Clover Valley Speckled Dace
(Rhinichthys osculus oligoporus)

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

Clover Valley speckled dace
(*Rhinichthys osculus oligoporus*)

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, or be changed in status from threatened to endangered. 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:

Clover Valley speckled dace (CVSD; *Rhinichthys osculus oligoporus*) are members of the minnow family of fishes (Cyprinidae) that occupy many waters of western North America. Isolation of populations has permitted genetic divergence and resulted in a number of morphologically distinct forms recognized as subspecies. The species' adaptability to a broad range of environments has allowed it to persist in habitats too harsh for the survival of many other fish. In general, speckled dace tend to be small (90 millimeters (mm), 3.5 inches (in)) or less in total length and are distinguished by subterminal mouths, small scales, thick tails, and slender bodies. Their color is usually olive, often with dark blotches that combine to form a dark side band (Moyle 2002). Clover Valley in Elko County, Nevada, contains the only known locations of CVSD. These locations consist of three spring systems: Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring.

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 Recovery Plan for the Endangered Speckled Dace of Clover and Independence Valleys (Service 1998), 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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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 February 14, 2007 (Service 2007). No information was received as a result of this announcement.

Listing History:

Original Listing
FR Notice: 54 FR 41448
Date of Final Listing Rule: October 10, 1989
Entity Listed: Clover Valley speckled dace, a fish species
Classification: Endangered

State Listing
The CVSD is listed as endangered by the State of Nevada.

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for CVSD is 9C 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 (Service 1983). This number indicates that the taxon is a subspecies that faces moderate 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 Endangered Speckled Dace of Clover and Independence Valleys *(Rhinichthys osculus lethoporus* and *Rhinichthys osculus oligoporus).*
Date Issued: May 12, 1998

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

Information on the Species and its Status

Species Biology and Life History

The Species Overview section of this 5-year review provides a basic description of CVSD biology. The Service is aware of no new information on the biology or life history of CVSD since the listing rule and recovery plan were issued.

With respect to life history, spawning occurs during the summer (typically in June and July) at water temperatures of 18 degrees Celsius (^{o}C) (65 degrees Fahrenheit (^{o}F)). The bases of the fins of both sexes turn orange to red during the breeding season, and males may or may not develop tubercles (bumps) on the pectoral fins (side fins behind gills).

Spatial Distribution

Clover Valley speckled dace are thought to be derived from an ancestral form of speckled dace similar to the Lahontan speckled dace *(Rhinichthys osculus robustus)* found in the Humboldt River system in Starr Valley, immediately to the north of Clover Valley. A connection between the valleys was thought to have occurred during the Pleistocene; however, no evidence of any recent connection has been found. Presumably, these subspecies have been separated for thousands of years (Hubbs and Miller 1972, Hubbs *et al.* 1974).

At the time of listing, CVSD were known to occupy three spring systems on privately-owned land in Clover Valley, Elko County, Nevada (Figure 1). The spatial distribution of CVSD has not changed since listing, in that the species is still extant at each of these three spring systems. It is unknown whether or not the spatial distribution of CVSD within these three spring systems has changed since listing. We present a brief synopsis of the distribution of CVSD within each spring system below, as derived from the listing rule (Service 1989) and the species' recovery plan (Service 1998).

At each of the three spring systems containing CVSD, the spring outflow has been impounded immediately below the spring head (discussed further in the Habitat or Ecosystem section of this review). The impoundment at each site has typically been referred to as a reservoir in most accounts; in all cases the reservoir serves the dual purposes of stock pond and a source of water for irrigation. For consistency, we refer to each impoundment as a reservoir.

Bradish Spring

Bradish Spring is the northernmost habitat for CVSD (Figure 2). This site is located at approximately 1,768 meters (m) (5,800 feet (ft)) elevation at the northeast corner of Signal Hill (Township 36 North, Range 62 East, Northeast ¼ of Section 19). Initially, this site was not considered suitable for CVSD and was not sampled (Hubbs *et al.* 1974). However, surveys in 1983 revealed CVSD to be present in Bradish Spring Reservoir (Vinyard 1984).

Wright Ranch Spring

Wright Ranch Spring is located between Bradish Spring to the north and Clover Valley Warm Spring to the south (Figure 3). Wright Ranch Spring is located at the southeast corner of Signal Hill at approximately1,768 m (5,800 ft) elevation (Township 36 North, Range 62 East, Northeast ¼ of Section 30). The CVSD were first documented in Wright Ranch Spring in 1934 (Hubbs *et al.* 1974) and occupy the Wright Ranch Spring Reservoir and portions of the reservoir outflows (discussed further in the Habitat or Ecosystem section of this review).

Clover Valley Warm Spring

Clover Valley Warm Spring is the southernmost habitat for the CVSD (Figure 4). Clover Valley Warm Spring is located at approximately 1,743 m (5,720 ft) elevation (Township 33 North, Range 61 East, Southeast ¼ of Section 12). The CVSD were first documented in Clover Valley Warm Spring in 1934 (Hubbs *et al*. 1974) and currently occupy the Clover Valley Warm Spring Reservoir and portions of the reservoir outflow (described further in the Habitat or Ecosystem section of this review).

Abundance

At the time of listing, the number of CVSD that inhabited the three spring systems was unknown (Service 1989). Numbers of CVSD fluctuate annually and seasonally, due to biotic and abiotic factors. The only available estimates of CVSD abundance come from surveys completed by the U.S. Geological Survey (USGS) (summer 2005 and winter 2006) and Nevada Department of Wildlife (NDOW) (summer surveys from 2009 to 2011). These data illustrate this annual, seasonal and site-to-site variability in abundance estimates (Table 1). These surveys used a combination of minnow traps and electrofishing. Abundance information for each spring system is discussed in further detail below.

Bradish Spring

The CVSD were first collected in Bradish Spring Reservoir in the summer and early fall of 1983 (Vinyard 1984). Surveys by USGS in summer 2005 and winter 2006 found 941 and 1,689 individuals, respectively, with estimated population sizes of 3,489 in the summer and 3,615 in the winter (Rissler and Scoppettone 2006). Surveys by NDOW in three consecutive summers (2009–2011) found 1,351 CVS in 2009, 434 CVSD in 2010, and 1,221 CVSD in 2011, with an estimated population size ranging from a maximum of 4,308 (in 2009) to a minimum of 1,280 (in 2010) (Petersen 2009, 2010, 2011) (Table 1). Captured CVSD ranged in size between 17 and 89 mm (0.6 and 3.5 in) fork length (FL), indicating the presence of multiple age classes.

Wright Ranch Spring

Wright Ranch Spring was initially surveyed in 1934, and a few small CVSD were observed (Hubbs *et al.* 1974). In the summer of 2005, USGS sampled 1,319 individuals, but only sampled 258 individuals the following winter (Rissler and Scoppettone 2006). During USGS surveys, CVSD were documented exclusively in the reservoir; these surveys did not extend into the three outflows draining this reservoir. The NDOW surveyed the reservoir at Wright Ranch Spring every summer from 2009 to 2011, and reported a minimum of 2,207 fish (in 2009) and a maximum of 6,479 CVSD (in 2011) (Petersen 2009, 2010, 2011) (Table 1). During 2010, NDOW also surveyed the reservoir and one of its three outflows (the only one assessed by NDOW as possibly containing enough water to support CVSD), where they sampled an additional 79 CVSD. NDOW did not survey outflows in subsequent years. Throughout their surveys, NDOW captured CVSD ranging in size from 18 to 94 mm (0.7 and 3.7 in) FL in the reservoir and from 13-55 mm (0.5 and 2.2 in) FL in the outflow, indicating the presence of multiple age classes. No population estimates for Wright Ranch Spring have been made by USGS or NDOW because of the large size of the reservoir and associated sampling limitations.

Clover Valley Warm Spring

Clover Valley Warm Spring has been periodically surveyed since the summer of 1934. No CVSD were observed in 1934, possibly because the cold water temperature caused CVSD to be inactive (Hubbs *et al.* 1974). In the summer of 2005, USGS reported 258 individuals in the reservoir and 440 in the outflow; the following winter they reported 1,393 fish in the reservoir and 538 in the outflow (Rissler and Scoppettone 2006). In the summers of 2009–2011, NDOW reported sampling 670 CVSD in 2009, 423 CVSD in 2010, and 1,494 CVSD in 2011 in the reservoir, and 566 CVSD in 2009, 206 CVSD in 2010 and 275 CVSD in 2011 in the outflow (Petersen 2009, 2010, 2011) (Table 1). Fish per mile totaled 13,992 in 2009, 2,736 in 2010, and 4,426 in 2011. NDOW did not complete surveys in the outflow in 2009 due to equipment malfunction. Throughout all surveys, NDOW captured CVSD ranging in size from 16 to 96 mm FL in the reservoir and from 32 to 80 mm (1.3 to 3.1 in) FL in the outflow, indicating the presence of multiple age classes. Population estimates were not calculated by USGS or NDOW because of the large size of the reservoir.

Habitat or Ecosystem

Speckled dace appear able to occupy a wide variety of habitats ranging from cold streams and rivers with rocky substrates to small thermal springs with silt substrates (Service 1998). Their adaptability to a broad range of environments has allowed them to persist in habitats too harsh for the survival of many other fish species.

Habitat conditions at two of the three spring systems known to support CVSD (Wright Ranch Spring and Clover Valley Warm Spring) have been modified since first surveyed in 1934 (Service 1998). However, there have been no formal surveys characterizing habitat or ecosystem conditions since the time of listing. The Service is unaware of anecdotal or other evidence suggesting substantial changes in these conditions have occurred since that time. Information gathered as a result of survey data suggests that CVSD are able to occupy rather harsh environments (Vinyard 1984; Stein 1995; Rissler and Scoppettone 2006; Petersen 2009, 2010, 2011). We briefly characterize habitat and ecosystem conditions for CVSD within each spring system below, based upon descriptions in the listing rule (Service 1989) and the species' recovery plan (Service 1998).

Bradish Spring:

Bradish Spring has a total discharge of 0.01 cubic meter per second (cms) (0.03 cubic foot per second (cfs)) (Rissler and Scoppettone 2006). The outflow is immediately impounded into a reservoir that is approximately 20 by 11 m (66 by 35 ft). In summer 2011, water temperature in the reservoir was reported at 16.1 ^{o}C (61 ^{o}F) (Petersen 2011). Water is either diverted from the reservoir through a standpipe and a covered irrigation pipe or allowed to flow into a lower reservoir. Water only enters the lower reservoir during periods of decreased irrigation demand when it overflows the upper pond through a corrugated pipe. The upper reservoir appears to have filled to a depth of approximately 25.4 centimeters (cm) (10 in) and width of 6.1 m (20 ft) (Vinyard 1984). A heavy growth of aquatic vegetation is abundant in the upper reservoir. The lower reservoir has been dry for at least the past 6 years, and has become completely overgrown with vegetation. The upper and lower reservoirs are located within a pasture that has been intermittently used by livestock (Petersen 2011).

Wright Ranch Spring:

Wright Ranch Spring issues from a limestone-alluvial contact and is immediately impounded in a reservoir measuring roughly 76 m (250 ft) long and 30 m (100 ft) wide. The flow has been reported at 0.1 ms^{-1} (35 cfs) (Rissler and Scoppettone 2006). In summer 2011, water temperature of the reservoir was reported to be 14.4^{o}C (58^{o}F) (Petersen 2011). Water exits the reservoir by either being pumped for irrigation or by being allowed to flow through corrugated pipes and into three outflows, downstream of the reservoir. Historically, the reservoir was used as a stock pond, especially in winter when cattle had continuous access. Anecdotal evidence suggests that the vegetation in the reservoir was burned or thinned at some point prior to the 2009 surveys. It is apparent from the heavy growth of vegetation in the reservoir that it hasn't been manipulated since. The current management of the reservoir is unknown.

In summer 2011, over half of the reservoir was almost entirely overgrown with vegetation, particularly sedges (*Carex* sp.), watercress (*Nasturium officinale*), pondweed (*Potamogeton* sp.), and algae (*Chara* sp.). Willows (*Salix exiguia*) were common around the border of the reservoir, with occasional wild rose (*Rosa woodsi*) scattered throughout the reservoir margins.

Three outflows flow to the east from the reservoir. These outflows, when wet, are used as irrigation ditches. Surveys by NDOW in 1995 provide the most recent and comprehensive description of habitat conditions; although all outflow channels may have been surveyed, descriptions are provided only for the northern outflow channel (Stein 1995). The northern outflow was described as a long, slow-glide channel with a hardpan bottom covered by a thin layer of silt. During these surveys, NDOW noted silt disturbed during pedestrian surveys caused the outflow channel to become quite turbid. The severe channelization of this channel seemed to preclude any type of pool formation. Vegetation within the stream consisted of watercress and algae, both of which were particularly abundant along the edges of the outflow. Riparian habitat for the north outflow consisted of common to abundant willow, occasional sedges, abundant grasses, rare mesic forbs, and occasional wild rose. Scuds (amphipod crustaceans, such as beach fleas) were the predominant invertebrate, while nonnative snails and aquatic beetles were found infrequently. Since 2009, the northern and middle channels have been dry as water has been directed to the southern channel (Petersen 2009, 2010, 2011).

Clover Valley Warm Spring:

Clover Valley Warm Spring issues from alluvium and is impounded immediately downstream of the springhead into a reservoir approximately 3 m wide and 0.6 m deep (10 ft x 2 ft) (Vinyard 1984). Discharge at the spring head is 1.9 ms^{-1} (6.24 cfs); downstream of the reservoir numerous seeps add approximately 1.8 ms^{-1} (5.84 cfs) to the flow (Eakin and Maxey 1951).

The reservoir is drained by two outflows: an irrigation channel that can either divert water to the north or return it to the original channel (Stein 1995), and the original channel, which consists of an upper and a lower section. The upper section, approximately 859.5 m (2,820 ft) long, extends from the reservoir to a fence line 500 m (1,640 ft) to the east. The lower section starts at the fence line and is comprised of split channels and irrigation structures. In general, the upper section contains better habitat conditions for CVSD, and has been the focus of NDOW's survey efforts from 2009–2011. Portions of the lower section have intermittent flow, and in general habitat conditions for CVSD in this section are not as suitable; therefore, NDOW did not survey the lower section of the outflow in their 2009–2011 surveys.

In the reservoir, dissolved oxygen content was measured at 5.3 milligrams per liter (5.3 parts per million) in May 1983 (Vinyard 1984). In summer 2011, water temperature of the reservoir was reported to be 19.4^{o}C (67^{o}F) (Petersen 2011). Algae and watercress within the reservoir has been increasing since NDOW started their surveys in 2009 (Petersen 2009, 2010, 2011).

In the upper section of the outflow, NDOW characterized the riparian area as composed primarily of sedges and grasses while rush (*Juncus* sp.) and hard-stem bulrush (*Scirpus* sp.) were also common (Stein 1995). Several types of mesic forbs were found only occasionally in the riparian zone. Aquatic vegetation was mostly watercress and algae. NDOW also noted this area

to be relatively rich in aquatic insects. Leeches, scuds, caddis flies, and native snails were all abundant in the channel (Stein 1995). While dragon fly larvae were common, nonnative snails were found occasionally, whereas giant water bugs were rarely encountered.

In 1995, the lower section was described as showing signs of heavy livestock use with portions well-entrenched and exhibiting severe signs of compaction (Stein 1995). The aquatic insect and plant components were similar to those found in the upper section, but generally lower in abundance. Riparian vegetation was also limited throughout this section with nonvegetated soils constituting one quarter of the outflow banks. Grass and rush were common, with mesic forbs and rabbit brush (*Chrysothamus* sp.) found occasionally. In the past, irrigation practices completely dewatered the natural outflow channel during the summer. Water from the outflow is still used primarily for irrigation of meadows.

Changes in Taxonomic Classification or Nomenclature

No taxonomic changes have been made for the CVSD.

Genetics

No genetic analysis has been completed for the CVSD.

Species-specific Research and/or Grant-supported Activities

Listed below is an example of monitoring activities which the Service has funded for CVSD recovery efforts.

Relative Abundance and Distribution of CVSD, USGS: USGS was funded through the Science Support Partnership (SSP) program in 2005 to complete a comprehensive survey of CVSD habitat. Through the SSP program, the USGS partners with the Service to understand and provide the critical science information required to effectively manage our nation's resources. Results from these surveys were summarized in the discussion of "Abundance", above.

CVSD Population Assessment, NDOW: NDOW has been funded for FY 2009–2012 through the Service's Section 6 grant program to conduct a population estimate for the three spring systems occupied by Clover Valley speckled dace. The studies will provide age class criteria, population sizes, trends in population and levels of reproduction to determine the number of age classes present; results from surveys conducted 2009–2011 were summarized in the discussion of "Abundance", above.

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

The destruction, modification or curtailment of its habitat or range was identified as a threat at the time of listing because of concerns about limited distribution and habitat manipulation due to irrigation practices (Service 1989). The current status of these threats is described below.

Limited Distribution

The limited distribution of CVSD is still considered a threat to the continued existence of the fish. To ensure the long term protection of CVSD populations and habitats (a delisting criterion, discussed further below), cooperation from the private landowners where CVSD are found is essential. However, attempts to develop and implement formal conservation agreements with private landowners have been unsuccessful, despite considerable effort on the part of the Service's Partners for Fish and Wildlife and Ecological Services Programs. Limited distribution will continue to be a threat until the three known populations of the species can be secured via conservation agreements with the private landowners.

Habitat Manipulation

Habitat manipulation is still considered a threat to CVSD. Neither CVSD nor their habitat were known before settlers moved into the area and began manipulating springs to facilitate irrigation. Therefore, precise limits of the historically occupied habitat are unknown. However, information gathered about other speckled dace occupying other springs within northern Nevada indicates that speckled dace are likely to have occupied all of the streams and wetlands maintained by local spring discharges. The quantity of suitable habitat was probably never very large for these dace since the springs they inhabit are small.

At all three populations of CVSD, manipulations of habitats downstream from reservoirs have restricted CVSD to the reservoir and a small section of outflow immediately downstream of the reservoirs. Initial surveys for CVSD in 1934 indicated that the springs occupied by this species had already been significantly altered, and that this alteration had presumably occurred many years prior (Hubbs *et al*. 1974). The outflows were impounded in small reservoirs prior to being distributed to various irrigated pastures. The ditched outflow habitats downstream from these reservoirs fluctuate from watered to dry depending upon the amount of water diverted from the reservoir for irrigation. Continued manipulation (*i.e.*, drawdown) of these reservoirs, and associated reductions in water levels and flow regime in the outflow habitats, continues to prohibit the long term presence of CVSD downstream from the reservoirs and is primarily responsible for the scarcity of CVSD in these outflows (Vinyard 1984; Rissler and Scoppettone 2006; Petersen 2009, 2010, 2011).

In 2011, the ranch property on which Clover Valley Warm Spring and its outflows occurs (Warm Creek Ranch) was purchased by a private landowner (Mrs. Madeleine Pickens) who has proposed converting the existing cattle ranch to a sanctuary for wild horses captured from Federal lands in Nevada. Under the proposal, up to 1,000 wild horses would be housed and allowed to roam on the privately owned ranch land and approximately 214,483 ha (530,000 ac)

of surrounding public lands administered by the BLM. The proposal would require BLM to transfer grazing privileges on the surrounding grazing allotments from cattle to horses. In spring 2012, BLM initiated the NEPA process to determine the environmental effects of the proposal. It is unknown at this time how the ranch will be managed or the results of the environmental analysis. However, if the environmental analysis finds there will be no significant impact and BLM allows the sanctuary to move forward, it could adversely affect CVSD by additional habitat manipulation.

In early 2012, the Service learned that the privately owned property on which Bradish Spring and its outflows occurs was for sale, but we have thus far not been able to determine any additional information regarding recent real estate transactions involving this property. Therefore, at the time of this review, the future status of two of the three known populations of CVSD (Bradish Spring and Clover Valley Warm Spring) and habitat conditions at these locations is in doubt.

In summary, limited distribution and habitat modification continue to be the primary threats to CVSD. Although the historical habitat is unknown, it is evident that manipulation of springs has occurred which has severely limited the distribution. The spring outflows have been diverted primarily for irrigation purposes. Past attempts have been made to enter the private landowners into a conservation agreement to protect CVSD and their habitat, but the landowners have declined.

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

Overutilization for commercial, recreational, scientific, or educational purposes was identifies as a threat to CVSD at the time of listing due to their small population size and limited distribution (Service 1989).

We do not consider overutilization for commercial, recreational, scientific, or educational purposes a threat to CVSD at this time. The State of Nevada designated CVSD as endangered, resulting in prohibition of the take or possession of the fish (Nevada Administrative Code 503.065; Nevada Revised Statutes 501.105, 501.110, 501.181). The Service is not aware of any ongoing or planned collection for any purpose, therefore this is not regarded as a threat.

FACTOR C: Disease or Predation

Disease and predation were listed as threats to CVSD populations at the time of listing (Service 1989) and are still considered threats. The current status of these threats is discussed below.

The introduction and establishment of nonnative fishes (*e.g.*, rainbow trout; *Oncorhynchus mykiss*) throughout North America threatens native fish populations by providing a vector for foreign diseases and a source of predation upon, and competition with, native species. In southern Nevada, Minckley and Deacon (1968) reported the appearance of foreign parasites following the introduction of exotic fishes to the Moapa River system. These parasites have since successfully infected the native fish community and may be depressing populations of these species (Minckley and Deacon 1968). Whether through disease, predation or competition,

nonnative fishes have been implicated in the extirpation of other native fishes (Moyle 2002, Taylor *et al.* 1984). In northeastern Nevada, extinction of the Independence Valley tui chub following introductions of largemouth bass and bluegill is strong evidence that such introductions have significantly impacted native fishes in spring systems (Service 1998). A number of diseases are also known to occur naturally in other speckled dace populations in the Great Basin, but these are not believed to have a substantial impact on population viability. To date, disease (whether foreign or naturally-occurring) has not been documented in CVSD populations.

Nonnative fishes (especially rainbow trout) were historically stocked in two of the three known populations of CVSD (Wright Ranch and Clover Valley Warm Spring). The specific interaction between CVSD and rainbow trout is not known, but Hubbs *et al.* (1974) reported low CVSD populations where rainbow trout had been introduced into reservoirs as compared with larger CVSD populations where rainbow trout were not present. The presence of predatory fish species in springs occupied by the CVSD is suspected to be primarily responsible for the small population sizes in CVSD (Hubbs *et al.* 1974, Vinyard 1984). We remain concerned that additional introductions of nonnative fish are likely, given the proximity of CVSD populations to roads and major highways (*e.g.*, State Route 232 and U.S. Highway 93) which facilitates introductions of nonnative fishes by members of the public.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms appear to be adequate at this time. Federal laws that may provide protection for CVSD and their habitat include the Clean Water Act and the ESA. State laws which protect CVSD include the 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) that protects Nevada's State-listed species, and Nevada Revised Statute 445A.305 that protects the water quality of Nevada's rivers, springs, and streams.

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

At the time of listing, vandalous acts and nonnative fish were identified as a natural or manmade threat affecting the continued existence of CVSD populations (Service 1989). However, the listing rule does not identify, and our files do not indicate, the source of these threats. As described throughout this review, the Service and its partners have been working cooperatively with the private landowners of these CVSD populations for several years. As a result, we do not believe that vandalous acts are a threat to CVSD at this time. Because threats from nonnative fish primarily manifest as disease, predation or competition, we discuss these threats under Factor C, above. Climate change represents a new threat identified since the time of listing, and is discussed below.

<u>Climate Change</u>

Our analyses under the ESA include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of

weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (*e.g.*, temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (*e.g.*, habitat fragmentation) (IPCC 2007). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

The 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 the CVSD, 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 CVSD through lowering groundwater levels.

While specific impacts to CVSD under predicted future climate change are unclear, it appears reasonable to assume that the species may be affected. However, we lack sufficient certainty on knowing how and how soon climate change will affect the species, the extent of average temperature increases in Nevada, or potential changes to the level of threat posed by drought. We have no knowledge of more detailed climate change information specifically for this species' range.

III. RECOVERY CRITERIA

A final, approved Recovery Plan has been published for CVSD (Service 1998). 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.

Downlisting Criteria

Downlisting Criterion No. 1 - Clover Valley speckled dace populations at each of the three springs (Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring) comprise at least two age classes.

This criterion has not been fully met. Surveys completed by USGS in the summer of 2005 and the winter of 2006 (Rissler and Scoppettone 2006), and summer surveys by NDOW from 2009 to 2011 (Petersen 2009, 2010, 2011) have consistently indicated the presence of two or more age classes of CVSD at each of the three spring systems (Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring). However, these findings are based on age-length frequency histograms, and there have been no studies that have looked specifically at the size-age relationship in CVSD. Therefore, while these data provide support for this inference, we cannot be certain that there are at least two age classes present.

This criterion addresses listing Factor A: *The present or threatened destruction, modification, or curtailment of its habitat or range.*

Downlisting Criterion No. 2 - Clover Valley speckled dace populations are stable or increasing in size.

This criterion has not been fully met. Estimates of abundance from USGS (Rissler and Scoppettone 2006) and NDOW (Petersen 2009, 2010, 2011) have revealed year-to-year, season, and site-to-site fluctuations in CVSD populations. At all three populations, the last available estimate of abundance is equal or greater than the first or second available estimate, suggesting that these populations are relatively stable. As noted elsewhere in this review, there are number of factors that may influence CVSD population numbers, the most being habitat conditions (*i.e.*, an increase in vegetation density). These changes, and others, also influence the efficiency of trapping and electrofishing efforts. Therefore it can be difficult to distinguish actual population trends from differences in sampling effort or sampling efficiency. Given that the number of CVSD at all three spring systems has fluctuated between surveys (2009–2011), it may be premature to regard the population as stable without additional survey data. However, most partners working with the species (especially USGS, NDOW and the Service) regard habitat conditions as relatively stable over the past several years, and interpret available data as more indicative of sampling bias than actual population trends. NDOW plans to repeat surveys again in 2012, thus providing another year of abundance estimates that will inform future evaluations of whether this recovery criterion has been met.

This criterion addresses listing Factor A and C: *The present or threatened destruction, modification, or curtailment of its habitat or range* (Factor A) and *Disease or Predation* (Factor C).

Downlisting Criterion No. 3 - Clover Valley speckled dace reproduction is documented for at least three consecutive years.

This criterion has not been fully met. The Service also acknowledges that this criterion is largely redundant with the first downlisting criterion, discussed above. Surveys completed by USGS (Rissler and Scoppettone 2006) and NDOW (Petersen 2009, 2010, 2011) show that CVSD populations at each of the three spring systems (Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring) comprise at least two age classes. However, there have been no studies that have looked specifically at size-age relationship for CVSD, so we cannot be confident that there are at least two age classes present.

This criterion addresses listing Factor A: *The present or threatened destruction, modification, or curtailment of its habitat or range.*

Recovery Criteria

Clover Valley speckled dace may be considered for delisting provided that **all** reclassification criteria (downlisting criteria) **and** Recovery Criteria 1, 2, and 3 have been met.

Recovery Criterion No. 1 - Clover Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within each spring system (Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring).

This criterion has not been met and may never be fully achievable. The terminology and language are unclear and there is a lack of data to support this criterion. The historical distribution of CVSD is unknown, and it is unclear what constitutes available habitat. Therefore, it is difficult to evaluate whether this criterion, as worded, has been met. We address this ambiguity in our recommendations for future actions, below.

This criterion addresses listing Factor A: *The present or threatened destruction, modification, or curtailment of its habitat or range.*

Recovery Criterion No. 2 - Clover Valley speckled dace populations exist at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years).

This criterion has not been met. As noted in the above discussion of downlisting criteria, available estimates of abundance (Rissler and Scoppettone 2006; Petersen 2009, 2010, 2011) are somewhat difficult to interpret, as they indicate annual, seasonal and site-by-site variation in CVSD population numbers that are at least partially attributable to differences in sampling efficiency. NDOW plans to sample again in 2012, providing another year of data that will assist in the evaluation of this criterion. Most partners actively involved in CVSD recovery efforts (primarily USGS, NDOW and the Service) regard habitat conditions as reasonably stable at the three CVSD populations, and expect that the observed fluctuations in abundance are more indicative of differences in sampling efficiency than actual population trends. However, more

years of survey data are needed to evaluate status and trends in CVSD populations, and this recovery criterion.

This criterion addresses all listing factors.

Recovery Criterion No. 3 - Long-term protection of CVSD populations and habitat is guaranteed.

This criterion has not been met. The CVSD populations and their habitats remain threatened by a number of factors including limited distribution, habitat alteration, and nonnative fishes. All known populations remain in private ownership, and to date, all efforts to develop and implement conservation agreements with these landowners have been unsuccessful. Land and water use on these private lands have adversely affected CVSD and their habitats, and in some cases impacts from overgrazing, stock watering, and irrigation are continuing to occur. Until the habitat is secured through a conservation easement or another avenue that would protect the habitat long term, this criterion has not been met.

This criterion addresses all listing factors.

IV. SYNTHESIS

Although the historical distribution of CVSD is unknown, the Service is aware of no new information to suggest that the species' distribution has changed since it was listed. The current distribution of CVSD consists of three populations within three spatially discrete, highly-modified spring systems each located entirely on private property. Primary threats at the time of listing included limited distribution, competition and predation by nonnative fishes, and habitat manipulation (Service 1989). These threats continue to preclude the recovery of CVSD, and only one new potential threat has been identified since the time of listing — climate change. Because these threats pose a significant risk to the long-term viability of CVSD populations, we believe that CVSD continues to meet the definition of endangered and no change in status is recommended at this time.

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: No change is recommended at this time.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

The Service recommends that the following should be continued and/or implemented within the next 5 years:

1. Implement decisions of Clover Valley and Independence Valley Speckled Dace Recovery Implementation Team (RIT) by working closely with appropriate Federal agencies, State agencies, and private landowners.

2. Resume efforts to enter into conservation agreements with the private landowners of the three CVSD populations.

3. Continue to fund NDOW through the Section 6 cooperative grant program to conduct annual surveys for CVSD as outlined in the Recovery Plan. Work with NDOW to ensure that data collected are adequate for objective evaluation of downlisting and recovery criteria.

4. Work with the RIT to develop objective standards for determining whether the recovery criterion relating to recolonization of historically occupied and suitable/available habitat has been met.

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

Clover Valley speckled dace (*Rhinichthys osculus oligoporus*)

Current Classification:

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'Elia Date 6/7/12

REGIONAL OFFICE APPROVAL:

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

Approve _____ Date _____

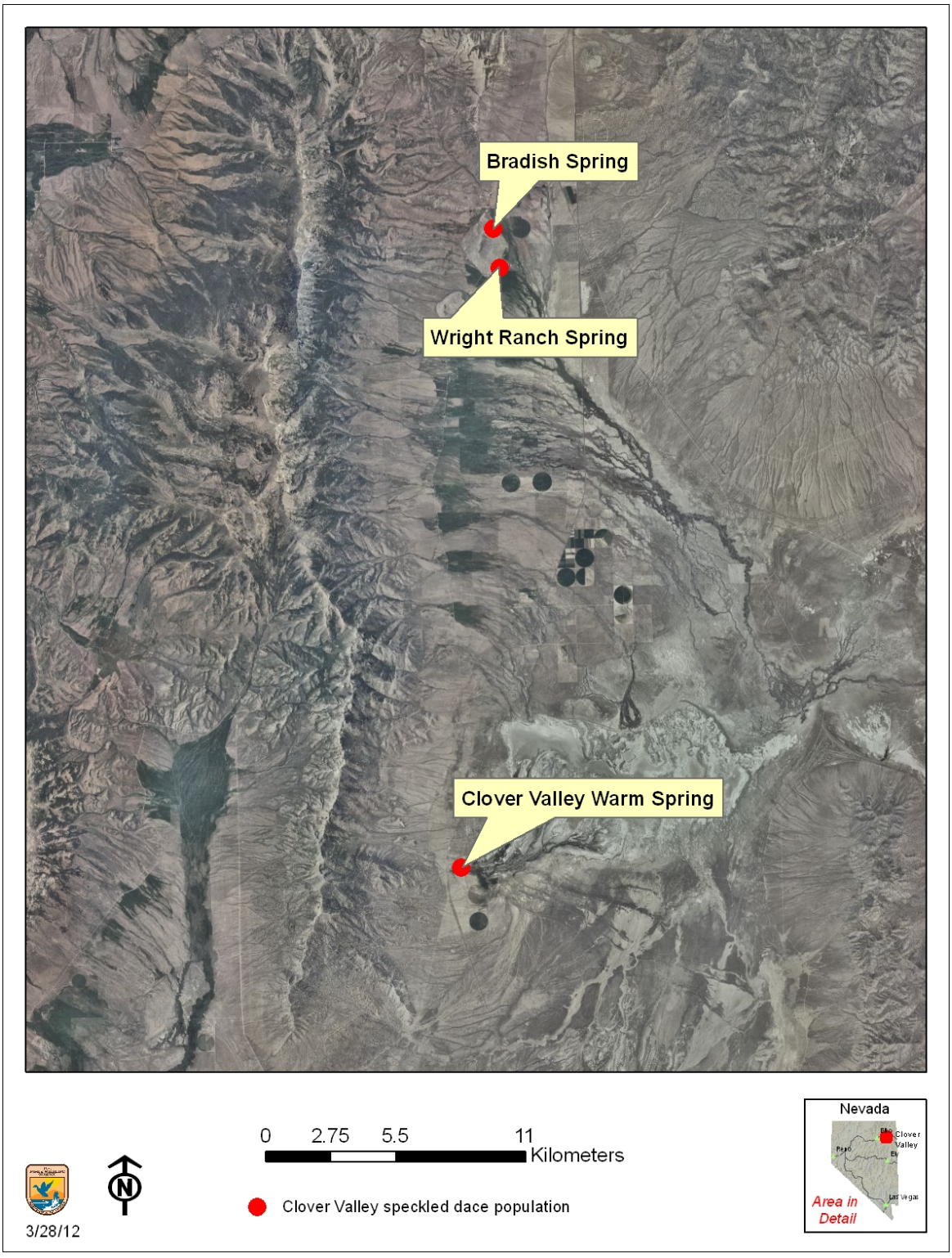

Figure 1. Map of Clover Valley showing the distribution of Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) in Elko County, Nevada. Prepared for 5-year review, 2012.

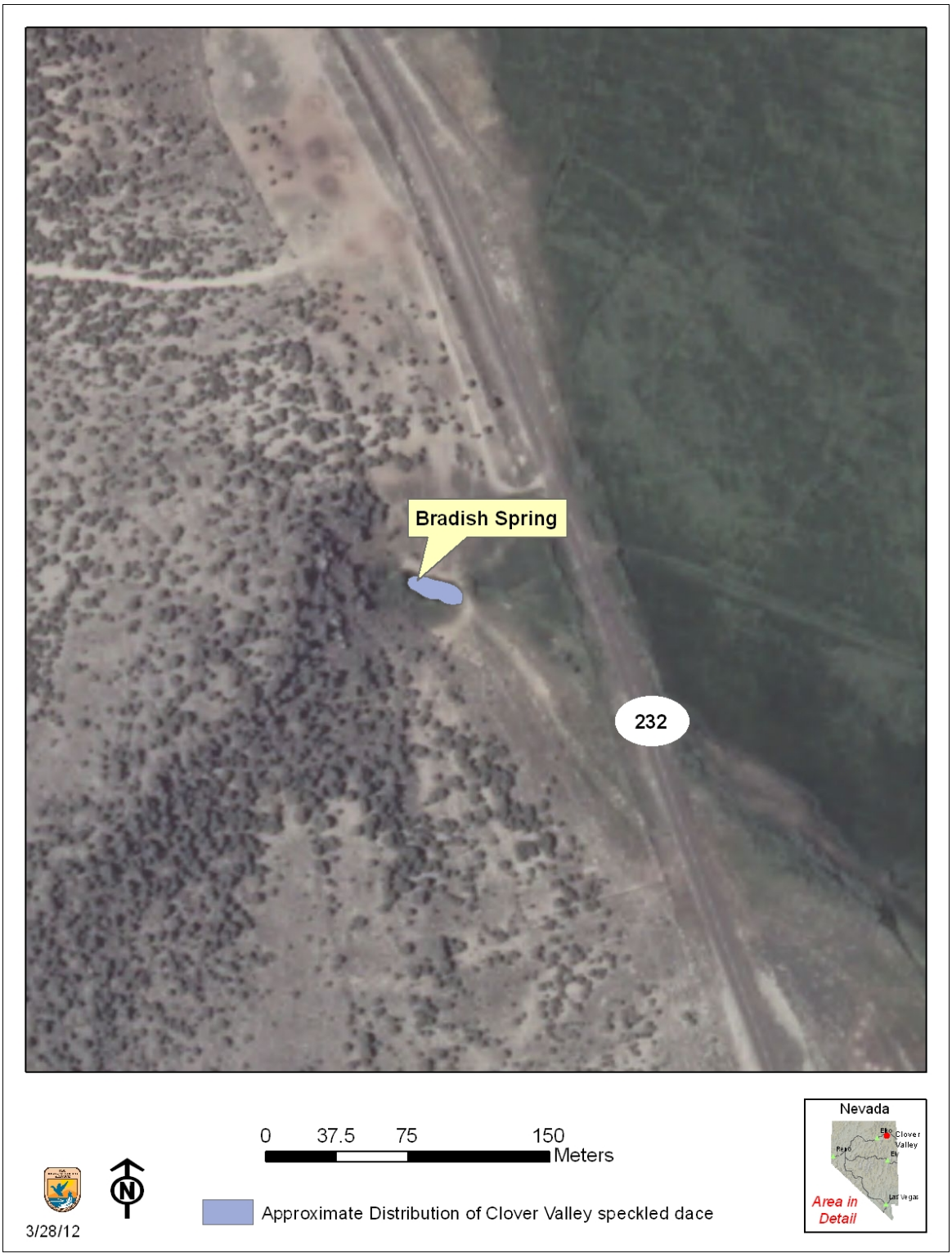

Figure 2. Map showing the approximate distribution of Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) in Bradish Spring, Clover Valley, Elko County, Nevada. Prepared for 5-year review, 2012.

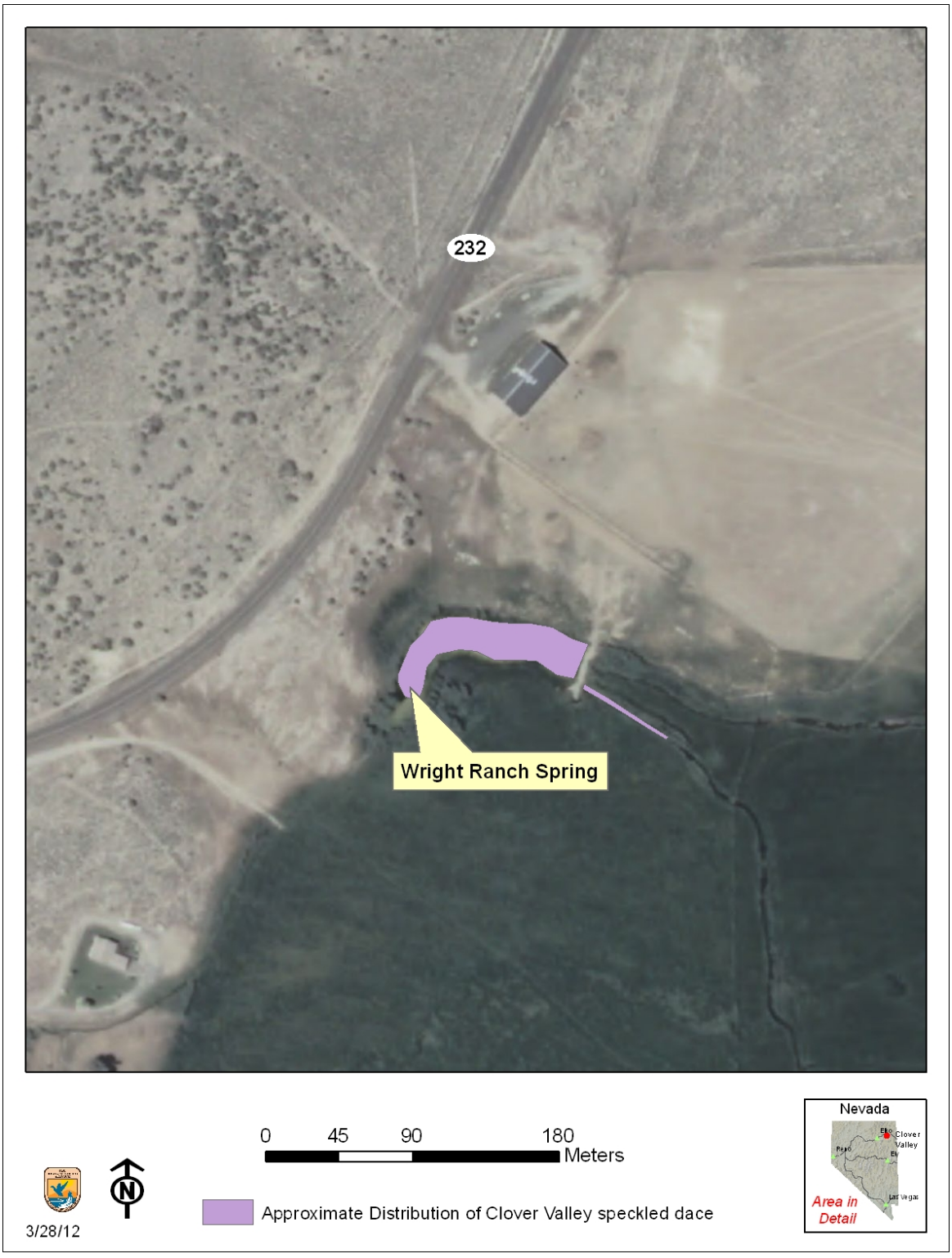

Figure 3. Map showing the approximate distribution of Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) in Wright Ranch Spring, Clover Valley, Elko County, Nevada. Prepared for 5-year review, 2012.

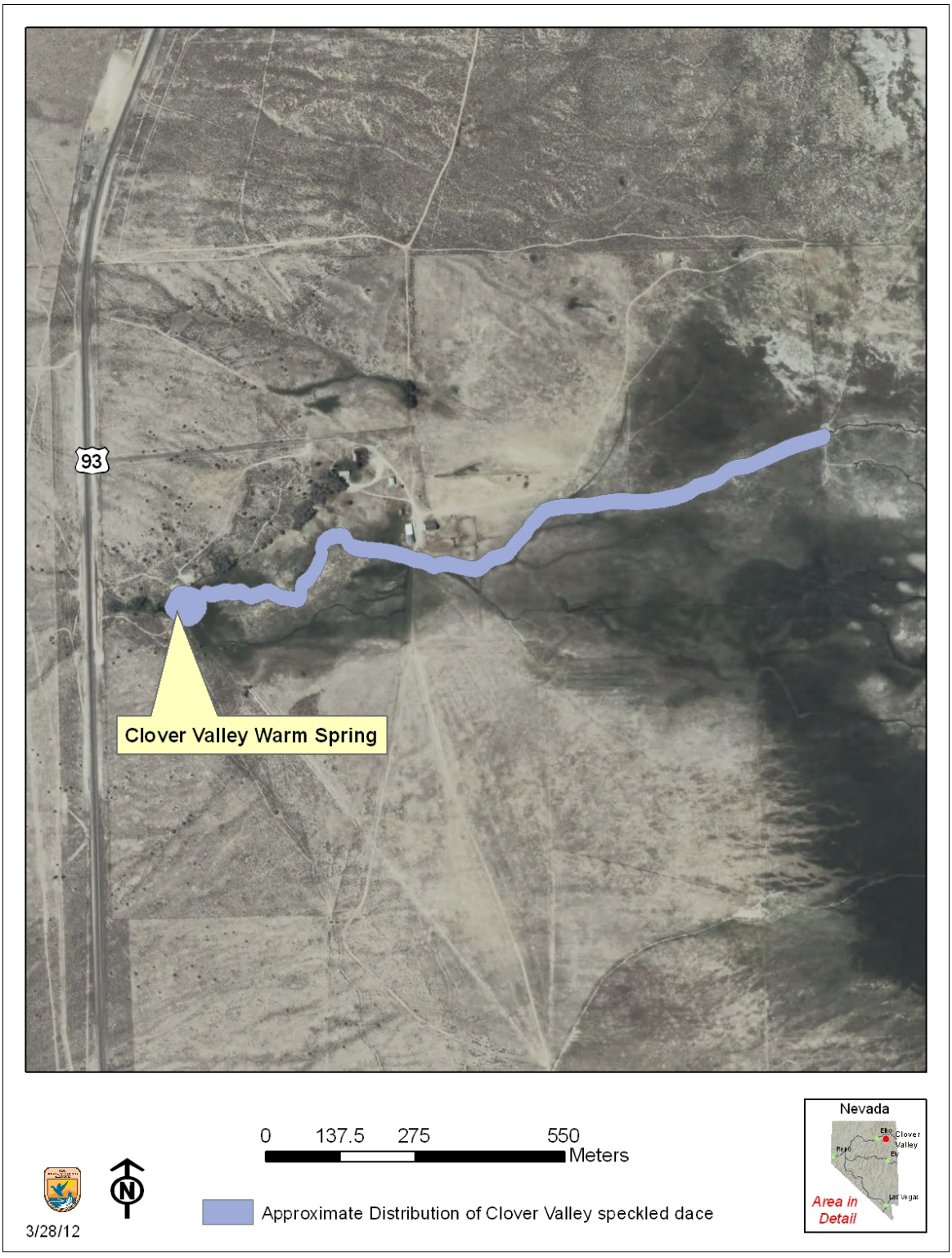

Figure 4. Map showing the approximate distribution of Clover Valley speckled dace (*Rhinichthys osculus oligoporus*) in Clover Valley Warm Spring, Clover Valley, Elko County, Nevada. Prepared for 5-year review, 2012.

Table 1. Numbers of Clover Valley speckled dace (*Rhinichthys osculus oligoporous*) for the three occupied spring systems (Bradish Spring, Wright Ranch Spring, and Clover Valley Warm Spring) in Clover Valley, Elko County, Nevada.

Source	Year	Season	Bradish Spring Reservoir	Wright Ranch Spring		Clover Valley Warm Spring	
				Reservoir	Outflow	Reservoir	Outflow
USGS	2005	Summer	941	1,018	NA	258	440
USGS	2006	Winter	1,689	768	NA	1,393	538
NDOW	2009	Summer	1,351	2,207	NA	670	566
NDOW	2010	Summer	434	5,018	79	423	206
NDOW	2011	Summer	1,221	6,479	NA	1,494	275