies were conducted using juvenile suckers to understand mortality in UKL and to inform net pen rearing operations (Burdick et al. 2020, Burdick et al. 2021). One study indicated that greater size at release and location of release can positively influence survival rates of Sucker Assisted Rearing Program (SARP) juvenile suckers in UKL (Caldwell et al. 2023). Additionally, investigations into the effects of disease, parasitism, and predation on survival of wild and hatchery-reared juveniles continues (Markle et al. 2020, Martin et al. 2021a., Evans et al. 2022, J. Lovy personal comm 2024).

Reports on remaining populations reveal a continued decline in the number of spawning adults in the Williamson River and high variability in survival across age-classes in the Lost River Unit (Hewitt et al. 2021, Martin et al. 2021, Krause et al. 2023). In one study from the UKL Unit, over 600 adult suckers were translocated from Lake Ewauna to UKL after being tagged with a radio telemetry tags to track movement (Banet and Hewitt 2019). The results from this project were limited to only a few years of tracking but indicated that encounters of translocated individuals were two times less likely than resident adult suckers (Banet and Hewitt 2019).

A few important changes were noted for adult suckers in the Lost River Unit, including the increasing abundance of non-native species bycatch and indications that all SNS-like fish captured were KLS or KLS/SNS hybrids based on genetic identification (Martin et al. 2021). An additional update on the Lost River Unit included information on Clear Lake spawning and movement patterns determined through radio telemetry. The reports on PIT tag re-encounter data suggested that SNS move further upstream into tributaries during spawning migrations (Banet et al. 2021).

Due to the inception of SARP in 2015 and the continued progress with captively rearing suckers, the initial methods for the program were reported in 2021 (Day et al. 2021). A genetic tool to assist staff in sucker identification has been developed using restriction-site-associated DNA sequencing (Smith et al. 2020). This technique provides the capacity to distinguish between the four Klamath Basin sucker species (Lost River sucker, shortnose sucker, Klamath largescale sucker, or Klamath smallscale sucker), but only in the UKL Unit (Smith et al. 2020, Smith et al. 2023). The genetics of SNS indicates that it hybridizes frequently with Klamath largescale sucker (Dowling et al. 2016, Smith et al. 2020, Smith et al. 2023).

Efforts to understand the effects of water quality parameters on LRS and SNS in UKL have also continued. Within the last three years a publication regarding water level fluctuations in UKL and the probability of these fluctuations effecting water quality thresholds for suckers was investigated (Kann and Walker 2020). This study analyzed long-term data set to evaluate potential relationships between water level fluctuations and pH, un-ionized ammonia concentrations, dissolved oxygen, and chlorophyll-a . The study indicates the probability of exceeding dissolved oxygen, un-ionized ammonia, and pH stress thresholds for suckers increased during both high and low lake elevations . Kann and Walker (2020) therefore recommend maintaining intermediate (but specific) lake levels to decrease the probability of exceeding these stress thresholds for LRS and SNS .

A review was also conducted to collate pertinent information on harmful cyanobacterial blooms and associated effects on juvenile SNS (Burdick et al. 2020). In this review the effects of cyanotoxins, high pH, hypercapnia, hypoxia, and high levels of ammonia on juvenile LRS and SNS were compiled, unless information was not available at which point other fish species' responses were included (Burdick et al. 2020). The pH in UKL regularly reached sub-lethal levels for extended periods of time and was noted as a factor that could increase mortality of juvenile suckers (Burdick et al. 2020). However, there is indication from this review that detrimental water-quality following harmful cyanobacterial blooms and crashes, along with the many other stressors in UKL, can likely cause chronic stress, which can lead to indirect mortality of juvenile suckers (Burdick et al. 2020). It is important to add that while harmful cyanobacterial blooms persist in UKL, these are largely driven by total phosphorus inflows to the lake during the winter months, and these inflows have been decreasing based on recent analysis of the period 1992-2018 (Walker and Kann 2022).

CURRENT SPECIES STATUS

The following discussion is a brief summary of the interacting influences of physical, chemical, and biological factors that continue to threaten shortnose sucker. To determine whether to list, delist, or reclassify (change from endangered to threatened status, or vice versa) a species under section 4(a) of the ESA, we evaluate five major categories of threats to the species: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. The following is a summary of these factors in relation to shortnose sucker status. For an in-depth treatment of the threats, see the SSA (USFWS 2019).

Factor A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The annual demography monitoring of adult LRS in UKL and the Lost River Units continues the trajectory of decline described by Hewitt et al. (2018), and updated by Krause et al. (2023) with

little change in population dynamics (Hewitt, et al. 2018, Hewitt et al. 2021, Krause et al. 2023). A new negative change in population size and structure occurred in Tule Lake National Wildlife Refuge sumps 1A and1B. During 2021-2022, the sumps were drained and the remaining LRS were salvaged from the water and relocated to Upper Klamath Lake. In 2023, juvenile SARP fish were stocked in Lower Klamath National Wildlife Refuge, which is adjacent to the Tule Lake sumps, and survival monitoring is ongoing. However, due to unreliability of water allocations it is unclear if a population located in this portion of historical habitat can persist. Assessments continue.

Loss and alteration of habitats (including spawning and rearing habitats) were major factors leading to the listing of shortnose sucker and continue to be significant threats to recovery through the lasting effects of the legacy of habitat loss and modification. Suitable habitat has drastically declined due to conversion of wetlands to agricultural use and construction of irrigation and hydroelectric facilities that create barriers, which prevent access to spawning habitat and cause mortality by entraining fish. Loss of ecosystem functions provided by effective wetland habitat continues to threaten the recovery of shortnose sucker through numerous pathways, including effects on water quality, water quantity, access to refugial areas, and food web dynamics.

Prevailing degraded quality of remaining areas exacerbates the effects of pervasive habitat loss. Most water bodies currently occupied by shortnose sucker do not meet water quality standards for nutrients, dissolved oxygen, temperature, and pH set by the States of Oregon and California. These conditions, which manifest primarily in summer, have caused several incidents of widespread adult mortality. The occurrence of mass mortality of fish in Upper Klamath Lake is not new; however, the modern dominance of the cyanobacterium *Aphanizomenon flos-aquae* in the system has led to increased regularity of extreme events. Although conditions are most severe in Upper Klamath Lake and Keno Reservoir, individuals throughout the basin are vulnerable to water-quality-related mortality. There is some indication that cyanobacterial blooms may now be present during the summer in Clear Lake, which, if true, is a distinct change from previous conditions. Assessments are on-going. Degraded water quality conditions weaken fish and increases their susceptibility to disease, parasites, and predation. Water quality remains one of the most important factors threatening shortnose sucker recovery.

Factor B: Overutilization for commercial, recreational, scientific, or educational purposes
Overutilization is not currently a threat to the species. Overharvest contributed to declining population levels prior to listing, but harvest of any kind has been restricted since 1987. Regulated collections of these species for scientific purposes continue. These collections are not currently a threat to population status. The demographic effects of these collections are regularly evaluated under the ESA Section 7 consultation process (USFWS 2023).

Factor C: Disease or predation
We identified non-native species as a potential threat at the time of listing through predation or as novel sources or modifiers of diseases and parasites. Several species of birds and fish (native and non-native) prey on shortnose sucker. The ultimate effect to the status of the species from these continues to be investigated and avian predation models are still being

refined (Evans et al. 2022). Recent information suggests parasites and disease could be a current or future threat to the shortnose sucker especially at the juvenile life-stage (Markle et al. 2020, J. Lovy personal comms. 2024).

Factor D: Inadequacy of existing regulatory mechanisms

Based on the protections provided by existing regulatory mechanisms, we do not consider the inadequacy of regulatory mechanisms to be a threat to the shortnose sucker. Several federal and state regulations directly and indirectly provide protection for shortnose sucker. The primary regulatory authorities are the Endangered Species Acts enacted by the Federal Government and the States of Oregon and California. Shortnose sucker are listed as endangered by each of these entities. In general, such authorities prohibit activities that will harm the species' chances of survival and/or recovery, including contemporary protection of habitat.

Factor E. Other natural or manmade factors affecting its continued existence

Climate Change

Shortnose sucker are adapted to withstand periodic droughts, but given the current reduced state of the species, increases in the intensity or frequency of droughts or a substantial shift in the timing of snowmelt and runoff may negatively affect shortnose sucker. Increasing temperatures could also pose a threat to populations because present-day maximum temperatures already approach stressful ranges for the species. Climate variability results from natural processes; however, climatic models suggest that anthropogenic causes drive much of the recent trends in global climate. It is difficult to predict accurately how such climatic changes will affect the shortnose sucker.

Conservation Efforts

We, together with many other entities and partners, have accomplished much to reduce threats to shortnose sucker since their listing, much of which is discussed in the revised Recovery Plan and most recent 5-year Status Review (USFWS 2012, 2019). Since the last 5-year Status Review, the KFNFH continues to be our strongest tool to bolster wild populations. With the construction of the hatchery and successful development of captive broodstock, we expect to reach our goal of rearing and repatriating up to 60,000 suckers (of all three species) to UKL annually. Since the inception of the hatchery in 2015, over 70,000 juvenile suckers (of all three species) have been added to augment the wild population.

SYNTHESIS

The status of shortnose sucker, relative to ESA listing, has not substantially changed since the previous 5-year Status Review in 2019. Shortnose sucker suffer from low resiliency as a species. The low resiliency is due to the extremely low numbers in most populations, inadequate access to suitable spawning habitat for most populations, and genetic impurity in most populations (i.e., impaired representation). Shortnose sucker have more populations across a broader area compared to Lost River sucker, but overall, the species' redundancy remains quite low. There are currently only three known spawning populations (Upper Klamath Lake, Clear Lake Reservoir, and Gerber Reservoir). There may be an additional population (Lake Ewauna) where spawning could potentially occur, albeit in very small numbers. In Upper Klamath Lake there are fewer shortnose sucker than Lost River sucker, by nearly an order of magnitude, but shortnose sucker is more abundant than Lost

River sucker in the Lost River sub-basin overall. However, the number of populations and effective abundance is diminished in the Lost River sub-basin given the high levels of genetic introgression with Klamath largescale sucker. The species has a high threat of extinction and a low recovery probability (recovery priority 5C).

RESULTS

Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
X **No change needed**

New Recovery Priority Number: No change (5C)
Brief Rationale: This represents species with a high degree of the threat of extinction, a low recovery possibility (5), and conflict with economic development (C).

RECOMMENDATIONS FOR FUTURE ACTIONS

Establish a Klamath Sucker Recovery Program
This effort was identified as a priority 1 Recovery Action (Action # 8) in the revised Recovery Plan (USFWS 2012). A Recovery Program should be structured to coordinate coherent, and consistent science-based, cooperative actions required to recover species. To do this, a Recovery Program maintains a dedicated staff structure, and coordinates recovery priorities and actions via a clear process of engagement with external partners. Actions from the Recovery Program should focus on (per Recovery Plan Actions 8.1-8.4.2): facilitating information exchange and synthesis; periodically assessing effectiveness of and adjusting recovery actions and priorities; and cause and effect monitoring. As part of these actions, the Recovery Program also identifies, supports, and informs use of recovery tools (e.g. the SARP program, off-channel rearing, etc.).

Expand and Improve the Rearing Program
The rearing program provides the best short-term avenue to increase the number of shortnose sucker in Upper Klamath Lake. This effort was identified as a priority Recovery Action (Action # 5) in the revised Recovery Plan (USFWS 2012). Actions should focus on improving the survival and growth of individuals while in captivity, maximizing survival and recruitment once reintroduced into Upper Klamath Lake, and increasing the overall numbers of individuals stocked. Development and maintenance of captive brood stock and the refinement of husbandry practices to ensure production of viable larvae is a top priority in planning for potential catastrophic events.

Establish at least Two Auxiliary Populations
The establishment of two auxiliary populations will help the team plan for stochastic events on

the landscape and provide a level of redundancy (Recovery Action #5). One location for an auxiliary population could be through the re-establishment of SNS on the landscape at Tule Lake, while a second location is designated and planned for.

Phosphorus Reduction

Poor water quality conditions in Upper Klamath Lake appear to be the most likely driver of persistent recruitment failures in the system. The principal driving factor of the water quality dynamics is the influx of phosphorus into the lake. Specific plans should be developed, and actions implemented to secure long-term reduction of phosphorus levels in the system (Recovery Action #2).

Adaptive Management

The most critical need for this species is to restore natural rates of recruitment to all populations. However, the complexity of biological and physical systems makes it very difficult to determine how to achieve this goal. Adaptive management should be used to implement recovery efforts (including the priorities named above) to ensure the most effective progress towards recovery (Recovery Action #8). Adaptive management includes a cycle of deciding on priority actions, action design, implementation, appropriate monitoring, evaluation, and adjustment of priorities and designs as necessary.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Shortnose Sucker (*Chasmistes brevirostris)*

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (Indicate reasons for delisting per 50 CFR 424.11):
____ Extinction
____ Recovery
____ Original data for classification in error
__X__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: 5C

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve JENNIE LAND Digitally signed by JENNIE LAND Date: 2024.08.12 13:05:07 -07'00' Date _____

The lead Field Office must ensure that other offices within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. The lead field office should document this coordination in the agency record.