

Warner sucker
(Catostomus warnerensis)

**5-Year Review:
Summary and Evaluation**



August 2010

**U.S. Fish and Wildlife Service
Oregon Fish and Wildlife Office
Portland, Oregon**

5-YEAR REVIEW

Species reviewed: Warner sucker (*Catostomus warnerensis*)

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5-YEAR REVIEW
Warner sucker (*Catostomus warnerensis*)

1.0. GENERAL INFORMATION

1.1. Reviewers:

Lead Regional Office:

Region 1 Endangered Species Branch, Jesse D’Elia (503) 231- 2349

Lead Field Office:

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Cooperating Field Office(s):

Not applicable

Cooperating Regional Office(s):

Not applicable

1.2 Methodology used to complete the review:

In order to conduct this 5-year review for the Warner sucker, the U.S. Fish and Wildlife Service (Service): gathered information since the time of listing, including progress reports from the Oregon Department of Fish and Wildlife (ODFW) of surveys of Warner sucker inhabited lakes and streams conducted in 2006, 2007, 2008, and 2009; reviewed activities undertaken since the time of listing to determine if recovery actions have progressed; reviewed new information regarding the status of the threats to the species; reviewed the recovery criteria in the recovery plan; and made recommendations for future actions . This review was conducted by the Oregon Fish and Wildlife Office’s Bend Field Office. The ODFW Assistant Project Leader for the Native Fish Investigation Project reviewed the draft 5-year review.

The notice of initiation of a 5-year review was published in the *Federal Register* on April 11, 2006. This notice requested any information concerning the status of the Warner sucker. An additional request for information was sent out to potential interested parties, including the working group formed for recovery plan implementation on February 8, 2008. No information was received in response to the *Federal Register* notice or the letter to potential interested parties.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

The Service announced the initiation of a 5-year review of 70 species including the Warner sucker, under section 4(c)(2)(B) of the Endangered Species Act (Act) in an April 11, 2006, *Federal Register* notice (71 FR 18345).

1.3.2 Listing History:

Original Listing

Federal Register notice: Endangered and threatened wildlife and plants; Determination that the Warner sucker is a threatened species and designation of its critical habitat (50 FR 39117-39123).

Date listed: September 27, 1985

Entity listed: The species Warner sucker (*Catostomus warnerensis*)

Classification: Threatened

Revised Listing, if applicable

Not applicable

1.3.3 Associated Rulemakings:

Warner sucker were listed September 27, 1985, with critical habitat designated. Warner sucker are included in “Special rules-fishes” in 50 CFR 17.44 (l). The rule has four parts and states:

“(1) No person shall take these species, except in accordance with applicable State fish and wildlife conservation laws and regulations in the following instances: (i) for educational purposes, scientific purposes, the enhancement of propagation or survival of the species, zoological exhibition, and other conservation purposes consistent with the Act. (ii) Incidental to State-permitted recreational fishing activities, provided that the individual fish taken is immediately returned to its habitat.

(2) Any violation of applicable State fish and wildlife conservation laws or regulations with respect to the taking of these species will also be a violation of the Endangered Species Act.

(3) No person shall possess, sell, deliver, carry, transport, ship, import, or export, by any means whatsoever, any such species taken in violation of these regulations or in violation of applicable State fish and wildlife conservation laws or regulations.

(4) It is unlawful for any person to attempt to commit, solicit another to commit, or cause to be committed, any offense defined in paragraphs (1) (1) through (3) of this section.”

1.3.4 Review History:

This is the first 5-year review for the Warner sucker.

1.3.5 Species’ Recovery Priority Number at Start of this 5-year Review:

The Warner sucker was assigned a recovery priority number of 2C. A priority number 2 means the species has a high degree of threat and a high potential for recovery. The species rank is elevated by adding the “C” designation to its numerical rank to indicate that there is or may be some degree of conflict between efforts for the species’ recovery and economic development. The conflict symbol C raises the priority number, so that 2C is a higher priority for recovery than if it were ranked 2.

1.3.6 Current Recovery Plan or Outline:

Name of plan or outline: “Recovery Plan for the Threatened and Rare Native Fishes of the Warner Basin and Alkali Subbasin”

Date issued: April 27, 1998

Dates of previous revisions, if applicable: Not applicable

2.0 REVIEW ANALYSIS

2.1. Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

Yes
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 No

2.1.3 Was the DPS listed prior to 1996?

Not applicable

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

Yes
 No

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved Recovery Plan containing objective, measurable criteria?

Yes
 No

The recovery criteria focus on delisting (see 2.2.3 below for the recovery criteria).

2.2.2 Adequacy of Recovery Criteria

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes
 No

The “Recovery Plan for the Threatened and Rare Native Fishes of the Warner Basin and Alkali Subbasin” (Recovery Plan) was finalized in 1998. New biological information on the Warner sucker and its habitat includes surveys conducted by the Bureau of Land Management (BLM) in 2001 (Hartzell et al. 2002), larval fish investigations (Kennedy et al. 2003), a study of ecological habits of early life stages (Kennedy and Vinyard 2006), and population estimates by the ODFW in 2006, 2007, 2008, and 2009 (Scheerer et al. 2006, 2007, and 2008 and Richardson et al. 2010).

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

Yes
 No

2.2.3 List the recovery criteria as they appear in the Recovery Plan, and discuss how each criterion has or has not been met, citing information:

The Recovery Plan provides information to guide recovery for three listed fish species: the Warner sucker, Hutton tui chub, and Foskett speckled dace, (USFWS 1998). The Recovery Plan states: “The primary objective for the Warner sucker is the eventual delisting of the species.” The Recovery Plan also provides objectives and criteria for conserving Warner sucker. The recovery criteria for Warner sucker are described in the Recovery Plan as:

“The Warner sucker may be considered for delisting when:

1. A self-sustaining metapopulation (a group of populations of one species coexisting in time but not in space) is distributed throughout the Twentymile, Honey, and Deep Creek (below the falls) drainages,

and in Pelican, Crump, and Hart Lakes. Self sustaining populations will be determined based on parameters such as:

- multiple age-classes, including adults, juveniles, and young of the year, which approximate normal frequency distributions,
 - a stable or increasing population size,
 - documented reproduction and recruitment, and
 - self-sustaining populations form a viable metapopulation, large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural habitat changes.
2. Passage is restored within and among the Twentymile, Honey, and Deep Creek (below the falls) drainages so that the individual populations of Warner suckers can function as a metapopulation.
 3. No threats exist that would likely threaten the survival of the species over a significant portion of its range.” (USFWS 1998, pp 40-41).

Recovery Plan Criterion 1: The Recovery plan states that specific information on Warner sucker life history and habitat requirements is necessary to determine the characteristics of a self-sustaining and viable population, and information on the extent and connectivity of habitat is needed. Specifically, the following data and research are needed to support the development of a population viability analysis: (1) abundance of young of the year, juveniles and adults of multiple year-classes in all populations, and the relationship of their abundance to climate; (2) factors influencing recruitment; (3) genetic variability; and (4) life history information.

Since the time of listing, studies have been conducted that document the range, status, abundance, and distribution of Warner sucker in stream habitat and prior to and after the desiccation of Crump and Hart Lakes (see section 2.3.1.1 and 2.3.1.2). However, because survey techniques and areas surveyed vary among the different studies conducted over the years, the results are difficult to compare.

ODFW conducted surveys of Warner suckers in the lakes and tributaries in 2006, 2007, 2008, and 2009 to obtain population and density estimates, determine distribution, document evidence of recent recruitment, and monitor trends in stream sucker distribution and abundance over time (see section 2.3.1.2). Additional population estimates will be needed before a population trend can be established (see section 2.3.1.2). The current available information is not enough to assess the population dynamics among the separate population segments to determine if there are self-sustaining populations that form a viable metapopulation.

Recovery Plan Criterion 2: Passage within and among the Twentymile Creek, Honey Creek, and Deep Creek (below the falls) has not been restored to assure that the individual populations of Warner suckers can function as a metapopulation. Although several screens have been installed, numerous impassable water diversion structures and unscreened canals exist on all major tributaries, impeding and preventing access to spawning habitat, fragmenting habitat, and separating populations (see section 2.3.2.1). In their 2007 investigations, the ODFW noted that “the presence of numerous impassable diversion dams and unscreened irrigation canals is a major obstacle to meeting recovery criteria” (Scheerer et al. 2007, p 13). These dams and canals act to fragment the habitat of Warner suckers in the basin. To accomplish recovery criteria number 2, a comprehensive screening and passage plan needs to be developed and implemented for the Warner Valley.

Recovery Plan Criterion 3: This species was listed in 1985 due primarily to the impacts to habitat through in-stream water diversions and artificial barriers which modify the habitat and prevent upstream migration and movement in and among streams, and by the introduction of exotic fish species which prey on larval and juvenile Warner sucker. Few actions have been taken to reduce these threats (see sections 2.3.1.5, 2.3.2.1, and 2.3.2.3).

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

2.3.1.1 New information on the species’ biology and life history:

The Warner sucker occurs in three stream systems and the lakes basin of the Warner Valley and a translocated population of Warner sucker at Summer Lake (see section 2.3.1.5). These populations of Warner sucker are believed to be comprised of two life history strategies in their reproductive behavior. Suckers residing in the lakes are lacustrine adfluvial or potamodromous fish which normally spawn in the streams. However, upstream migration may be blocked by low stream flows during dry water years or by irrigation diversion dams and spawning may occur in nearshore areas of the lakes (White et al. 1990 p 13). The lake suckers can become resident lake populations or migrate upstream to spawn (White et al. 1990, p 13). Lake resident suckers are generally larger than stream residents (USFWS 1998, p 18).

Suckers residing in streams inhabit and spawn in Twentymile, Honey and Deep creeks and their tributaries, and can migrate downstream and repopulate lakes that have refilled after desiccation due to drought. This life history strategy is believed to be a key survival mechanism in an area that can experience both prolonged drought which can result in drying up of the lake habitat or scouring flows which can affect the stream habitat (USFWS 1998, p18). Survey

information indicates that only stream morph suckers are exhibiting recruitment as evidenced by young-of-year and juveniles (White et al. 1990, p12, Tait and Mulkey 1993b, p 8-12, USFWS 1998, and Scheerer et al. 2006 p 13, 2007 p 12).

Although Warner sucker was first described by Snyder in 1908, limited life history information had been collected. In 1979, Coombs and Bond completed a report of the spawning and early life history of Warner sucker. Several studies were undertaken from 1990 through 2009 (White et al. 1990, White et al. 1991, Tait and Mulkey 1993a, Tait and Mulkey 1993b, Allen et al. 1994, Kennedy and Olsen 1994, Allen et al. 1995, Tait et al. 1995, Allen et al. 1996, Bosse et al. 1997, Hartzell et al. 2002, Kennedy et al. 2003, Kennedy and Vinyard 2006, and Scheerer et al. 2006, 2007, and 2008, and Richardson et al. 2010). These studies document the range, status, abundance, and distribution of Warner sucker in stream habitat and prior to and after the desiccation of Crump and Hart Lakes, lake recolonization by other native and nonnative fish, and surveys of stream characteristics (see sections 2.3.1.2, and 2.3.1.5).

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Historical data on abundance are limited; Snyder (1908) made no estimate of populations in the lakes or streams. Anecdotal accounts by long time residents of Warner Valley reported that large numbers of suckers (called “redhorse”) ascended Honey Creek in the spring and would spawn far up in the canyon (Andreasen 1975, p 45). A population estimate was attempted in 1979 by Coombs et al. (1979), but the recapture and distribution of adult suckers did not allow a dependable population estimate to be made. They were able to estimate the population of suckers in the spillway canal north of Hart Lake to be 1,316 individuals. However, the 95 percent confidence interval (CI) was 666 to 6,667 individual suckers (Coombs et al. 1979, p 17).

White et al. (1990) conducted stream and lake sampling throughout the Warner Valley to assess current distribution and status of the sucker. The largest adult sucker population was observed in Hart Lake and Twelvemile Creek, 54% and 28%, respectively, of all suckers caught (White et al. 1990, p 8). Successful spawning was observed in Hart Lake, but no recruitment was documented. Populations found in Anderson, Crump, and Pelican lakes, and Twentymile Slough showed little evidence of recruitment. White et al. (1990 p 12-13) suggested that stream resident populations in the Honey Creek drainage and Twentymile Creek drainage may provide the only significant recruitment. Larval Warner suckers were not detected despite extensive sampling at the mouths of Honey Creek and Twentymile Creek (Allen et al. 1996). A study of Warner sucker drift ecology by Kennedy and Olsen (1994, p 11), suggested that larvae do not have a propensity to drift and may instead remain in natal stream habitat (Kennedy and Olsen, 1994, p 11) for an undetermined rearing period.

Investigations by White et al. in 1991 coincided with a winter fish kill, and the fifth year of drought conditions. Age and growth studies showed a wide variation in growth rate and a maximum age of 17 (White et al. 1991, p iii). By 1992 most of the lentic habitat in Warner basin was desiccated due to the drought and resulted in the loss of many of the lake and slough resident sucker populations (Allen et al. 1994). Allen et al. (1994, 1995, and 1996) conducted investigations from 1993 through 1996 to document the rate of recolonization of Warner sucker and other native and nonnative fishes in the Warner Lakes. Allen et al. (1996) concluded that there existed a viable population of Warner sucker in Hart Lake after the period of lake desiccation. They also estimated that the distribution of suckers was expanding into the lakes to the north after discovering Warner sucker in Anderson and Flagstaff Lakes and that the presence of Warner sucker in Crump Lake, after the lakes had thoroughly dried in 1991, indicated recruitment of Warner sucker in the basin (Allen et al. 1996, pp 17 and 18).

Tait et al. (1995, p 26) estimated the population of suckers within defined reaches in Twentymile and Honey drainages. The results from their snorkel surveys are best described as density or numbers of fish per mile of stream surveyed. Within the Twentymile Creek basin they estimated 70.5 young-of-year per mile of stream surveyed; 164.0 juvenile (1+); and 72.2 adult ($\geq 2+$) suckers per mile of surveyed habitat. In Honey Creek basin they estimated 26.2 young-of-year; 21.9 juvenile (1+); and 20.2 adult ($\geq 2+$) suckers per mile of surveyed habitat (Tait et al. 1995, p 26). These results are useful estimates of density of suckers per mile, but do not estimate the population of suckers in the Warner Basin.

No surveys were conducted from 1998 through 2000; surveys were resumed in 2001. Hartzell et al. (2002) sampled lake habitat and compared relative abundance results from past surveys. A total of 183 Warner suckers were captured with 176 from Hart Lake. This represents a 7.1 percent reduction in Warner sucker abundance from the 1997 total of 197 Warner sucker (Hartzell et al. 2002, p 6). This report also describes broad changes in relative abundance of the exotic fish present in the Warner Lakes basin (see section 2.3.2.3).

In 2006 ODFW conducted investigations to quantify the abundance of Warner suckers, to document recruitment, and to estimate abundance of Warner suckers relative to nonnative fish abundance. In addition, Warner suckers were tagged with Passive Integrated Transponders (PIT) to determine growth rates and movements, and radio tagged to document seasonal spawning migration. The 2006 surveys focused on lake dwelling Warner sucker and documented similar distribution of Warner sucker described in earlier investigations by Coombs and Bond (1980), and White et al. (1990 and 1991). Additionally, ODFW attempted to estimate the population of Warner sucker in Crump Lake and Hart Lake using a statistically-based sampling procedure. The number of Warner sucker recaptured in the lakes was not sufficient for a valid mark-recapture population estimate (Scheerer et al. 2006, p 6). The 2006 surveys were dominated by large sized,

older suckers, and ODFW did not find evidence of substantial recruitment of suckers (Scheerer et al. 2006, p 13).

Although a population estimate was not obtained in 2006, a comparison of the catch per unit effort for trap netting at Hart Lakes in 2006 is the lowest on record. Compared to 2001, the last year a substantial effort was made to net fish in Hart Lake, the number of Warner sucker catch per unit effort (CPUE) decreased approximately 90 percent (Scheerer et al. 2006, p 12). The catch rate for Crump Lake was highest on record, but the CPUE was still quite low (Scheerer et al. 2006, p 6). However, ODFW acknowledged that comparing the 2006 CPUE estimates with past estimates may be misleading if the past sampling techniques did not occur during similar spring months (Scheerer et al. 2006, p 6).

The ODFW found that: (1) minimal recruitment is believed to have occurred in recent years because the majority (91%) of the suckers captured was larger than 250 mm (8.84 inches) fork length (FL); and (2) the average length of suckers has increased substantially since 1994 (Scheerer et al. 2006, p 7). The ODFW concluded that the population of Warner sucker in Crump and Hart Lakes is severely depressed (Scheerer et al. 2006, p 12).

In 2007, ODFW conducted investigations of Warner basin tributaries to describe the current distribution of stream resident populations of Warner sucker and to quantify their abundance. Access through private lands to sample the streams was limited and only a fraction of the desired sample sites were actually surveyed. The 2007 population estimate for the streams of the entire Warner basin was 6,852 Warner sucker for fish larger than 60 mm (2.36 inches) fork length (FL) (95% CI: \pm 92%) (Scheerer et al. 2007, p. 9). Because of the patchy distribution of Warner sucker (as described in section 2.3.1.5) in the streams and the presence of a few sites with high sucker densities, the abundance estimates had low levels of precision (Scheerer et al. 2007, p 12). Additional population estimates will be needed before a population trend can be established.

Samples also showed an irregular distribution of age classes. This is not uncommon for stream fishes where the younger age classes are very abundant. Warner sucker ranged in size from 22 mm (0.87 inches) to 330 mm (12.99 inches) FL with the majority (85 %) less than 100 mm (3.94 inches) FL and only a few (2%) larger than 200 mm (7.87 inches) FL (Scheerer et al. 2007, p 5). Warner sucker mature at 3 to 4 years at a length of 130 mm (5.12 inches) to 160 mm (6.30 inches) FL (Coombs et al. 1979, p 33). Most of the suckers collected were estimated to be less than one year old (Scheerer et al. 2007, p 5). The ODFW was uncertain if the scarcity of suckers less than 30 mm (1.18 inches) FL was due to low reproduction in 2007, or due to an inability to effectively sample small size suckers using backpack electrofishing equipment (Scheerer et al. 2007, p 5).

In 2007, the ODFW also obtained a mark-recapture population estimate of adult Warner suckers at the Summer Lake Wildlife Area. This population resulted

from natural production of adult suckers that were moved to the irrigation canal at the Wildlife Area when the Warner Lakes desiccated during the 1992 drought (see section 2.3.1.5). The population estimate was 142 fish (95% CI: 91-218) in the ditch that extends from the well head to the gated culvert (Scheerer et al. 2007, p 9).

In 2008, ODFW resumed survey work in the lake habitats of Crump and Hart Lakes (Scheerer et al. 2008 p 1). An additional attempt at a mark-recapture estimate was conducted but was not completed because only one Warner sucker was recaptured. However, an estimate of Warner sucker in Hart Lake was completed based on the recapture of Warner sucker marked in 2006. ODFW estimated 565 Warner suckers larger than 155 mm (6.10 inches) FL (95% CI: 250-1,114; 56-97%), and assumed a 33 percent mortality rate over the two year period between marking and recapture (Scheerer et al. 2008, p 4). Additionally, ODFW did not find evidence of substantial recruitment of suckers.

In 2009, the mark-recapture population estimate for 21.3 km (13.23 miles) of streams within the Twentymile Creek drainage was 4,612 Warner suckers (95% CI: 3,820-5,567) (fish larger than 59 mm, 2.32 inches FL). The 2009 estimate of adult Warner suckers (>159 mm, 6.23 inches FL) was 1,169 fish (95% CI: 969-1,412) (Richardson et al. 2010, p 8). In addition, 421 Warner suckers were PIT tagged, adding to the 86 tagged in 2007-2008 (Richardson et al. 2010, p 11). Recapturing of these tagged fish will be useful to assess movement patterns and growth rates in future years.

The ODFW also obtained a mark-recapture population estimate of adult Warner suckers at the Summer Lake Wildlife Area in 2009. The population estimate was 660 fish (95% CI: 421-1,024), up substantially from the 2007 estimate of 142 fish. Suckers ranged in size from 40-270 mm (1.57-10.63 inches) FL. The 2009 size distribution was broader than the distribution in 2007 (90-220 mm, 3.54 -8.66 inches FL) (Richardson et al. 2010, p 22). The presence of smaller, presumably younger fish recruited into the population, may explain the larger population size observed in 2009.

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

No genetic research has been done on this taxon. Tissue samples have been collected and a proposal by the Abernathy Fish Technology Center has been submitted for future analyses but has not yet been funded.

2.3.1.4 Taxonomic classification or changes in nomenclature:

At the time of listing, the Warner sucker was considered to be the species *Catostomus warnerensis*. Warner sucker was first described by Snyder in 1908. Snyder examined morphometric and meristic characters in samples from Deep

Creek (previously referred to as Warner Creek) in south-central Oregon. He determined that the morphometric and meristic data supports classification of Warner sucker as a distinct species. Andreasen (1975) studied the systematics of several suckers in southern Oregon and affirmed the distinction of Warner sucker and verified the Warner sucker as a distinct species. No additional studies on the taxonomy of the species are known.

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g., increasingly fragmented, increased numbers of corridors), or historic range (e.g., corrections to the historical range, change in distribution of the species' within its historic range):

The Warner sucker is endemic to the Warner Basin in southeastern Oregon, northeastern California, and northwestern Nevada. The historic range of Warner sucker includes the basin's three permanent lakes, Hart, Crump, and Pelican; the ephemeral Anderson, Swamp, Mugwump, Flagstaff, Upper Campbell, Campbell, Stone Coral, and Bluejoint Lakes; and all the sloughs and canals connecting these lakes. Warner sucker also reside in the three major stream basins which are tributaries to these lakes (Deep Creek, Twentymile Creek, and Honey Creek). The southernmost known distribution of Warner sucker is in the upper reaches of West Barrel Creek in California. In 2001 Scoppettone and Rissler (2003, p 7) captured a single Warner sucker in West Barrel Creek while sampling for Cowhead tui chub (*Gila bicolor vaccaceps*). Discovery of the single fish indicates a connection to the lower Warner sucker inhabited reaches of Twelvemile Creek located approximately 8 kilometers (4.97 miles) downstream. The northern limit of known distribution is the waterway connecting Lower Campbell Lake and Turpin Lake (Bosse et al. 1997, p 12).

Occupied habitat is estimated to be 54.72 kilometers (34 miles) of stream and three lakes as primary habitat for Warner sucker (FR 50, 188, pp 39122-39123, 1985). Critical habitat designated at the time included 69.20 kilometers (43 miles) of stream habitat including 15.24 meters (50 feet) on either side of the stream. Although the lakes comprise over 24 square miles of open water habitat, the lakes are prone to desiccation on a regular basis due to climate and weather cycles; therefore the area of lake habitat is typically less than the total area of the lakes. The lakes to the north of Hart Lake are occupied by Warner sucker when there is ample water flowing north for continuing years. These lakes are prone to desiccation more frequently than Crump, Hart, and Pelican Lakes.

An additional stream channel at the Summer Lake Wildlife Area in the Summer Lake Basin provides alternate habitat for Warner sucker. In 1991, Warner sucker were salvaged during the drying period to establish a refugial population. The drought at that time resulted in the complete desiccation of the lakes in the Warner basin. Suckers were transported from Hart Lake and were to be transported to the Dexter National Fish Hatchery for long term holding and possible experimental propagation to determine if Warner sucker can be reared in a hatchery. Because of a delay in the transportation, seventy five suckers were

temporarily held in an irrigation canal at the Summer Lake Wildlife Area. All 75 Warner sucker were collected from the ditch and transported to the Dexter National Fish Hatchery (all subsequently died) (White et al. 1991 p 10). The following year larval Warner sucker were observed in the ditch, apparently the progeny of the adult suckers temporarily stored there (White et al. 1991 p 10). The population at Summer Lake continues to persist (see section 2.3.1.2).

The results of the 2007 stream investigations conducted by ODFW indicate that the sucker populations in Warner basin tributaries have patchy distributions (Scheerer et al. 2007, p 5). At locations where Warner suckers were collected, densities were typically low. Survey results were similar to results from a previous stream assessment of Warner suckers, obtained in 1994 (Tait et al. 1995). Tait et al. (1995) also found sucker distribution to be patchy and densities to be relatively low. Both the ODFW 2007 survey and the survey conducted in 1994 (Tait et al. 1995, pp 8, 11-12) documented relatively high sucker numbers in lower Twelvemile Creek. Different methods were employed in 1994 (snorkel surveys) than in 2007 (multiple-pass electrofishing), thus actual density estimates are not directly comparable.

The surveys conducted in 2007 were more comprehensive than the previous surveys, which enabled a better description of current Warner sucker distribution and to identify additional areas of relatively high sucker abundance. The 2007 surveys documented a broader distribution of both adults and juvenile Warner suckers in the Honey Creek and Twentymile Creek drainages. In addition, both adult and juvenile Warner suckers were documented in lower Deep Creek. In 2006, ODFW surveyors noted that adult Warner suckers which were radio tagged in Crump Lake moved into lower Deep Creek during the spawning period (Scheerer et al. 2006). This observation suggests that lower Deep Creek may serve as important sucker spawning and rearing habitat.

In 2009, ODFW conducted an investigation of the population of Warner sucker in Twentymile Creek subbasin. Results of the surveys provided information on current sucker distribution. Most of the suckers were found between the Dyke diversion and the canyon reach (3,786; CI = 3,112-4,603) (Richardson et al. 2010, p 8). A large proportion of the suckers had parasites and/or lesions (>60%). Most parasites were fish lice (*Lernaea* sp.) (Scheerer 2009b, pers. comm.).

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

The Warner sucker's habitat is limited primarily to the three stream basins and lakes in Warner Basin as described above (see section 2.3.1.5). The Warner basin is a closed basin with no outflow and is located between two large fault blocks, Hart Mountain to the east and the Warner Mountains to the west (Allen et al. 1994, p 3). The drainage pattern of the basin tends south to north (White et al. 1991, p 1), with the small ephemeral lakes to the north being last to fill from

runoff in the spring. The floor of the valley encompasses a chain of shallow lakes, marshes, sloughs, potholes, and irrigation ditches. Although all the lakes in the basin are subject to desiccation, the three most permanent lakes are Crump Lake, Pelican Lake, and Hart Lake (White et al. 1991, p 1). The rest of the natural lakes are located to the north and flood only on years with ample water supply from run-off.

Crump and Hart Lakes provide habitat for Warner sucker throughout the seasons and years when water is retained in the lakes. Both lakes desiccate naturally on an irregular cycle. During the times of drying, the lake habitat is diminished or eliminated. Although the ephemeral cycle of the valley is natural, it has likely been aggravated by degradation of watershed conditions by a variety of human activities. Much of the irrigated land in the Warner Valley is managed for flood irrigation accomplished by diverting water from tributary streams using diversion dams, weirs, headgates, and lateral ditches (White et al. 1991, pp 1 and 2).

In years with ample water runoff, the amount of water diverted from streams would be only a portion of the total flow, but in drought years, the total stream flows do not meet the demand for existing water rights, so the entire stream flow may be diverted by the irrigators (USFWS 1998, pp 27-28). Over a series of droughts, reduced flows can cause the lake levels to drop, and in conjunction with pumping of water from the lake, result in complete drying of Hart Lake (USFWS 1998, pp 27-28). Irrigation practices can also cause sudden and drastic changes in water level in the lower reaches of the streams, thereby stranding fish in the streams, sloughs and lakes at the time of low flow (USFWS 1998, p 28).

Introduction of exotic fish for sport fishery drastically altered the lake environment and the ability for both Warner sucker and Warner redband trout to survive in the lakes. Crump and Hart Lakes were stocked with non-native fish for sport recreation in the early 1970's. Introduced fish include white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), brown bullhead (*Ameiurus nebulosus*), and largemouth bass (*Micropterus salmoides*) (see section 2.3.2.3). Introduction of these non-native piscivorous fish is thought to have sharply curtailed the successful recruitment to lake populations of Warner sucker (Williams et al. 1990, p 247). In addition to the Warner sucker, native fish present in the lake include tui chub (*Gila bicolor*) and a few redband trout (*Oncorhynchus mykiss*).

Possible benefit from the lakes drying is the severe depletion of the introduced game fish in the lakes and sloughs throughout the Warner Valley (White et al. 1991, p 14). Post drought, the lakes refill and fish begin to repopulate the lake habitat. Allen et al. (1994, p 2) studied the recolonization rates of Warner sucker and other fishes in the Warner Lakes. After the desiccation of the lakes in 1992, an abundant snowpack and wet spring in 1992 allowed most of the lakes in the Warner basin to refill. A monitoring study was implemented to determine the distribution, abundance and rates of recolonization of fish species which survived

the drought. Although the lakes were dry for an extended period of time, all species survived and repopulated the lakes. Allen et al. (1994 p. 7) concluded that Warner sucker were able to recolonize the lakes from the tributary streams (Twentymile, Deep, and Honey creeks) and that any lake population of Warner sucker is not likely to sustain itself as a strictly lake population (Allen et al. 1994, p 8).

Prior to the lakes drying in 1992, total fish captured during sampling of the Warner lakes was dominated by nonnative fishes, with white crappie being the most abundant nonnative fish captured. For several years following the drought in the early 1990's, native fishes dominated the catch, with tui chub being the most abundant native fish captured. Since 1997, nonnative fish have become reestablished and dominate catch records of sampling done since then (Scheerer et al. 2008, p 22).

Mortality of Warner sucker as a result of drought or winter kill, in conjunction with the barriers to outmigration, may limit the ability of the Warner sucker population to rebound after the lakes desiccate. The lake populations are dependent upon stream dwelling fish to recolonize the lakes as they did after the droughts of the 1930s. Currently, any out migrating Warner suckers would be imperiled by predation by introduced game fish and the possibility of being entrained into irrigation ditches (White et al. 1991, pp 13-14).

2.3.1.7 Other:

The State of Oregon enacted an Endangered Species Act (Oregon ESA) in 1987 and amended it in 1995. The Warner sucker was State listed as threatened as part of the original enactment of the Oregon ESA in 1987. See section 2.3.2.4 for a description of the Oregon ESA.

In 2002, the Oregon Fish and Wildlife Commission adopted the Native Fish Conservation Policy to ensure conservation and recovery of native fish in Oregon. As part of this policy, interim risk assessments were completed for selected native fish species in 2005. Warner sucker were not included in the status assessment (ODFW 2005). Although the ODFW Native Fish Status Report did not include an assessment of Warner sucker, the state defers to completed recovery plans if the species is listed under the federal Endangered Species Act, and likely would not complete an additional plan unless they find a specific need to cover actions of the State (S. Miller 2009 pers. comm.).

In 2006, the ODFW finalized their Oregon Conservation Strategy (Strategy) (ODFW 2006). The Strategy is an overarching State-wide approach for conserving fish and wildlife through the use of voluntary measures and collaboration. The Warner sucker is a "strategy species" for the Northern Basin and Range Ecoregion in southeast Oregon. Strategy species include rare and at risk species. The Strategy identifies species requirements, limiting factors, data

gaps, and actions needed to conserve these species. Limiting factors for the Warner sucker described in the Strategy are invasive species, forest and agricultural practices, road construction, irrigation structures which impede passage, and water withdrawals resulting in minimal flows in stream habitat and lower lake levels. The Strategy identifies that data gaps include information on genetics and long term habitat needs for self sustaining populations and information on spawning habitat. According to the Strategy, needed conservation actions include: 1) maintain or restore spring waters; and 2) maintain or restore migration corridors among habitats.

In 2007 the Corps of Engineers (Corps) constructed a nesting island in Crump Lake at the location of an eroded natural island for Caspian terns (*Sterna caspia*) to accommodate displaced Caspian terns from the nesting islands in the Columbia River estuary. The purpose of the island construction project was to provide an alternate nesting site for Caspian terns and to reduce Caspian tern predation on juvenile salmonids, while ensuring the conservation of the Caspian tern.

This project was determined to adversely affect Warner suckers through increased predation by Caspian terns resulting from the increase in nesting habitat. The Corps consulted under section 7 of the Endangered Species Act. In our biological opinion, the Service determined that the proposed action would not likely jeopardize the continued existence of the Warner sucker. It was estimated that 21 Warner suckers may be taken annually due to predation by a colony of an estimated 300 pairs of nesting Caspian tern (USFWS 2005).

Terms and conditions of the biological opinion require the Corps to monitor the Caspian tern nesting colony to determine the actual amount of predation on Warner sucker. During monitoring of the newly established nesting colony at Crump Lake in 2008, monitors observed at least one Warner sucker taken as forage by the nesting Caspian terns. The Corps notified the Service that based on monitoring surveys, they documented observations of five suckers in bill loads of Caspian terns, one of which was confirmed as a Warner sucker by the presence of a floy tag implanted by ODFW. Four additional suckers were also foraged on and brought back to the island colony. It is likely that the suckers are Warner suckers due to the proximity of the foraging area to Warner sucker occupied habitat. Some uncertainty has been presented as to the positive identification as Warner sucker as Caspian terns may be foraging as far away as the Goose Lake basin, where other species of sucker are present, approximately 54.72 kilometers (34 miles) to the west of Crump Lake (Corps 2009).

The Corps determined that the number of Warner sucker taken during the first year of nesting likely exceeded the take of 21 Warner sucker permitted by the biological opinion. Therefore, the Corps has reinitiated formal consultation and continues to gather more information on predation on Warner sucker by Caspian terns.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

Diversion Structures and Fish Passage:

The 1985 listing rule noted that water diversions exist on all streams occupied by the Warner sucker and that these barriers and diversion structures have blocked the movement of suckers into spawning streams, particularly during periods of low flow. During periods of low flow all water is often diverted (FR 50 no. 188, pp 39119-39120).

Irrigation diversion structures constructed throughout the Warner Valley in the late 1930's were the first large scale impact to Warner sucker. There are water diversion structures on all major tributaries (Twentymile, Honey and Deep Creeks). Stern (1989) assessed the water diversion structures in Warner Valley; these included four cement dams with permanent retaining walls, approximately nine wooden weirs, five outlets running underneath the roadway along the north end of Hart Lake, and two spillways (one adjacent to the Greaser Reservoir dam, and one adjacent to the Hart Lake outflow dam/weir).

In Twentymile Creek, fish passage is needed at the Cahill/MC diversion and Greaser Reservoir dam (Stern 1989). Passage at the Greaser Reservoir dam would have limited benefit to Warner sucker, as the reservoir is not spilled on a regular basis and there is little opportunity for Warner sucker to negotiate an upstream passage from Crump Lake to Greaser Reservoir. The Dyke diversion on Twentymile Creek has a fish ladder, but is likely not suitable for passage of Warner sucker (Scheerer 2008, p 5). The ladder was installed at a steep angle typically used for salmonid passage, which may be too difficult for suckers to negotiate.

In Deep Creek, there is an impassable waterfall upstream approximately 8 kilometers (5 miles) west of Adel which is believed to be the upstream extent of Warner sucker distribution. Fish passage is also not provided at a concrete spillway/dam south of Adel. The O'Keefe/Cleland diversion on Deep Creek has recently been screened. Additional work is needed to construct fish passage at the site. There are seven diversions/impoundment structures within a two mile segment of Honey Creek. Stern concluded that upstream fish passage is critical for the Warner sucker in Honey, Twentymile and Deep creeks (Stern 1989).

The use of the diversion structures for irrigation in March generally coincides with the spring spawning run for Warner sucker (Stern 1989). Warner sucker have been able to persist, despite the diversion structures with no fish passage mechanism, either because they migrate upstream early in the spring prior to the

installation of boards used to raise the level of the water in the stream to diversion canals (USFWS 1998, p 27) or they are recruited into the lakes from successful spawning in the tributary streams. The result has been fewer fish are able to make the upstream migration during the artificially shortened migration period, especially in years of low stream flow (USFWS 1998, p 27). In addition to blockage of the stream channels to migrating fish, the irrigation diversions also impact young-of-year, juvenile, and post-spawn suckers moving downstream from spawning sites. Small fish are susceptible to moving down the irrigation canals, and getting trapped, unable to return to the stream. If the canals are drained as the result of irrigation practices attempting to use all the water in the canal or ditch, the fish entrained into the irrigation canal are likely trapped (USFWS 1998, p 27). Most likely, trapped fish will not survive through the end of the irrigation season.

In 1994, the ODFW contracted for an evaluation of fish passage at water diversions in Honey Creek (Campbell and Craven 1994). The report inventoried and made recommendations for passage and screening at eight diversion structures previously identified by Coombs and Bond (1980). White et al. (1990) also discussed passage problems at irrigation diversion throughout the Warner basin and suggested fish passage devices to be installed at several irrigation diversions.

Many irrigation diversions remain unscreened and passage structures at the irrigation diversions are lacking or do not adequately address sucker passage needs. A fish ladder was installed in cooperation with the BLM and private landowner at the Dyke diversion on Twentymile Creek (Stern 1989). The fish ladder at the Dyke diversion is a Denil steep-pass design. During the investigation conducted by ODFW in 2008, the trap on the fish ladder was operated from April 18, through June 17, 2008. No fish were captured in the trap (Scheerer et al. 2008, pp 4-5). Previously, the fish trap was run during the spring months in 2001 to assess redband trout passage in Twentymile Creek (ODFW 2001). During the trapping investigation, no Warner suckers were observed passing up the ladder. Recent studies of other sucker species show that a shallower slope and a design using vertical baffles to slowdown the waterflow, rather than vertical drops is needed for suckers to negotiate up-slope (Mefford et al. 2001, p 7). A thorough evaluation of the ladder is needed to determine if the passage structure meets current knowledge of sucker passage requirements and the state of the art for fish passage facilities.

In 2007, a screen was installed on one of the Deep Creek irrigation diversions; a small screen was installed on upper Honey Creek above Warner sucker distribution. From 2005 through 2007, NRCS assisted local landowners to install several spray type screens on lateral withdrawal points along the “main drain” irrigation canal in the Twentymile Creek watershed. Recently a passage structure was designed and constructed by the Service’s Partners for Fish and Wildlife Program in cooperation with ODFW for one of the upstream irrigation diversions

on Honey Creek. An additional fish passage and screening project has been identified on the Taylor Ranch middle diversion on Honey Creek and will be completed in Fall of 2010.

Stream Habitat:

The 1985 final listing rule states that “In addition to water diversions, channelization of streams and overgrazing have disturbed soils in the watershed and degraded streams even further by allowing siltation of gravel beds normally used for spawning”. The Recovery Plan completed in 1998 (USFWS 1998) reported that streams in the Warner Basin exhibited signs of degradation such as cut stream banks, damaged riparian zones, bare stream banks, large sagebrush flats which replaced wet meadows, springs with reduced riparian vegetation, and increased sedimentation. Since the time of listing, Federal agencies including Bureau of Land Management and the Forest Service have taken actions to reduce grazing and watershed impacts to Warner suckers and designated critical habitat.

The BLM responded to the listing of Warner sucker by modifying grazing allotments with potential to impact Warner sucker or its designated critical habitat in recognition that livestock trampling of stream side riparian vegetation could have a negative impact on Warner sucker. The BLM consulted on grazing allotments and modified allotments to either preclude cattle by building enclosure fences, or to set standards and monitor to ensure those standards are met in riparian areas of streams tributary to occupied habitat.

After implementation of changes to the grazing management in the Warner basin, the BLM completed a ten year long monitoring program of stream conditions of the Warner basin from 1997-2007. The report summarizes stream conditions over a ten year period and concludes that exclusion of livestock and management prescriptions has been effective at improving vegetative and channel conditions, although it stated that “there is still room for improvement” (Munhall 2007, p 3).

Recovery of riparian conditions has been hindered in some reaches of stream due to unauthorized use of allotments and excluded areas, and exceedence of authorized use periods, numbers, and rangeland utilization standards (Munhall 2007, p 1). The report also identifies roads and road maintenance as impacting stream conditions by confining and cutting off floodplains and contributing excess sediment to streams. Many remaining degraded stream conditions are the result of watershed level affects from water withdrawal, channelization, logging, and road construction (Munhall 2007, p 1). The report provided management recommendations including the need for instream work along some reaches to stabilize banks, rock placement to create pools, and stabilization of the channel around the Twelvemile O’Keeffe diversion to prevent a head cut. The report also stated that the Nevada reach of Twelvemile Creek could benefit from bank stabilization or stream habitat improvement projects (Munhall 2007, p 3).

The Fremont-Winema National Forest (Forest) implements cattle grazing management via allotments in tributaries upstream of occupied Warner sucker habitat. The Forest modified grazing practices to implement standards that limit the utilization of riparian vegetation along streams tributary to Warner sucker inhabited streams or streams designated as critical habitat (USDA 1997 and 2007). In 2007, after following the terms and conditions of a biological opinion and monitoring their activities for ten years, the Forest re-evaluated the effects to Warner sucker and determined that the grazing activities currently are “not likely to adversely affect Warner sucker, their habitat, or designated critical habitat” (USDA 2007 p 54). The conclusion of the assessment was based on current stream habitat assessments and the past use of strict utilization standards on allotments previously determined to negatively affect Warner sucker habitat (USDA 2007 pp 54-57). The Service concurred with the Forests’ determination based on improved habitat quality, key elements in the grazing program to ensure use levels that maintain a proper functioning condition on an upward trend, and annual effectiveness monitoring.

Lake Habitat:

In addition to the occupied stream habitat, Warner sucker also inhabit the lakes of Warner Valley. Observations by White et al. (1990, p 12) indicate that Warner suckers grow larger in the lake environment than in the streams. The lake habitats are subject to drying during recurring periods of drought (see section 2.3.1.6). Presumably when the lake habitat desiccates to the point where it no longer supports the Warner sucker, the lake morph is lost and the stream morph persists. When the lakes refill, the lakes are repopulated by stream morphs invading from the tributary streams (USFWS 1998, p 17), sloughs, and canals that did not go dry. The lakes therefore represent a more productive, but less stable environment for Warner sucker to use on an opportunistic basis (USFWS 1998, p 17).

Habitat fragmentation and degradation due to agricultural development and the placement of irrigation structures in spawning streams are in part responsible for the decline in abundance and distribution of Warner sucker (Williams et al. 1990, p 247). Water flowing to the lakes in Twentymile, Deep, and Honey Creeks is diverted for irrigation purposes. Diversion of water from the streams tributary to the lakes reduces the amount of water available to flow into the lakes. Although there is some return flow from the irrigated fields, there is a net loss from transpiration and evaporation of water used for irrigation. Hart Lake is also used for irrigation. Water users pump water directly out of the lake. The irrigation practices, and in particular, pumping of water out of Hart Lake contributes to more rapid and frequent desiccation of the lake.

Additionally, the introduction of exotic fish for a sport fishery significantly altered the lake environment and the ability for both Warner sucker and Warner redband trout to thrive (USFWS 1998, p 29).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

The original listing of 1985 stated: “There is no evidence to suggest overutilization of the Warner sucker for any of these purposes.” No information is available to change this statement.

2.3.2.3 Disease or predation:

The original listing of 1985 stated: “Exotic centrarchid (sunfishes and freshwater basses) and ichtalurid (catfishes) fishes have been stocked into lakes in the Warner Basin. Large centrarchids and ichtalurids are capable of preying on Warner suckers. Of particular concern are large numbers of crappie (*Pomoxis spp.*) in Hart and Crump Lakes. Exotic fishes also may introduce new parasites and disease organisms to which the sucker may be susceptible. Exotic salmonid fishes (trout) introduced into the streams may also exert predation pressures.”

Threats related to predation by nonnative fish continue to affect Warner sucker in the lake habitats of the Warner basin and in the lower reaches of the tributary streams. Exotic fish were first introduced into the lakes of the Warner Valley between 1971 and 1973 (White et al. 1990, and 1991). In addition to competing for resources such as food and shelter, the introduced fish are also piscivorous, and likely to feed on eggs, embryos, larval, and juvenile Warner sucker (USFWS 1998, p 29). Introduced fish include white crappie, black crappie, largemouth bass, brown bullhead, and brook trout (*Salvelinus fontinalis*).

White et al. (1990, p 17) found that all lacustrine habitats in the Warner Valley are dominated by introduced fish species to the extreme detriment of the native fish. Although the lakes dried in the early 1990s, when the water returned, the exotic fish were still present and their populations increased as the waters rose (Allen et al. 1994, p 7). Prior to the lake drying in 1992 Crump and Hart Lakes were dominated by nonnative fish. For a number of years after the drought, native fish, primarily tui chub, were the most abundant fish found in sampling efforts. Since 1997, introduced nonnative fishes dominated the fish fauna of the lakes. ODFW investigations in 2006 documented that nonnative fish (White crappie, Black crappie, juvenile crappie, Largemouth bass and Brown bullhead) made up 72% of the fish captured in Crump and Hart Lake (Scheerer et al. 2006, p 10). Only 114 Warner sucker and six Redband trout were captured.

It is likely that piscivory of Warner sucker in the lakes, primarily by white crappie, black crappie, and brown bullhead, has had a significant effect of reducing or eliminating young-aged Warner sucker from the lake populations leaving only the larger suckers. Although suckers may spawn successfully, the resulting offspring are not likely to survive predation and live to reproductive age.

No Federal, State, or private management plan, contingency plan, or on-going monitoring program is in place to limit, eliminate, or monitor extent of known exotic species, nor is there any plan in place to address future invasive species introductions.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

The 1985 listing rule stated: “Oregon State law provides protection against taking of the Warner sucker by requiring a collecting permit, but the State has no provision for the protection of habitat.”

Oregon Endangered Species Act:

The Warner sucker was listed as threatened by the State of Oregon as part of the original enactment of the Oregon ESA in 1987. The Oregon ESA prohibits the “take” (kill or obtain possession or control) of listed species without an incidental take permit. The Oregon ESA applies to actions of State agencies on State-owned or leased land, and does not impose any additional restrictions on the use of private land (ORS 496.192). Under the Oregon ESA, State agencies (other than State land owning or managing agencies) determine the role they may serve in contributing toward conservation or take avoidance (OAR 635-100-0150).

The Oregon ESA also directs that Survival Guidelines (OAR 635-100-0130 and 0135) or an approved endangered species management plan (OAR 635-100-0140) be prepared. Because the Warner sucker was State-listed prior to these 1995 amendments, these requirements do not apply to the Warner sucker. The Oregon ESA regulates the “take” of Warner sucker, but does not directly regulate or restrict activities that affect Warner sucker habitat that is located on private land. Much of the Warner Valley floor is privately owned, with the exception of the larger lake beds which are property of the State of Oregon. The foothill and upland areas of the valley are mostly publicly owned with most of the lands divided between the BLM, Forest Service, and the Fish and Wildlife Service (White et al. 1991, p 2). Therefore, no protection of the habitat is included in the State ESA designation and no State management plan exists for the species.

The State of Oregon’s Native Fish Conservation Policy calls for conservation and recovery of native fish in Oregon. The policy is implemented through the development of collaborative conservation plans for individual species management units and then adopted by the Oregon Fish and Wildlife Commission. The ODFW has not conducted a risk assessment for Warner sucker. The Native Fish Conservation Policy does not provide regulatory protection for Warner sucker, and changes in management cannot be required on private land. The State has not initiated any additional conservation planning for Warner sucker.

Oregon Water Law:

Under Oregon law, all water is publicly owned. Water users must obtain a permit or water right from the State of Oregon. Oregon water laws are based on the principle of prior appropriation. Under the prior appropriation doctrine, the water right authorizes diversion of water only to the extent water is available and beneficially used. The water right priority date determines who gets water in a time of shortage.

In high water years, the amount of water diverted from Honey Creek, Twentymile Creek, and Deep Creek may be only a portion of the total flow, but in drought years, total stream flows often do not meet existing water rights, and so entire streams may be diverted (USFWS 1998, pp. 27-28). Over a series of drought years, reduced flows, and irrigation water diversion can cause drops in lake levels and in conjunction with lake pumping for irrigation can cause the lakes to dry up ((USFWS 1998, p 28).

In 1987, the State of Oregon added “instream water rights” as a beneficial use. Instream water rights establish flow levels to remain in a stream for protecting fish, minimizing the effects of pollution, or maintaining recreational uses (ORS 537.322 -537.360). Oregon Administrative Rule 635-400-0000-0040 establishes the methodologies for ODFW to apply for instream water rights. Instream water rights establish flow levels to remain in a stream and have a priority date and are regulated in the same way as other water rights. Under Oregon law, an instream water right cannot affect a use of water with a senior priority date. Oregon water law allows water right holders to sell, lease, or donate water rights to be converted to instream water rights. At this time there are no instream water rights for occupied Warner sucker habitat in the Warner Basin.

Oregon Fish Passage and Screening Statutes:

Oregon regulations regarding fish screening and by-pass devices for water diversions or obstructions (OAR 498.301-346) state that any person who diverts water in which fish subject to the State Fish and Wildlife Commission’s regulatory jurisdiction exist may be required to install, operate and maintain screening or by-pass devices to provide adequate protection for fish populations (OAR 498.306). The ODFW has established a cost-share program to implement the installation of screening or by-pass devices. The installation of a screening or by-pass device may be required only under certain criteria including: a) the water diversion is 30 cubic feet per second or more; b) a new water right is issued for the water diversion; c) the point of water diversion is transferred; d) ODFW receives fewer than 150 requests for installation of screens on diversions in a biennium; or e) the Fish Screening Task Force requires installation of screening or by-pass to complete the screening of a stream system or reach. Implementation of the Oregon screening and by-pass program is predominantly on a voluntary basis unless there is a new water right, change in water right, or permit status which

may include a fish screening requirement as a condition of the water right. See section 2.3.2.1 regarding existing screened and unscreened diversions within occupied Warner sucker habitat.

Oregon State policy requires upstream and downstream passage at all artificial obstructions in Oregon waters in which migratory native fish are currently or have historically been present (except under certain defined circumstances) (ORS 509.580-910 and OAR 635-412-0005-0040). Consistent with the Oregon Plan, ODFW seeks cooperative partnerships to remedy fish passage problems. The “triggers” requiring addressing fish passage are installation, major replacement, a fundamental change in permit status, or abandonment of the artificial obstructions. Addressing fish passage requirements includes obtaining one of the following: 1) ODFW approval for a passage plan; 2) a waiver from providing passage; or 3) an exemption for providing passage. Waivers for fish passage requirements are granted if it is determined that mitigation proposed by the applicant provides a net benefit to native migratory fish. Exemptions from fish passage may be granted if it is determined that the lack of fish passage has already been mitigated, a legal waiver has been granted, or there is no appreciable benefit to native migratory fish.

ODFW maintains a statewide inventory of artificial obstructions, in order to prioritize enforcement actions based on the needs of migratory fish (ORS 509.585). The prioritization shall include, but is not limited to the degree of impact of the artificial obstruction on native migratory fish, the biological status of the native migratory fish stocks, and any other factor established by ODFW by rule. Priority artificial obstructions are subject to the State Fish and Wildlife Commission’s authority as provided in ORS 509.625. The Commission may order a person owning or operating a lawfully installed obstruction on the priority list to install fish passage or to provide alternatives to fish passage if the Commission can arrange for nonowner/nonoperator funding of at least 60 percent. This provision is infrequently used and the program is primarily implemented through the above identified “triggers” or on a voluntary basis. Within the Warner Basin one passage obstruction on Honey Creek is listed on the existing Statewide Fish Passage Priority List as a medium priority. The priority list is in the process of being updated and ODFW plans to finalize the new list at an upcoming Commission meeting in 2011 (Apke 2010, pers. comm.).

2.3.2.5 Other natural or manmade factors affecting its continued existence:

The 1985 listing rule stated: “Any prolonged drought will hasten the demise of the Warner sucker if all or most of the water in the streams is diverted. During the 1930’s and early 1960’s, Hart and Crump Lakes were almost dry. During such times, maintenance of adequate stream habitat is critical to survival of the species and any diversion of stream flow would be particularly detrimental. The reduced numbers of populations and individuals make this species especially susceptible to any natural or manmade factors that adversely affect it.”

Warner suckers remain vulnerable to prolonged drought, particularly desiccation of lakes from drought and irrigation use and the drying or reduced stream flow of stream channels from irrigation water removal. Although the Warner sucker recolonized the lake habitat after the desiccation of the lakes in the early 1990's, future and possibly longer periods of drought could adversely affect the Warner sucker.

Additionally, due to the geographic limits and modification to stream habitat by constructed irrigation diversions and ditches in the closed Warner basin in which the Warner sucker are distributed, there is limited opportunity for the suckers to naturally disperse away from stress, habitat degradation, dewatering and other disturbance factors.

No conservation agreement or legal mechanism is in place with the private land owners to ensure long-term protection of the stream and lake habitat or to provide adequate stream flow or passage. No contingency plan exists in the event of lake desiccation, or catastrophic disturbance. Monitoring for desiccation of the lakes is limited to casual observations by ODFW field crews and other personnel passing through the Warner Valley. The Oregon Water Resources Department has proposed installing an automated staff gage that would provide real time information on lake levels. This device has not yet been installed.

2.4 Synthesis

The Warner sucker was listed as threatened in 1985 because the range and numbers of Warner sucker had been reduced substantially; predation by exotic fish had reduced survival of juvenile suckers especially in lake habitat; and instream water diversions and artificial barriers restrict movement, migration, and spawning of suckers within and among streams.

The 1998 Recovery Plan recognized the vulnerability of the Warner sucker based on stream channel and watershed degradation, irrigation diversion practices, and predation and competition from introduced fishes. The Recovery Plan stressed the need to address the threats to this species through restoring and maintaining the natural aquatic and riparian habitats, protecting and rehabilitating populations, including conserving genetic diversity, controlling introduced exotic fishes, securing adequate water supplies for the continued survival of the species, monitoring populations and habitat conditions, and evaluating long-term effects of climatic trends (USFWS 1998, p 39).

To date, limited implementation of the Recovery Plan has occurred. Warner sucker habitat improvement has occurred through changes in grazing management on BLM and Forest Service lands, but few changes in land management have been made on private lands. Management of habitat on private land through conservation agreements, land exchanges, or acquisition has not occurred, and long-term management guidelines have not been developed and implemented. Progress has been accomplished through the construction of seven screens. Three screens have been installed on Deep Creek, three on Honey Creek, and one on the BLM diversion on the Hart Lake pump station. One

passage structure has been completed on Honey Creek and one on Twentymile Creek. An additional passage structure is under construction on Honey Creek and will be completed in Fall of 2010. However, many irrigation diversions remain unscreened and passage structures at the irrigation diversions are lacking or do not adequately address sucker passage needs (see section 2.3.2.1). These unscreened diversions on both the streams and Hart Lake remain priority screen points due to the potential for "take" of Warner suckers during pump operation.

Predation of Warner sucker by nonnative fish continues to impact Warner sucker in the lake habitats of the Warner basin and extends up into the lower reaches of the tributary streams. Monitoring by ODFW indicates that the lake populations of Warner sucker are seriously depressed, and that successful recruitment is limited, likely due to the competition and predation by non-native fish (Scheerer et al. 2006, p 12). Because of the patchy distribution of Warner sucker (as described in section 2.3.1.5) in the streams and the presence of a few sites with high sucker densities, the 2007 abundance estimates had low levels of precision (Scheerer et al. 2007, p 12). The estimates completed in 2009 had much higher levels of precision (Scheerer 2009b, pers. Comm.). Additional population estimates will be needed before a population trend can be established.

The Warner sucker is presently only known to occur in three stream basins and the series of lakes in the Warner basin. They remain vulnerable to predation by exotic fish and are affected by modification to habitat through the continued operation of water diversions and barriers that restrict movement and migration of Warner sucker. Prolonged drought, particularly desiccation of lakes from drought and irrigation use and the drying or reduced stream flow of stream channels from irrigation water removal, greatly impact Warner suckers' viability and recovery. Therefore, the classification for Warner sucker is warranted to be maintained as threatened status.

3.0 RESULTS

3.1 Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No change is needed

3.2 Recovery Priority Number: 2C

Brief Rationale:

We recommend maintaining the recovery priority number at 2C which is a high degree of threat with a high potential for recovery based on the on-going threats described in section 2.3.2. and the potential for recovery through the development

of fish passage structures, screening of diversions, and stream flow management. Recovery of the Warner sucker will depend upon the construction of fish passage structures to interconnect population segments and allow access to spawning habitat in streams, screening of diversions to avoid direct take of individuals, and stream flow management strategies to ensure adequate flows to sustain all life stages and histories of Warner sucker. Additionally, control of non-native fish will help to maintain the lake morph life history of the Warner sucker. The development and implementation of these necessary measures is expected to have a high level of conflict because: 1) the utility and additional costs and maintenance of fish passage and screening projects are a concern to some private landowners; 2) water in the Warner basin is already the subject of conflict by water users in the basin; and 3) the non-native fish in the Warner Lakes are a popular recreational fishery.

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. Develop and implement a comprehensive, prioritized screening and passage strategy for the Warner Valley. Work with the ODFW to identify priority artificial obstructions within Honey Creek, and Twentymile Creek to be included on the Statewide Fish Passage Priority List.
2. Reconstruct the fish ladder on Dyke diversion on Twentymile Creek to adequately provide passage for Warner suckers.
3. Work with private land owners to reduce the risk to migrating Warner sucker as they move up and down stream, particularly during and after spawning periods. Assist land owners in the installation of passage structures and improvements to irrigation water diversion structures to reduce impact to Warner sucker while also improving the efficiency of water used so instream flows may be conserved to benefit Warner sucker and other fish species present. Investigate use of water leasing as a means to assure adequate instream water for Warner sucker habitat.
4. Work with the ODFW to develop a long-term management and monitoring plan for the Warner sucker population and its habitat. Monitoring should be sufficient to track fluctuations in fish abundance, quantity and quality of available habitat, and abundance of nonnative or invasive aquatic plant, invertebrate, or fish species. Surveys every other year in streams and lakes would limit injury or mortality due to handling while providing information on multiple age classes of fish, and population trends.
5. Collect key life history information, including population age structure, age and size at maturity, longevity, and spawning timing and duration. Determine whether the Warner sucker population is self-sustaining and “large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural habitat changes” as stated in the recovery plan (USFWS 1998).

6. Evaluate the potential for control of introduced non-native fishes. Also consider potential for preventing introduction of other invasive species.
7. Evaluate the genetic variability that exists within the stream tributary populations. Determine if there is population structuring among the distinct habitat areas that contain suckers (Honey Creek, Deep Creek, Twentymile Creek, Crump Lake, and Hart Lake). Use of genetic analysis would aid in determining the distinction between potential populations. Genetic studies will aid in determining population structuring, provide evidence of bottlenecks or low genetic diversity, and if structuring occurs may allow us to determine origins of lake fishes from these signatures. Distinguishing between these populations will aid in answering questions regarding the potential for relying on metapopulations for conservation of the species.
8. Evaluate the health of Warner sucker. Recently, surveyors handling Warner sucker have observed lesions and external parasites. An assessment of hematological parameters would provide an assessment of current and potential health concerns.

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Catostomus warnerensis*

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:

Review Conducted By: Alan Mauer

Acting Monty Knudsen Date 9/30/10
Field Supervisor, Fish and Wildlife Service