Desert Dace
(*Eremichthys acros*)

5-Year Review:
Summary and Evaluation

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U.S. Fish and Wildlife Service
Nevada Fish and Wildlife Office
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5-YEAR REVIEW
Desert Dace (*Eremichthys acros*)

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (ESA) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, be changed in status from threatened to endangered, or not be changed in status. Our original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the ESA, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the ESA that includes public review and comment.

Species Overview:

Desert dace (*Eremichthys acros*) are endemic to thermal spring systems in Soldier Meadow, Humboldt County, Nevada. Desert dace is the only member of the genus *Eremichthys* of the Cyprinidae family. It can grow to a maximum length of about 60 millimeters (mm) (2.4 inches (in)) (Hubbs and Miller 1948), and their life span is likely 1–3 years (Ono *et al*. 1983; Sigler and Sigler 1987). Desert dace occupy a variety of habitats in Soldier Meadow including: spring pools up to 15 meters (m) (49.2 feet (ft)) in diameter and 3.4 m (11.2 ft) deep; spring outflow streams typically less than 0.3 m (1 ft) deep; alkali marsh areas with overland flow among cattails (*Typha domingensis*), hardstem bulrush (*Scirpus acutus*), and other herbaceous plants; artificial impoundments; and earthen irrigation ditches. Substrate composition in the spring pools and outflow streams is variable and includes silt, sand, pebbles, and rocks. Desert dace have the highest temperature tolerance of any minnow in western North America (Nyquist 1963) and occupy habitats ranging in temperature from 18 to 40.5 degrees Celsius (^{o}C) (64 to 104 degrees Fahrenheit (°F)).

Methodology Used to Complete This Review:

This review was prepared by the Nevada Fish and Wildlife Office (NFWO), following the Region 8 guidance for 5-year reviews issued in February 2011. We used information from the 1997 Recovery Plan for the Rare Species of Soldier Meadows (Service 1997), and survey information from experts who have been monitoring this species. We received no information from the public in response to our Federal Register Notice initiating this 5-year review. This 5-

year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing. We focus on current threats to the species that are attributable to the ESA's five listing factors. This review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

Contact Information:

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Lead Field Office: Todd Gilmore; Nevada Fish and Wildlife Office; (775) 861-6300.

Federal Register (FR) Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register on March 22, 2006 (Service 2006). No Information was received as a result of this announcement.

Listing History:

Original Listing
FR Notice: 50 FR 50304
Date of Final Listing Rule: December 10, 1985
Entity Listed: Desert dace (*Eremichthys acros*), a fish species
Classification: Threatened

State Listing
Desert dace (*Eremichthys acros*) was listed by the State of Nevada as threatened on May 29, 1984.

Associated Rulemakings: A **4(d) rule** was published at the time of listing on December 10, 1985 (Service 1985) allowing the take of desert dace in accordance with State laws and regulations for educational and scientific purposes, enhancement of propagation or survival of the species, zoological exhibition, and other conservation purposes consistent with the ESA. **Critical Habitat** for the desert dace was also designated at the time of listing and includes specific thermal springs and their outflows within the Soldier Meadow area of Humboldt County, Nevada (Service 1985).

Review History: No formal status reviews have been completed for this species.

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for the desert dace is 7C according to the Service's 2011 Recovery Data Call for the NFWO, based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority Guidelines,

September 21, 1983 (Service 1983)). This number indicates that the taxon is a species that faces a moderate degree of threat and has a high potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline

> **Name of Plan or Outline:** Recovery Plan for the Rare Species of Soldier Meadows
> **Date Issued:** May 27, 1997

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy

The ESA defines "species" as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition of species under the ESA limits listing as distinct population segments to species of vertebrate fish or wildlife. The 1996 Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the ESA (Service 1996) clarifies the interpretation of the phrase "distinct population segment" for the purposes of listing, delisting, and reclassifying species under the ESA.

The desert dace is not listed as a DPS, nor is there any relevant new information regarding the application of the 1996 policy that suggests this species should be listed as a DPS.

Information on the Species and its Status

Species Biology and Life History

Desert dace (*Eremichthys acros*) are endemic to thermal spring systems in Soldier Meadow, Humboldt County, Nevada. Desert dace is the only member of the genus *Eremichthys* of the Cyprinidae family. It can grow to a maximum length of about 60 millimeters (mm) (2.4 inches (in)) (Hubbs and Miller 1948), and their life span is likely 1–3 years (Ono *et al*. 1983; Sigler and Sigler 1987). Desert dace are omnivorous, feeding primarily on filamentous algae, diatoms, aquatic vegetation, zooplankton, snails, and aquatic insect larvae (Nyquist 1963; Ono *et al*. 1983). Ovaries of sexually mature desert dace contain ripe eggs throughout the year. Reproduction has been documented in March, May, and November in the wild, and in April under laboratory conditions (Nyquist 1963). Size at sexual maturity has not been reported in the literature; however, specimens reared in the laboratory spawned at 13 months of age (Nyquist 1963).

Spatial Distribution

The distribution of desert dace has fluctuated over time, likely due to a combination of biotic and abiotic factors. The historical distribution of desert dace is unknown, although fish likely occupied the spring systems in Soldier Meadow for tens of thousands of years (Service 1985). Approximately 50 connected and isolated spring systems originate in Soldier Meadow. At the

time of listing, desert dace were described as occupying eight of these Soldier Meadow spring systems; however, information currently on file with the NFWO is inadequate for determining the exact spring systems occupied by desert dace as of that time. The most comprehensive surveys of desert dace distribution are those conducted by the U.S. Geological Survey (USGS) in 2002-2003 (Rissler *et al*. 2004), which involved sampling across much of Soldier Meadow over four seasons (fall, winter, spring, and summer). The USGS observed dace (either native speckled dace (*Rhinichthys osculus*) or desert dace) in a total of 9 areas (Figure 1, Areas 1-9), and specifically identified desert dace in all of these areas except Area 5. The USGS also mapped another area (Area 10) as containing potentially-suitable habitat for desert dace. A brief description for each of these 10 areas mapped by USGS follows.

Area 1

Area 1 includes an unnamed spring system at the northern end of Soldier Meadow approximately 7 km (4.3 mi) north of Mud Meadow Reservoir (Figure 1). The spring system is located on private lands; the spring outflow is diverted to provide water for Soldier Meadow Ranch. This is the 1939 type locality for desert dace (Hubbs and Miller 1948). Of the 10 areas depicted in Figure 1, this is the only one located on private lands; all remaining areas occur on public lands managed by the BLM.

Area 2

Area 2 includes several small unnamed springs and one large spring pool approximately 5 km (3 mi) north of Mud Meadow Reservoir (Figure 1). The outflows from each of these springs drain to the south into a terminal marsh, with the exception of one spring outflow located on private lands that has been diverted from its historical channel. Desert dace were first collected in Area 2 in 1961 (Nyquist 1963).

Area 3

Area 3 includes a number of connected, unnamed spring systems approximately 1 km (0.6 mi) north of Mud Meadow Reservoir (Figure 1). The outflow from these springs flows south, drying before it reaches this reservoir. Desert dace were first collected here in 1987 (Vinyard 1988).

Area 4

The largest contiguous habitat and population of desert dace occurs in Area 4 (Figure 1). This area includes several large unnamed springs and nearly 2,800 m (9,186 ft) of spring outflow approximately 2.5 km (1.5 mi) northwest of Mud Meadow Reservoir. Desert dace are not found in the springheads of these spring systems, likely due to water temperatures that exceed this species' thermal tolerance (Vinyard 1996). However, desert dace do occur throughout the spring outflows, in some instances within close proximity to thermal spring pools used by recreational bathers and campers. Further downstream, the spring outflow splits, with one fork flowing southeast and terminating in a meadow and the other flowing east and terminating in an irrigation ditch. Desert dace were first reported from Area 4 in 1942 (Hubbs and Miller 1948).

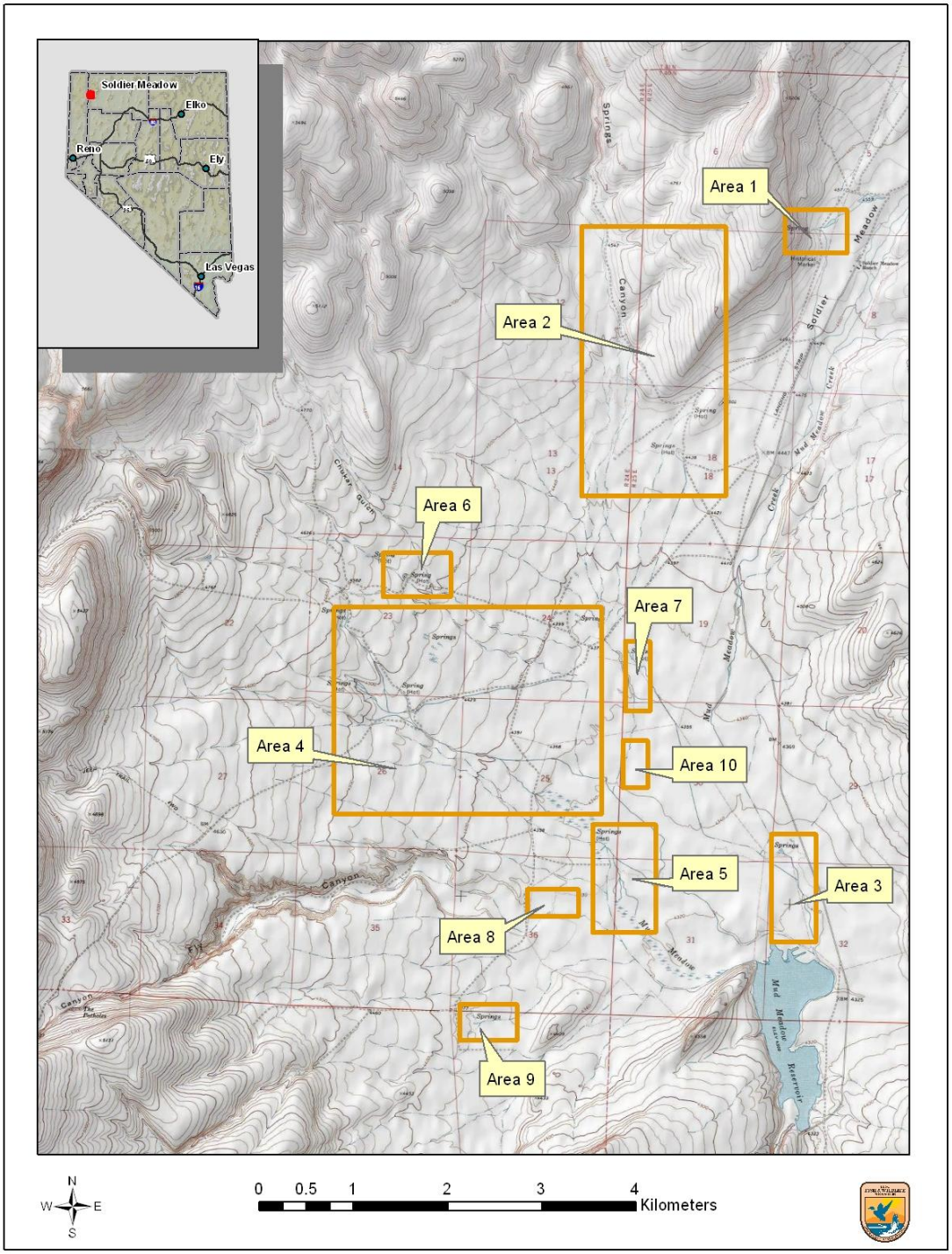

Figure 1. Map of Soldier Meadow showing occupied areas (Areas 1-9) and unoccupied but potentially suitable habitat (Area 10) for desert dace (*Eremichthys acros*), Humboldt County, Nevada. Prepared for 5-year review, 2012.

Area 5

Area 5 includes a number of unnamed spring systems and outflows approximately 1 km (0.6 mi) northwest of Mud Meadow Reservoir (Figure 1). The outflow from these springs intermittingly provides a surface connection to this reservoir. Desert dace were first reported in Area 5 in 1987 (Vinyard 1988, 1996).

Area 6

Area 6 includes a small unnamed spring and outflow approximately 5 km (3 mi) northwest of Mud Meadow Reservoir (Figure 1). Desert dace were first reported in Area 5 in 1987 (Vinyard 1988, 1996).

Area 7

Area 7 includes a series of unnamed springs and outflows approximately 3 km (1.8 mi) northwest of Mud Meadow Reservoir (Figure 1). Area 7 is also located approximately 0.7 km (0.4 mi) downstream of Area 2; these areas may be connected by surface flows during high runoff events, but desert dace are not expected to migrate between them because the intervening water temperatures are too cold. Desert dace were first reported in Area 7 in 1942 (Hubbs and Miller 1948).

Area 8

This area includes a series of unnamed spring pools near the mouth of Fly Canyon approximately 2 km (1.2 mi) northwest of Mud Meadow Reservoir (Figure 1). Area 8 was first reported as occupied in 2002 (Rissler *et al*. 2004). In 2010 NDOW reported a new population of desert dace in the upper reach of Fly Canyon (NDOW 2010), approximately 1.8 km (1.1 mi) upstream of Area 8 as mapped by the USGS and as depicted in Figure 1.

Area 9

This area includes a series of unnamed springs and one major outflow approximately 2.5 km (1.5 mi) west of Mud Meadow Reservoir (Figure 1). The outflow conveys water to the east, but dries before it reaches this reservoir. Area 9 was first reported as occupied in 2002 (Rissler *et al*. 2004).

Area 10

Area 10 is approximately 2 km (1.2 mi) northwest of Mud Meadow Reservoir (Figure 1). This area was not identified until summer 2003, when the USGS mapped it as potentially suitable, but unoccupied, habitat for desert dace (Rissler *et al*. 2004). Desert dace have yet to be detected in this area (NDOW 2010; Byrne, pers. comm. 2011).

Summary of spatial distribution

Most of the 10 areas mapped and surveyed by USGS were previously reported as occupied or potentially-suitable habitat (Hubbs and Miller 1948; Nyquist 1963; Vinyard 1988, 1996). Areas 8 and 9 represented new populations not found in previous surveys (Rissler *et al*. 2004); it is unknown if these additional areas of occupied habitat represent historical desert dace habitat, areas where desert dace were intentionally introduced, or recent natural (*e.g.*, unassisted by humans) colonization events. During these USGS surveys, desert dace were found in water temperatures ranging from 10.8 to 38^{o}C (51.4 to 100.4^{o}F), but were found in highest numbers in water temperatures near 15^{o}C (59^{o}F) (Rissler *et al*. 2004). Surveys conducted by the Nevada Department of Wildlife (NDOW) in summer 2010 (NDOW 2010) and 2011 (C. Byrne, NDOW, pers. comm. 2011) suggest that desert dace may only remain in 3 (Areas 2, 4, and 5) of the 9 areas reported as occupied in 2002–2003 (Rissler *et al*. 2004). The areas where desert dace were not found in 2010 were reported to be either dry or densely vegetated (NDOW 2010). Speckled dace were the only other native fish found in the 2010 surveys.

Most of the 10 areas depicted in Figure 1 are semi-discrete in that there are no known perennial surface flows linking them; Areas 4 and 5 are notable exceptions to this pattern in that surface flows have frequently been observed linking these areas. Throughout Soldier Meadow, runoff from snowmelt or storm events during wet years could provide temporary surface connectivity and may facilitate infrequent or periodic movement of dace. The extent to which this occurs, and the timing of such migration events, is not known.

Abundance

At the time of listing, the abundance of desert dace was unknown (Service 1985). Since listing, surveys have been conducted periodically using different sampling methods. The discrepancies in sampling methods make it difficult to develop sound comparisons among the surveys. As described in the Spatial Distribution section, spring systems in a total of 10 distinct areas within Soldier Meadow are known to contain (Figure 1, Areas 1–9) or have potentially-suitable habitat for (Area 10) desert dace. Abundance data are discussed below for the nine areas (Areas 1-9) in which the species has been reported to occur.

Area 1

Area 1 was also surveyed in 1961, 1962, 1987, 1988, and 1989, and desert dace were observed each of those years, but numbers were not reported (Nyquist 1963; Vinyard 1988, 1996). The USGS found an average of 7 desert dace per seasonal survey period in Area 1 during 2002–2003, with the highest number sampled in the winter (Rissler *et al*. 2004). Area 1 was not surveyed in 2010 (NDOW 2010) or 2011 (Byrne, pers. comm. 2011). However, numerous dace (species unknown) were observed in this area in October 2011 (T. Gilmore, Service, pers. comm. 2011). Based on the warm water temperatures at this location, the dace observed in 2011 were likely desert dace.

Area 2

Desert dace were first collected in Area 2 during 1961 (Nyquist 1963) and were collected here again in 1987, 2002, 2003, and 2010 (Vinyard 1988, 1996; Rissler *et al*. 2004; NDOW 2010). Numbers of fish were not reported until 2002–2003, when the USGS reported an average of 368 desert dace per survey across four sampling periods (Rissler *et al*. 2004). In 2010, a total of 42 desert dace were reported in Area 2 (NDOW 2010).

Area 3

Desert dace were first collected here in 1987, but numbers were not reported (Vinyard 1988). An average of 509 desert dace per survey were sampled here in 2002–2003, with the highest number sampled in the fall (Rissler *et al*. 2004). In 2010, only speckled dace were reported in Area 3 (NDOW 2010).

Area 4

Desert dace were first reported here in 1948 (Hubbs and Miller 1948), and subsequent surveys in 1987, 2002, 2003, 2010, and 2011 all describe numerous desert dace in this area. Numbers of desert dace were not reported by Vinyard (1988, 1996) or Byrne (2010), but USGS surveys in 2002–2003 found an average of 1,328 desert dace per survey with the highest number sampled in the fall (Rissler *et al*. 2004). Area 4 remains the single largest area of concentration of desert dace.

Area 5

Vinyard (1988, 1996) first sampled desert dace in Area 5 in 1987, however he did not provide estimates of abundance. The USGS did not observe desert dace in this area in 2002–2003 (Rissler *et al*. 2004). NDOW observed desert dace in this area in 2010 and 2011, but did not report estimates of abundance (NDOW 2010; Byrne, pers. comm. 2011).

Area 6

Numbers of desert dace were not reported when they were first sampled in this area in 1987 (Vinyard 1988). Desert dace were still present in 2002–2003 with the highest numbers sampled in the winter, and an overall average of 8 fish reported per sampling period (Rissler *et al*. 2004). Desert dace were not observed in this area in 2010 or 2011, as it was mostly dry with dense vegetation (NDOW 2010; Byrne, pers. comm. 2011).

Area 7

Desert dace were first sampled in Area 7 in 1942 by Hubbs and Miller (1948). Subsequent surveys in 1961, 1995, 2002, and 2003 found numerous desert dace in this area (Nyquist 1963, Vinyard 1996, Rissler *et al*. 2004). Numbers of desert dace were not reported by Nyquist (1963) or Vinyard (1996). In 2002–2003, the USGS (Rissler *et al*. 2004) found an average of 19 desert

dace per survey season, with the highest number of fish sampled in the fall. NDOW did not sample fish of any species in Area 7 in 2010 (NDOW 2010) or 2011 (Byrne, pers. comm. 2011).

Area 8

Area 8 was first reported as occupied in 2002, and an average of 75 desert dace per survey period were sampled here in 2002–2003, with the highest number sampled in the fall (Rissler *et al*. 2004). Desert dace were not found in this area in 2010, but that year NDOW reported the species some 2.1 km (1.3 mi) further upstream within Fly Canyon (NDOW 2010) beyond the boundary of Area 8 as mapped by USGS (Figure 1, also see Rissler *et al*. 2004). NDOW did not report numbers of desert dace observed in Fly Canyon in 2010. The areas in which NDOW observed the species in 2010 (further upstream in Fly Canyon) are not perennially connected by surface water to the downstream locations (mapped as Area 8) where USGS reported the species, but these spring outflows may be connected under high flow conditions.

Area 9

Area 9 was first reported as occupied in 2002, and an average of 327 desert dace per survey period were reported here in 2002–2003, with the highest number of fish sampled in the fall (Rissler *et al*. 2004). No fish were sampled in this area in summer 2010, and it was mostly dry (NDOW 2010).

Summary of abundance data

Early surveys provided limited and mostly qualitative abundance information (Nyquist 1963; Vinyard 1988, 1996). Surveys the USGS conducted in 2002–2003 provided abundance data for desert dace throughout Soldier Meadow across four seasons (Rissler *et al*. 2004). These surveys yielded an overall average (across all four sampling periods) of 2,644 desert dace across 8 sampling areas (*i.e.*, all areas depicted in Figure 1, except Area 5 (where the dace were not identified to species by USGS) and Area 10 (which was mapped as suitable but unoccupied). Although representative of only a single year of survey effort and conditions 8 years ago, these data provide the most robust indication of overall abundance of the species throughout Soldier Meadow.

In 2010, NDOW conducted surveys using trapping and electrofishing techniques over a 2-week period in July (NDOW 2010). Total counts (of individual fish observed) were provided for some areas and presence/absence for others (NDOW 2010). For this reason, the NDOW dataset provides a more robust indication of the species' distribution than its abundance. NDOW also did not structure their sampling or report their findings in terms of the same sampling areas delineated by the USGS in 2002–2003.

Given the different levels of sampling effort, population metrics used, and areas surveyed by USGS and NDOW, these two datasets cannot be directly or easily compared. Despite these limitations, survey data from 2010 suggest that desert dace may now be absent, either seasonally or permanently, from many areas throughout Soldier Meadow where they were sampled in 2002–2003 (NDOW 2010; Byrne, pers. comm. 2011). However, the Service regards it as

premature to regard the species as extirpated from areas where it was not observed in 2010 and/or 2011. Future multi-season surveys are needed to verify whether or not and/or to what degree the species' abundance may have declined.

Habitat or Ecosystem

Desert dace occupy a variety of habitats in Soldier Meadow including spring pools up to 15 m (50 ft) in diameter and 3.4 m (11.2 ft) deep; outflow streams typically less than 0.3 m (1 ft) deep; alkali marsh areas with overland flow among cattails (*Typha domingensis*), hardstem bulrush (*Scirpusacutus*), and other herbaceous plants; artificial impoundments; and earthen irrigation ditches. Spring discharge, nonnative fish, and dense vegetation appear to be the most important factors influencing the suitability of habitat for desert dace (Vinyard 1996; Rissler *et al.* 2004; Byrne 2010).

Desert dace have the highest temperature tolerance of any minnow in western North America (Nyquist 1963) and occupy habitats varying in temperature from 15.0 to 40.5^{o}C (59 to 104^{o}F; Service 1997). Water temperature is a determining factor in desert dace distribution within a spring system. Cooler habitats (23–29^{o}C, 73–84^{o}F) downstream of springheads generally have the highest fish densities. Within the outflow streams, desert dace occur predominantly in upstream sites with higher velocities, but also occupy lower velocity reaches where water temperatures are relatively high (Vinyard 1988). Dace may be distributed as far as 2.4 km (1.5 mi) downstream of a springhead (Vinyard 1988). However, distribution apparently shifts seasonally according to water temperature. In the summer, springhead pool temperatures may exceed desert dace tolerance limits and the fish move downstream. As stream temperatures decrease in winter, the species' range contracts upstream.

Limited habitat monitoring has been conducted associated with the hot springs in Soldier Meadow since the recovery plan was published in 1997. A 2-year study was undertaken in 1999 to measure various aspects of water quality in disturbed and undisturbed springs, identify impacts to water quality associated with recreational and grazing uses, and to provide the BLM with recommendations for monitoring water quality in the Soldier Meadow spring systems (Peacock *et al.* 2001). This preliminary study documented that water quality is affected by anthropogenic activities associated with recreational use of the hot springs bathing pools (Peacock *et al.* 2001). Spring outflows downstream of bathing pools had statistically significant increases in biological oxygen demand (BOD), conductivity, and pH following major holidays with increased public recreational use. The increases in BOD and conductivity may indicate increases in organic pollutants in the water column, whereas increases in pH suggest increased alkalinity that may be attributed to the use of soaps and detergents in the spring outflows. The effects of elevated BOD, conductivity, and pH did not appear to cause significant fluctuations in other water quality measurements such as dissolved oxygen (DO) or total dissolved solids (TDS), suggesting that impacts from recreational use are transitory (Peacock *et al.* 2001).

Water quality data for sites in Soldier Meadow that were heavily used by livestock had higher overall BOD, pH, and turbidity than all other sites that were minimally grazed or ungrazed in 1999–2000 (Peacock *et al.* 2001). Dense macrophytic vegetation growth in the stream channels, elevated levels of organic pollutants from cattle fecal material, high pH levels, and reduced DO

levels indicated negative effects from livestock grazing on these streams (Peacock *et al.* 2001). The BLM has established water quality standards for desert dace habitat, and based on the 1999–2000 data, only DO did not meet these standards; however, regular water quality monitoring was recommended to better understand the effects of grazing on ecosystem health (Peacock *et al.* 2001).

Changes in Taxonomic Classification or Nomenclature

No taxonomic classification or changes in nomenclature have been made. This species represents a monotypic genus.

Genetics

We are not aware of any efforts to collect or analyze genetic samples from this species.

Five-Factor Analysis

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the ESA.

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

At the time of listing, the desert dace was primarily known from private lands where the diversion of spring outflows into irrigation ditches for agricultural activities was identified as the primary threat to the species (Service 1985). These actions reduced available habitat by forcing desert dace into areas that provided unsuitable habitat. When the recovery plan was finalized, a more substantial proportion of the species' range was by then on public lands managed by the BLM, where additional threats related to increased recreational use had been identified (Service 1997). Neither the listing rule nor the recovery plan specifically mentions threats from livestock, feral horses or burros, but these animals have since become identified as a potential threat to the species and its habitat. The current status of known habitat threats is discussed below.

As discussed above (Section II, Information on the Species and its Status, Spatial Distribution and Abundance), desert dace has been reported from nine discrete areas throughout Soldier Meadow (Areas 1-9, Figure 1), and suitable habitat for this species has been mapped in one other area (Area 10, Figure 1). Nine of these areas (Areas 2-10) occur on lands managed by the BLM; of these, only one (Area 4) currently receives substantial recreational use in the form of bathing and camping. As previously discussed, Area 4 supports the largest amount of interconnected, occupied habitat and greatest abundance of desert dace, encompassing a large complex of spring systems with numerous spring heads and over 2,800 m (9,186 ft) of spring outflow habitat.

A substantial portion of Solider Meadow occurs on public lands managed by BLM as part of the Black Rock Desert-High Rock Canyon-Emigrant Trails National Conservation Area (NCA). The Black Rock Desert has been a popular recreational destination for decades: during the summer of 1990, approximately 2,800 people visited this area (BLM 1998). Between 1994 and

1995, visitor use increased by 3,000–4,000 12-hour visitor days (BLM 1998). Designation of the NCA in 2000 brought increased visibility and visitation, with the highest use occurring on Memorial Day and Labor Day weekends (BLM 2003). By 2001, dispersed recreational use had increased to nearly 70,000 days (BLM 2003).

In 2004, the BLM characterized the top four recreational uses of Soldier Meadow as: bathing in hot springs, camping, all-terrain vehicle travel, and four wheel driving (BLM 2004a). Each of these recreational activities threatens desert dace and its habitat. However, the BLM has undertaken numerous measures to manage recreational use throughout the NCA and particularly Soldier Meadow, in the form of planning decisions and the implementation of on-the-ground actions.

In 1998, the BLM completed an Environmental Assessment (EA) for the Soldier Meadow Activity Plan (SMAP; BLM 1998). The preferred alternative within the SMAP was designed to: (1) address impacts to special status species and cultural resources from increased recreation; livestock, wild horse and burro grazing; and potential geothermal and mineral development; (2) implement management actions to provide favorable habitat conditions for desert dace that would enable the Service to delist the species; (3) implement management actions to protect habitat for *Potentilla basaltica* (Soldier Meadows cinquefoil, a candidate for Federal listing) so the Service would not need to list the species; and (4) implement management actions to protect cultural resources in the area from further degradation. Specific actions identified in the SMAP included: monitoring area use, increasing law enforcement, designating visitor use areas, designating specific bathing pools with walk-in access, limiting camping, limiting vehicle parking and camping within 61 m (200 ft) of the springheads and outflow channels, developing interpretive signs, and dismantling impoundments in non-designated bathing areas.

In 2003, the BLM issued a Proposed Resource Management Plan and Final Environmental Impact Statement for the Black Rock Desert-High Rock Canyon-Emigrant Trails National Conservation Area (BLM 2003). Among other actions, the Resource Management Plan designated approximately 841 ha (2,077 ac) of public land as the Soldier Meadows Area of Critical Environmental Concern (ACEC) (BLM 2003). This action expanded an existing ACEC designated in 1982 to encompass 124 ha (307 ac) where special management attention was needed to protect and prevent irreparable damage to important biological, cultural, and historical resources, including desert dace. The expansion of this ACEC in 2003 provided more protection and management focus on the desert dace, while expanding BLM's management focus to include two other candidates for Federal listing (elongate Mud Meadows springsnail (*Pyrgulopsis notidicola*) and *Potentilla basaltica*). The ACEC is also designated as a BLM Research Natural Area (RNA), indicating an area which contains natural resource values of scientific interest and is managed primarily for research and educational purposes.

In May 2004, the BLM completed an EA for the Soldier Meadows Recreation Management Plan (SMRMP; BLM 2004b). This SMRMP was intended to implement conservation actions identified in the Proposed Resource Management Plan pertaining to the listed and candidate species of Soldier Meadow, including: closing access roads to spring, riparian and wetland areas; limiting off-highway vehicles to designated roads and trails; establishing a central campground away from sensitive habitats; and implementing a monitoring program to assess the

effects of these actions on listed, candidate, and sensitive species. The Resource Management Plan was finalized in July 2004, and incorporated implementation of the SMAP and SMRMP (BLM 2004a).

These numerous BLM planning documents established the purpose and scope for specific management actions to minimize the impact of recreation upon sensitive natural resources. In 2004, the BLM constructed a designated, central campground to preclude dispersed camping in sensitive habitats, and established walkways to direct foot traffic to areas where it would have minimal impacts on sensitive habitats. Flat rocks were hand placed at designated spring pools to form level, permanent platforms for bathers and eliminate the tendency for users to place carpet or plywood at the pool edges. The BLM also implemented a campground host system during the period of peak visitor use. This site steward interacts with visitors, directing them toward designated camping and bathing areas while providing general public outreach, and also retains record of the levels and patterns of visitor use. These measures were further supplemented by: placement of educational signs describing the risks to humans from thermal hot springs and the need to protect sensitive species found in these habitats; increased on-site presence of BLM staff (including law enforcement); and installation of a 1,215 ha (3,000 ac) exclosure fence to exclude livestock, and feral horses and burros from the majority of the hot springs, including desert dace habitat (BLM 2004c, 2004d). Law enforcement presence occurs mainly during holiday weekends or major events, such as the annual Burning Man Festival. All of these actions have been fully implemented and have been successful at reducing recreational and grazing impacts to the habitats of the sensitive species of Soldier Meadow, including portions of desert dace occupied habitat (Gilmore 2006, 2007, 2008, 2010).

These management actions undertaken by BLM have resulted in significant reductions in threats from recreational use, and some reductions in threats from livestock, feral horses and burros. However, in 2010 NDOW reported heavy trampling from feral horses in the upstream portions of Fly Canyon (e.g., upstream of Area 8 in Figure 1) as well as within the spring systems of Areas 3 and 9, prompting concerns that the hydrology of these springs and the desert dace reportedly found there could be at risk (NDOW 2010). BLM is actively conducting feral horse gathers in the areas surrounding Soldier Meadow; these actions are necessary to manage and reduce ongoing threats to desert dace.

Nonnative fish species also continue to pose a significant threat to the overall integrity of the spring systems in which desert dace occur, as well as providing a source of competition and predation upon desert dace in particular. The threat from predation by nonnative fish is discussed under Factor C, below.

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

At the time of listing, overutilization for commercial, recreational, scientific, or educational purposes was not considered a threat to desert dace (Service 1985), and we do not consider it a threat at this time.

FACTOR C: Disease or Predation

At the time of listing, disease and predation were not believed to be contributing factors to the threatened status of desert dace (Service 1985). The final listing rule acknowledged that disease or predation could result from the introduction of nonnative species, and discussed them under Factor E. Currently, nonnative fish (particularly green sunfish (*Lepomis cyanellus*) and goldfish (*Carassius auratus*)) pose a direct threat to desert dace through predation and competition for resources. A discussion of some of the threats to desert dace from nonnative fish is provided below.

Mud Meadow Reservoir has contained nonnative fish (green sunfish and goldfish) for decades (Vinyard 1988, 1996; Service 1997; Rissler *et al.* 2004; Byrne 2010), and some of these species have migrated upstream and successfully entered tributary spring systems occupied by desert dace. In 2002, spring outflows in Areas 5 and 7 were found to contain green sunfish, and Area 5 also contained goldfish (Rissler *et al*. 2004). During these surveys, the USGS also failed to observe desert dace in Area 5. Nonnative fish compete with desert dace via predation and competition; failure to observe desert dace in this area raised concerns that the species had been extirpated as a result of these threats. Areas 5 and 7 are either seasonally or perennially connected to Mud Meadows Reservoir, the presumed source of the nonnative fish. In 2006, Mud Meadows Reservoir and adjacent outflow reaches were treated to eradicate nonnative fish. Prior to the treatment, NDOW completed an electrofishing survey and determined that the distribution of nonnative fish in the spring outflows was not as widespread as when the 2002–2003 surveys were conducted (J. French, NDOW, pers. comm. 2006). These nonnative fish were relatively large in size, indicating no or little recruitment was occurring (French, pers. comm. 2006). In 2010, nonnative fish were present in the reservoir but were not found in any of the adjacent outflows where they had been located in previous surveys (Byrne 2010). Based on the size of the fish that were sampled in 2010 (green sunfish 49–88 mm (1.9–3.5 in) total length (TL); goldfish 38–105 mm (1.5–4.1 in) TL), multiple age classes were present and recruitment was taking place.

In 2006, the Service and BLM contracted with a geomorphologist to construct temporary fish barriers at three locations to protect occupied desert dace habitat from further nonnative fish invasion until a more permanent solution could be implemented. In 2008, the BLM contracted another geomorphologist to design and construct permanent structures to replace the existing temporary fish barriers. Two permanent fish barriers were constructed in fall 2011. The structural integrity of the permanent fish barriers is expected to render them more effective at completely blocking upstream fish passage.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms appear to be adequate at this time. Federal laws that may provide protection for desert dace and their habitat include the National Environmental Policy Act, Clean Water Act, ESA and Federal Public Lands Management Act. State laws which protect desert dace include the Nevada Revised Statute 503.584 *et seq.*; 244.386 that protects Nevada's listed species, and Nevada Revised Statute 445A.305 that protects the water quality of Nevada's rivers, springs, and streams.

Federal Protections

National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA; 42 U.S.C. 4371 *et seq*.) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects (40 CFR. 1502.16). These mitigations usually provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Endangered Species Act (ESA)

The ESA is the primary Federal law providing protection for desert dace. The Service's responsibilities include administering the ESA, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 CFR 402.02). A non-jeopardy determination may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally-listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The ESA provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that result from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 CFR 402.02). For projects without a Federal nexus that would likely result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan that details measures to minimize and mitigate the project's adverse effects to listed species.

Clean Water Act (CWA)

Under section 404, the U.S. Army Corps of Engineers (USACOE) regulates the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). In general, the term "wetland" refers to areas meeting the USACOE criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any action with the potential to impact waters of the United States must be reviewed under the CWA, NEPA, and the ESA. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts.

The USACOE interprets "the waters of the United States" expansively to include not only traditional navigable waters and wetlands, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. However, recent Supreme Court rulings have called into question this definition. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving "isolated" wetlands. Currently, USACOE regulatory oversight of such wetlands (***e.g.***, vernal pools) is in doubt because of their "isolated" nature. In response to the Supreme Court decision, the USACOE and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a "significant nexus" standard that may protect some, but not all, isolated wetland habitat (USEPA and USACOE 2007). The overall effect of the new permit guidelines on loss of isolated wetlands, such as vernal pool habitat, is not known at this time.

Federal Land Policy and Management Act of 1976 (FLPMA)

The BLM is required to incorporate Federal, State, and local input into their management decisions through Federal law. The FLPMA (Public Law 94–579, 43 U.S.C. 1701) was written "to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes." Section 102(f) of the FLPMA states that "the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures … to give Federal, State, and local governments and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands." Therefore, through management plans, the BLM is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall "give priority to the designation and protection of areas of critical environmental concern" in the development of plans for public lands. Although the BLM has a multiple-use mandate under the FLPMA which allows for grazing, mining, and off-road vehicle use, the BLM also has the ability under the FLPMA to establish and implement special management areas such as Areas of Critical Environmental Concern, wilderness, research areas, etc., that can reduce or eliminate actions that adversely affect species of concern (including listed species).

State Protections in Nevada

Under Nevada Administrative Code 503.050, 503.065, 503.067, 503.075, 503.080, 503.090, 503.103, and 503.104 (Nevada Revised Statutes 501.105, 501.110, 501.181, and 503.650), a species may be designated as protected, threatened, endangered, or sensitive. The State statutes and regulations aimed at protecting wildlife and plant species, respectively, are administered by the NDOW and the Nevada Division of Forestry, under the Department of Conservation and Natural Resources. Capturing, removing, or destroying animals and plants on the State's fully protected list is prohibited for wildlife under Nevada Administrative Code 503.093 and 503.094 (Nevada Revised Statues 501.105 and 501.181) and for plants under Nevada Administrative Code 527.250 to 527.460 (Nevada Revised Statutes 527.050 and 527.300), unless a special permit has been obtained from NDOW or the Nevada Division of Forestry.

Summary of Factor D

In summary, the ESA is the primary Federal law that has provided protection for desert dace since its listing as threatened in 1985. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the ESA. Therefore, other laws and regulations have limited ability to protect the species in absence of the ESA.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

The final listing rule, published in 1985, identified nonnative species as a natural or manmade threat affecting the continued existence of desert dace. This is still considered a threat and is addressed above in Factor C. Climate change is a new threat that was not identified at the time of listing. Some of the potential effects of climate change on desert dace are discussed below.

Climate Change

Research has shown that the annual mean temperature in North America has increased from 1955 to 2005; however, the magnitude varies spatially across the continent, is most pronounced during spring and winter months, and has affected daily minimum temperatures more than daily maximum temperatures (Field *et al*. 2007). Other effects of climate change include, but are not limited to, changes in types of precipitation (Knowles *et al*. 2006), earlier spring run-off (Stewart *et al*. 2005), longer and more intense fire seasons (Brown *et al*. 2004; Westerling *et al*. 2006; Bachelet *et al*. 2007), and more frequent extreme weather events (Diffenbaugh *et al*. 2005; Rosenzweig *et al*. 2007). These changes in climate and subsequent effects can be attributed to the combined effects of greenhouse gases, sulphate aerosols, and natural external forcing (Karoly *et al*. 2003; Barnett *et al*. 2008).

Warming trends seen over the past 50 years in the United States are predicted to continue to increase (Field *et al*. 2007). The Intergovernmental Panel on Climate Change (IPCC) states that of all ecosystems, freshwater ecosystems will have the highest proportion of species threatened with extinction due to climate change (Kundzewicz *et al.* 2007). However, quantifying the potential site-specific effects to desert dace, and the time scale at which they would occur, is

problematic. The species is geographically isolated and dependent on groundwater discharge to maintain its spring system habitats. Difficulties remain in reliably simulating and attributing climate change effects at such small, localized scales. Natural climate variability is relatively larger-scaled, thus making it harder to distinguish changes expected due to external, human-related sources (IPCC 2007). Our concern with this threat is linked to the extent that climate change may affect the water supply of desert dace through lowering groundwater levels and increasing the frequency/intensity of wildfires in the area.

III. RECOVERY CRITERIA

Recovery plans provide guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust enough to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

Recovery Objective: Improve the status of desert dace so it may be delisted.

Recovery Criteria: Desert dace may be considered for delisting when the following criteria are met:

1) **Historical habitat in the one dewatered stream channel on public land (T40N, R24E, Sec. 25 and 26) is restored so that it supports desert dace.**

   Recovery criterion 1 has not been met. Habitat restoration has not been initiated on the historically-occupied spring outflow channel. The now-dewatered outflow remains directed into a dry irrigation ditch adjacent to the original spring outflow channel, and no desert dace are present (Rissler *et al*. 2004; Byrne 2010).

2) The desert dace population in each of the eight historically occupied spring systems is stable or increasing in size and comprising two or more age classes for 3 years.

Recovery criterion 2 has not been fully met. Population abundance monitoring has not been conducted for a consecutive 3-year period within historical habitats.[1] Data from intermittent surveys during 1987–1995 (Vinyard 1988, 1996), intensive surveys in 2002–2003 that spanned four seasons (Rissler *et al.* 2004), and summer-only surveys in 2010–2011 (Byrne 2010; Byrne pers. comm. 2011) are not directly comparable, but do suggest that desert dace abundance may have decreased within a portion of their historical habitat. In 2002–2003, USGS observed dace (either speckled dace or desert dace) in a total of 9 areas (Figure 1, Areas 1–9), and identified desert dace as present in all of these areas except Area 5. The USGS also mapped another area (Area 10) containing potentially-suitable habitat for desert dace. Two areas mapped by USGS (Areas 8 and 9) represented new populations not found in previous surveys (Rissler *et al*. 2004). In 2010, desert dace were found in only three of the eight (Areas 2, 4, and 5) historically-occupied areas, but they were also discovered in a new location not previously reported (Byrne 2010). No studies have specifically examined the size-age relationship for desert dace. Recent surveyors have reported the presence of multiple age classes of dace within Soldier Meadow (Rissler *et al.* 2004; Byrne 2010). However, as of this review, the Service is unaware of age-class data having been collected or reported for each population of desert dace.

3) Reproduction and recruitment are documented from each historically occupied spring system with suitable water temperatures for 3 years.

Recovery criterion 3 has not been fully met, as population and temperature monitoring have not been conducted for a consecutive 3-year period. Spawning activity of desert dace has not been observed in recent surveys (2002–2003 or 2010), but reproduction and successful recruitment can be inferred from observations of multiple age classes (Rissler *et al.* 2004; Byrne 2010).

Thermograph data from 2002–2003 and 2010 surveys, combined with population data, show that desert dace were present in spring systems where water temperatures ranged between 9.4 and 39.0^{o}C (49 and 102^{o}F) (Rissler *et al.* 2004; Byrne 2010). Reproduction was occurring in these historical spring systems, but a potential link between temperature and reproduction was not examined (Rissler *et al.* 2004; Byrne 2010). In 2002–2003, desert dace were most abundant in cooler reaches and springs with relatively stable temperatures near 15 ^{o}C (59^{o}F) (Rissler *et al.* 2004).

4) Habitat modification, nonnative fishes, and parasites no longer threaten the long-term survival of the species.

Recovery criterion 4 has not been fully met. Substantial progress has been made to address threats from habitat modification, but nonnative fish are still considered to be a

[1] See Spatial Distribution and Abundance sections for more details.

threat. Construction of permanent fish barriers will help to reduce the threat of nonnative fish from accessing desert dace habitat. However, as long as there is even periodic hydrologic connectivity between the spring systems and Mud Meadow Reservoir, and so long as nonnatives remain in this reservoir the threat from nonnative fish may never be removed from the spring systems of Soldier Meadow.

IV. SYNTHESIS

Desert dace were listed as threatened with critical habitat in 1985. The species was not listed as a DPS, nor is there relevant new information that would lead the Service to consider listing this species as a DPS in accordance with the 1996 policy. Desert dace have a recovery priority number of 7C, and a recovery plan was published in 1997. Surveys conducted in 2002–2003 and 2010 indicate that desert dace populations may be declining within a portion of their historical habitat, likely due to nonnative species invasions and a reduction of available habitat (Vinyard 1996; Rissler *et al*. 2004; Byrne 2010). Permanent fish barriers were constructed in 2011 to prevent nonnative fish from encroaching further upon desert dace habitat. Additional funding is required to implement identified habitat restoration measures and achieve recovery. Population monitoring has not been frequent enough or sufficiently intensive to determine if some recovery criteria are being met. However, numerous conservation measures have been implemented by BLM in the Soldier Meadow area since 1997 which partially address recovery criterion 4, by reducing various types of habitat modification associated with livestock grazing and recreational use of hot springs and surrounding areas. An interagency team is currently evaluating nonnative species distribution and implementing control measures in cooperation with the private landowner that, in combination with habitat restoration, will allow for recovery and delisting of desert dace.

V. RESULTS

Recommended Listing Action:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (indicate reason for delisting according to 50 CFR 424.11):
    ____ *Extinction*
    ____ *Recovery*
    ____ *Original data for classification in error*
_X_ No Change

New Recovery Priority Number and Brief Rationale: It is recommended that the recovery priority number not change.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

The Service recommends that the following actions be implemented over the next 5 years in order to recover desert dace:

- Continue to implement measures to fully meet the recovery criteria identified in the Recovery Plan for the Rare Species of Soldier Meadows (Service 1997). Population monitoring for a consecutive 3-year period is crucial to determine how management actions are affecting desert dace populations, as well as nonnative fish populations. The Service has provided funding to NDOW through section 6 of the ESA for monitoring desert dace and nonnative fish; however, the Service and NDOW need to ensure that continued additional funding will be required in future years to continue these efforts. In addition, monitoring protocols need to be refined to ensure that data collection is adequate for an objective evaluation of progress toward meeting recovery criteria.

- Continue monitoring the effectiveness of, and maintain (as necessary), the permanent fish barriers that were constructed in 2011.

- Continue to cooperatively work with BLM, USGS, NDOW, and the owner of Soldier Meadows Ranch to ensure adequate management actions (*e.g.*, the Soldier Meadows Recreation Management Plan; BLM 2004b) are taken in Soldier Meadow to restore spring outflows to historical conditions, manage threats posed by nonnative fish species within the spring systems of Solider Meadow, and prevent upstream passage of nonnative fish from Mud Meadow Reservoir. Addressing the threats from nonnative fish species over the next five years is likely to require maintenance of existing fish barriers, and could require installation of additional fish barriers. Removal of fish barriers is a long term objective that will, in reality, only be feasible once nonnative fish populations throughout the system are eradicated or effectively suppressed.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Desert dace (*Eremichthys acros*)

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
_X_ No change needed

Review Conducted By: Todd Gilmore

Date Submitted to Region 8: _____

FIELD OFFICE APPROVAL:

Lead Field Supervisor, U.S. Fish and Wildlife Service

Approve Edward D. Koch Date 3/30/12

REGIONAL OFFICE APPROVAL:

Lead Regional Director, U.S. Fish and Wildlife Service, Region 8

Approve _____ Date _____