5-YEAR STATUS REVIEW
Kendall Warm Springs dace
(*Rhinichthys osculus thermalis*)

GENERAL INFORMATION

Species: Kendall Warm Springs dace (*Rhinichthys osculus thermalis*)
Date listed: October 13, 1970
FR citation: 35 FR 16047
Classification: Endangered
Most recent status review: The most recent status review of Kendall Warm Springs dace (KWSD) is a 5-year status review completed by the U.S. Fish and Wildlife Service's (Service) Wyoming Ecological Services Field Office (WYFO) in 2017 (USFWS 2017).

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (ESA), the purpose of a 5-year status review is to assess each listed species to evaluate if the species' status has changed, and whether it should be classified differently or removed from the List of Threatened and Endangered Wildlife. The WYFO revised the recovery plan for KWSD in 2015 (USFWS 2015), which included an extensive review of the species status, population trends, threats, recovery objectives, recovery criteria, and recovery actions. In addition, WYFO completed a status review of KWSD in 2017 (USFWS 2017), which briefly analyzed new data and recommended no change in status. These documents represent our evaluation of the best available scientific information on the species, so this 5-year status review relies on the analyses included therein and updated information since their publication.

Federal Register Notice citation announcing this status review:

A notice announcing the initiation of the 5-year status review for this taxon and the opening of a 60-day comment period to receive information from the public was published in the Federal Register on January 12, 2021 (86 FR 2442).

REVIEW ANALYSIS

Updated Information and Current Species Status

The KWSD is endemic to a small section of a single, thermally fed stream in Sublette County, Wyoming, which is located entirely on property administered by the U.S. Forest Service, Bridger-Teton National Forest (BTNF). Population abundance of the KWSD has not been accurately estimated, but relative abundance data indicate a decline over the past two decades. Principal threats to the species include limited distribution, small population size, and potential future changes to habitat from aquifer pollution, oil and gas or salable mineral development, and/or non-native species introductions. Given the narrow distribution and small population size of KWSD, threats to habitat have the potential to cause catastrophic impacts to the entire species. Recovery actions, therefore, focus on protecting Kendall Warm Springs from degradation and establishing captive populations of KWSD to protect against catastrophic loss. Ongoing conservation efforts

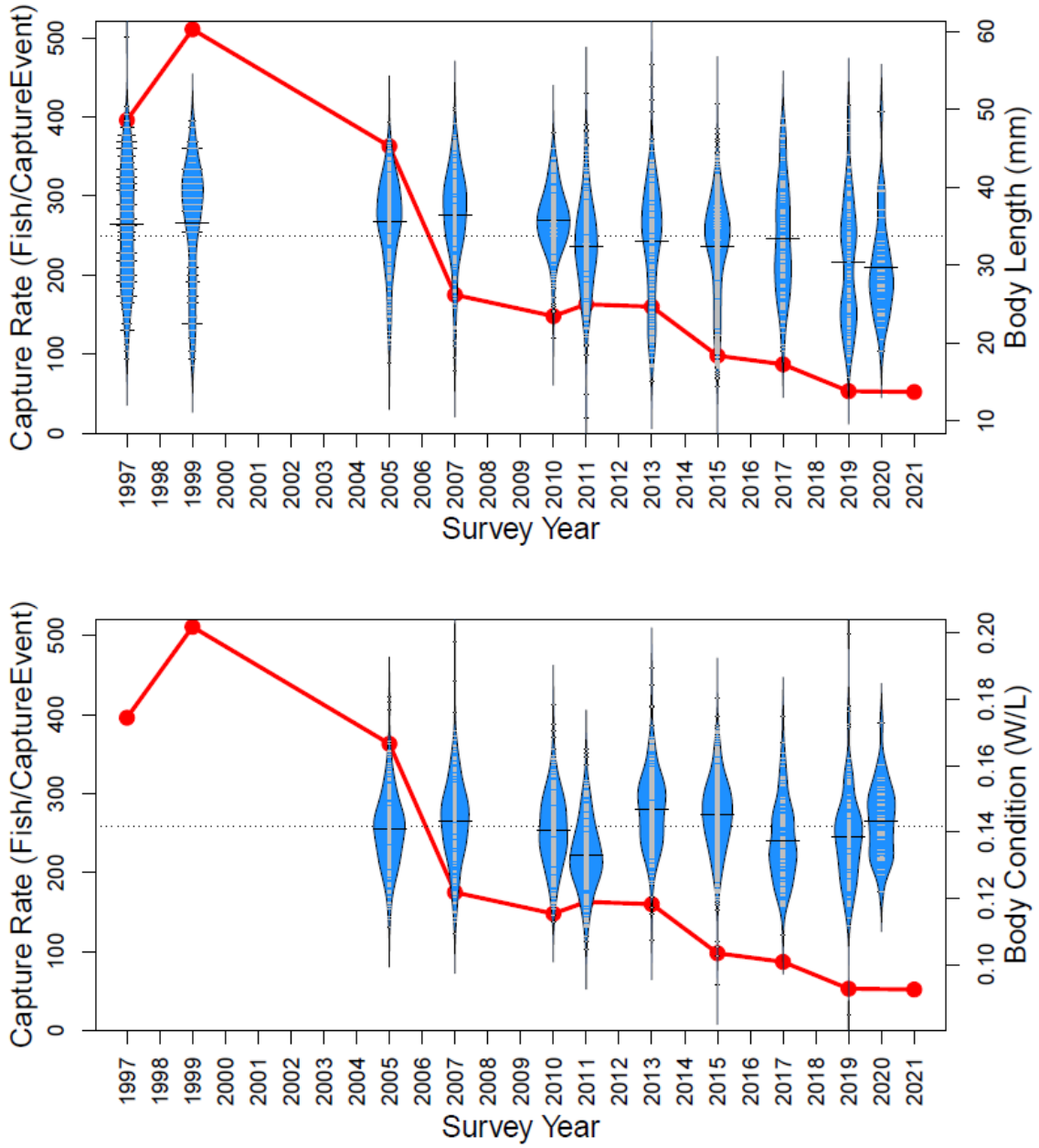
include annual monitoring, restrictions on use of Kendall Warm Springs for bathing, recreation, fishing, and livestock grazing, as well as restrictions on introduction of non-native fishes and mineral extraction near the spring. The BTNF Land and Resource Management Plan includes provisions for KWSD conservation, such as establishing the spring as a Special Interest Area and establishing protection of KWSD as a management objective.

Abundance and Distribution

The actual abundance of adult KWSD has never been accurately estimated, but a rough assessment when the taxon was described suggested the population could be on the order of 200,000 to 500,000 fish (Hubbs and Kuhne 1937). No abundance estimates have been made since that time, although regular catch-per unit effort surveys have been conducted since the late 1990s.

To track the population of KWSD, fish are sampled biennially in the stream below Kendall Warm Springs using live traps during the month of June. The overall capture rate in 2021 was similar to, though slightly lower than, the 2019 effort (USFWS 2022a). Overall, the KWSD population appears to be decreasing, as evidenced by long term declines in these relative capture numbers, resulting in average catch per unit effort currently less than 20 percent of what it was at its peak in 1999 (Figure 1). This decline is consistent and appears to represent an actual trend in the underlying abundance of KWSD, rather than noise due to trapping variation across the monitoring period. This continued downward trajectory, as well as a shift in population size structure (Figure 1), indicate continued reason to be concerned about the stability of the wild population.

Figure 1: Plot of KWSD body lengths and body condition (blue bean plots) superimposed on the capture rate of KWSD dace from monitoring surveys conducted from 1997 to 2021 (red dots and line). Data show a continued decrease in catch per unit effort since 1999, and a decrease in length of captured fish since 2010. Capture rate is the number of fish captured per capture event, where a capture event includes all traps (N~18) placed in Kendall Warm Springs for a 12-hour period. Body condition of fish was calculated as body width divided body length derived from capture photos; skinnier fish have lower condition values. Reproduced from USFWS (2022a).



Threats

The set of listing factors set forth in Section 4(a)(1) of the ESA include: (A) the present or threatened destruction, modification, or curtailment of 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 the species' continued existence. A systematic examination of what is known about the KWSD life history in the context of the five listing factors in the ESA, was used to identify threats. Principal threats to the species included limited distribution (Factor E), small population size (Factor E), and potential future changes to habitat from aquifer pollution (Factors A and D), oil and gas or salable mineral development (Factors A and D), and/or non-native species introductions (Factor E) (USFWS 2015). Given the narrow distribution and small population size of the KWSD, threats to habitat have the potential to cause catastrophic impacts to the entire species.

The KWSD small population size and limited distribution are considered principal threats to the species. There is only one wild population of KWSD in one geographic area, so any negative impacts affecting the population would affect the entire wild KWSD population. A key recovery action in the KWSD revised recovery plan was the establishment of a captive refugia population (USFWS 2015). Since that time two refugia populations have been established; one at Gavins Point National Fish Hatchery in 2018 (GPNFH 2021), and one at Jackson Fish Hatchery in 2018 (JNFH 2021). Successful captive breeding and rearing of KWSD is occurring at the Gavins Point facility.

Currently, the threats listed in the revised recovery plan that remain unaddressed include the potential for oil and gas or salable mineral development and inadequate existing regulatory mechanisms (USFWS 2015). Oil and gas development could stress the KWSD population by changing spring water quantity or quality or introduce sediment and contaminants into the spring. If drilling in the area is pursued in the future, the overall threat level could quickly escalate from a high level to a severe level threat for the KWSD and result in significant mortality and possible extinction of the species in a very short time (USFWS 2015). Current regulatory mechanisms are in place, but additional mechanisms could be improved to further protect the KWSD (USFWS 2015). The BTNF could protect the recharge zone for Kendall Warm Springs from potential oil and gas development, and the BTNF could make the area "administratively unavailable."

In 1998, an invasive aquatic plant, watercress (*Nasturtium officinale*), was identified in the stream occupied by KWSD. While watercress occurred in Kendall Warm Springs for over two decades, it was identified as a new threat to KWSD (Factor A) in June 2021 when biologists observed an overgrowth of this mat-forming plant that had not been noted in previous surveys. Some areas were so thick with this plant that side-channel flows were restricted, and native vegetation was being excluded (USFWS 2022a). In such a small, contained system, shifts in vegetation could play a large role in everything from water quality, to flow rates, to availability of cover. Though correlative, the establishment and spread of watercress coincides with a marked decrease in relative abundance estimates of KWSD in the system, since it was identified in 1998 (USFWS 2022a).

In May and June 2022, BTNF implemented the Kendall Warm Springs Watercress Removal Project (Project; USFWS 2022b), which removed watercress from the entirety of the Kendall Warm Springs system. Immediately after removal of the watercress, more consistent flows were

observed within the stream below Kendall Warm Springs as water expanded throughout the entire channel following the treatment, which resulted in fish gaining access to more habitat. There is danger that watercress will re-establish in the locations from which it was removed in 2022. The Project includes monitoring and additional watercress removal for two additional years.

Recovery Criteria

The ultimate goal of the revised recovery plan (USFWS 2015) is to minimize the threats to KWSD to the point that protection under the ESA is no longer required and the KWSD can be delisted. The recovery objectives are to reduce and/or remove threats to the species and its habitat, to ensure a population persists in the wild, to establish at least two captive refugia populations, and to obtain an increased understanding of the relationship the species to its physical, chemical, and ecological environment. To provide objective, measurable criteria which, when met, would result in the determination that the species be removed from the list, or down listed from endangered to threatened, the following recovery criteria were established.

The KWSD will be considered ready for reclassification from endangered to threatened when:

1. The population of KWSD and its habitat are shown to be protected by the effective implementation of a no drilling zone (e.g., buffers, administratively unavailable areas, withdrawals, etc.) that significantly reduces the threats associated with the introduction of toxins (petroleum products or fracking fluids) to its habitat by oil and gas extraction activity that could intercept the spring recharge zone that supplies water to its habitat. These protections should be assured through formal inclusion as regulatory mechanisms in an approved land management plan or other regulatory means.
2. The naturally occurring KWSD population is experiencing a stable or increasing trend in relative abundance over a five-year period as indicated by Catch per Unit Effort (CPUE) survey methodologies or other methods as determined by the Recovery Team.
3. A captive KWSD population is established and successfully propagated and maintained in at least one location, including complete documentation of propagation methods and hatchery requirements. The captive population will consist of the number of individuals and pairs that will ensure the maintenance of long-term genetic diversity and integrity necessary for long-term species viability as documented in the best available scientific information.

The KWSD will be considered recovered and ready for removal from the list of endangered and threatened wildlife (delisted) when all the additional criteria listed below are realized:

1. The population of KWSD and its habitat are shown to be protected from present and foreseeable threats to the point where listing is no longer required through implementation of activities including stewardship, protection of groundwater in the spring recharge zone, and ensuring adequate regulatory enforcement. These protections should be assured through formal inclusion as regulatory mechanisms in an approved land management plan or other regulatory means.
2. The naturally occurring KWSD population is experiencing a stable or increasing trend in relative abundance over a ten-year period as indicated by Catch per Unit Effort (CPUE) survey methodologies or other methods as determined by the Recovery Team.

3. Necessary administrative measures are implemented to ensure flows are maintained. Suitable flows and water quality in the Kendall Warm Springs stream are determined through recovery tasks and assured through formal inclusion as regulatory mechanisms in an approved land management plan or other regulatory means.
4. Captive KWSD populations are established and successfully propagated and maintained in at least two locations, including complete documentation of propagation methods and hatchery requirements. Captive populations will consist of the number of individuals and pairs that will ensure the maintenance of long-term genetic diversity and integrity necessary for long-term species viability as documented in the best available scientific information.
5. Non-native species, if present, are controlled within the Kendall Warm Springs ecosystem and are not causing declining trends in relative abundance of the KWSD population there. Additionally, develop and implement a management strategy to monitor the site for the presence of non-native species and promptly take action to address any concerns from any non-native species for which presence has been verified. This management strategy should be formally adopted by incorporation as a regulatory mechanism in an approved land management plan or other regulatory means.

Currently, some recovery criteria have been met. Regulatory mechanisms and administrative measures are being implemented to ensure habitat is protected and flows are maintained. The use of soaps, detergents, sunscreens, or bleaches in the Kendall Warm Springs has been prohibited by the BTNF since 1975, and a fence regularly maintained by the BTNF excludes livestock from 160 acres immediately adjacent to the stream. Mining or staking locatable mineral claims in a 160-acre area surrounding the Kendall Warm Springs habitat is prohibited (USFWS 2015). The Wyoming Game and Fish Department prohibits the use of KWSD as bait, the introduction of non-native fishes to Kendall Warm Springs, and fishing in the Kendall Warm Springs area (USFWS 2015). In addition to these regulatory mechanisms and measures, two captive KWSD populations were established and one of these facilities is successfully breeding and rearing KWSD.

Several other criteria have not been met for down listing and/or delisting, most notably:

1. The Kendall Warm Springs recharge zone is not protected from oil and gas development.
2. The naturally occurring KWSD population is not stable or increasing.
3. Although two captive populations are established, only one is successfully propagating.

Synthesis

We completed a 5-year review for KWSD in 2017 (USFWS 2017) wherein we recommended no change to the endangered status of the species. At that time key recovery criteria had not been met. Specifically, a potential decrease in abundance, the lack of established captive populations, and the lack of regulatory restrictions preventing development impacts to Kendall Warm Springs precluded down listing or delisting KWSD.

Since publication of the 2017 status review, the establishment of two captive refugia populations meets a major recovery criterion, although only the population at Gavins Point National Fish Hatchery has achieved consistent survival and propagation. There continues to be a low wild population size, a continued lack of regulatory restrictions preventing oil and gas development, and currently there is the additional threat of invasive watercress within the system.

Considering that several key recovery criteria have not been met and an additional threat not previously identified in the 2017 status review has emerged, we conclude that KWSD still meets the Endangered Species Act definition of an endangered species, and we recommend no status change at this time.

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 is needed

Recovery Priority Number

We recommend that the recovery priority number remain at 12C, which indicates a subspecies with a moderate degree of threat and low recovery potential that may conflict with development projects.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. Continue population monitoring (with the possible addition of quantifying fry abundance and/or distribution within the stream)

2. Include monitoring of KWSD habitat, specifically to include quantification of watercress in the vegetation component of that monitoring.

3. Implement annual maintenance removal of watercress.

4. Continue the development and genetic management of captive refugia KWSD populations.

5. Revisit efforts to implement administrative measures to protect Kendall Warm Springs from oil and gas development pressures.

REFERENCES

GPNFH. 2021. Kendall Warm Springs Dace Captive Propagation for Gavins Point National Fish Hatchery: 2020 Annual Report. Informal report prepared by Christopher Hooley and Nick Starzl. Gavins Point National Fish Hatchery, Yankton, South Dakota. January 2021.

Hubbs, C.L. and E.R. Kuhne. 1937. A new fish of the genus Apocope from a Wyoming warm spring. Occasional papers of the Museum of Zoology Number 343. University of Michigan Press, Ann Arbor, Michigan.

JNFH. 2021. Kendall Warm Springs Dace Captive Propagation for Jackson National Fish Hatchery: 2020 Annual Report. Informal report prepared by David Harper and Aida Farag. Jackson National Fish Hatchery, Jackson, Wyoming. January 2021.

USFWS. 2022a. Kendall Warm Springs Dace Summary of Activities for 2021. U. S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, Cheyenne, Wyoming. January 25, 2022. 17 pp.

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR STATUS REVIEW FOR

KENDALL WARM SPRINGS DACE (*Rhinichthys osculus thermalis)*

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: 12C

FIELD OFFICE APPROVAL:

Approve TYLER ABBOTT Digitally signed by TYLER ABBOTT Date: 2022.08.23 10:11:20 -06'00' Date _____

Tyler A. Abbott
Field Supervisor
Wyoming Ecological Services Field Office
U.S. Fish and Wildlife Service