

**Independence Valley Speckled Dace  
(*Rhinichthys osculus lethoporus*)**

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



**Independence Valley Speckled Dace  
Photograph by Steve Ambruzs, US Geological Survey**

**U.S. Fish and Wildlife Service  
Nevada Fish and Wildlife Office  
Reno, Nevada  
June 2008**

# **5-YEAR REVIEW**

## **Independence Valley Speckled Dace** *(Rhinichthys osculus lethoporus)*

### **1.0 GENERAL INFORMATION**

Independence Valley speckled dace (*Rhinichthys osculus lethoporus*) inhabit the Independence Valley Warm Springs Complex in Elko County, Nevada, and it is the only system from which these fish are known. Specific habitat requirements for this subspecies have not been formally defined, however, recent population surveys indicate a wide-spread distribution throughout the Complex except in spring-head areas or ponds that are inhabited by non-native predatory fishes. Primary threats at the time of listing were identified as limited distribution, habitat manipulation, small population size, and nonnative fish introductions. Given the most recent survey results, some of these threats are questionable. The U.S. Fish and Wildlife Service, in cooperation with the U.S. Geological Survey and Nevada Department of Wildlife, is currently engaged in a survey in accordance with the downlisting criteria outlined in the Recovery Plan.

#### **1.1 Methodology used to complete the review**

This 5-year review includes an analysis of life history, research, and survey data available from the U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, Reno, Nevada; Nevada Department of Wildlife; U.S. Geological Survey; and other data available in general scientific literature. The recovery goals and criteria for the subspecies described in the 1998 *Final Recovery Plan for the Endangered Speckled Dace of Clover and Independence Valleys* (Recovery Plan) were used in this evaluation. Staff in the Nevada Fish and Wildlife Office, Reno, Nevada conducted this review.

#### **1.2 Reviewers**

**Lead Region** – Region 8, California and Nevada; Diane Elam and Jenness McBride (916) 414-6464

**Lead Field Office** – Nevada Fish and Wildlife Office, Reno, Nevada; David Potter (775) 861-6300

**Cooperating Field Office(s):** None

**Cooperating Region(s):** None

## **1.3 Background**

### **1.3.1 FR Notice citation announcing initiation of this review**

On February 14, 2007, we, the U.S. Fish and Wildlife Service (Service) announced initiation of the 5-year review for the Independence Valley speckled dace and asked for information from the public regarding the species' status (72 *FR* 7064). No information for Independence Valley speckled dace was received as a result of that announcement.

### **1.3.2 Listing history**

FR notice: 54 *FR* 41448  
Date listed: October 10, 1989  
Entity listed: Subspecies  
Classification: Endangered

### **1.3.3 Associated actions**

No associated actions have been designated for this subspecies.

### **1.3.4 Review History**

The most recent review of the subspecies' status is the *Final Recovery Plan for the Endangered Speckled Dace of Clover and Independence Valleys* published on May 12, 1998. However, that review did not include a formal five-factor threat analysis to re-evaluate the subspecies' listing status. No other comprehensive status reviews have been completed.

### **1.3.5 Species' Recovery Priority Number at start of review**

In the 2007 Recovery Data Call for the Nevada Fish and Wildlife Office, the Independence Valley speckled dace was assigned a recovery priority number of 6C, meaning that this is a subspecies with a high degree of threat and a low recovery potential, and has a conflict with other resource uses. Recovery priority numbers are based on a 1-18 ranking system where 1 is the highest-ranking recovery priority and 18 is the lowest.

### **1.3.6 Recovery Plan or Outline**

Name of Plan: *Final Recovery Plan for the Endangered Speckled Dace of Clover and Independence Valleys (Rhinichthys osculus lethoporus and Rhinichthys osculus oligoporus)*

Date issued: May 10, 1998

Previous revisions: None

## 2.0 REVIEW ANALYSIS

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

#### 2.1.1 Is the species under review listed as a DPS?

*Yes*  
 *No*

#### 2.1.2 Is there relevant new information that would lead you to re-consider the listing this species as a DPS in accordance with the 1996 policy?

*Yes*  
 *No*

### 2.2 Recovery Criteria

#### 2.2.1 Does the species have a final, approved recovery plan?

*Yes*  
 *No*

#### 2.2.2 Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?

*Yes*  
 *No*

#### 2.2.3 Adequacy of recovery criteria.

##### 2.2.3.1 Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?

*Yes, however, the criteria are not explicitly “threats-based” and are, in some cases, vague and not measurable.*  
 *No*

**2.2.3.2 Are all of the 5 listing factors<sup>a</sup> that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?**

Yes  
 No

The existing criteria are not strictly threats-based in that they are not specifically framed in terms of the five listing factors. Additionally, potential new threats have been identified which are not addressed in the recovery criteria.

**2.2.4 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors\* are addressed by that criterion. If any of the 5 listing factors are not relevant to this species, please note that here.**

Downlisting Criteria

The Independence Valley speckled dace may be considered for reclassification from endangered to threatened when Downlisting Criteria 1 and 2 have been met:

*Downlisting Criterion No. 1* – The population at Independence Valley Warm Springs comprises at least two age classes, the population size is stable or increasing, and reproduction is documented for at least 3 consecutive years.

This criterion addresses all factors.

This criterion cannot be demonstrated due to a lack of data for occupied areas. The area in question, referred to as the Independence Valley Warm Springs Complex or Area<sup>b</sup>, is composed of a series of spring areas or ponds, seeps, ditches (for flow conveyance), and a large marsh. There has been no comprehensive effort to survey the Warm Springs Area for Independence Valley speckled dace over the required period (i.e., 3 consecutive years). The best and most recent information available on the Independence Valley speckled dace population is a report by the U.S. Geological Survey describing results from surveys conducted about ten

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<sup>a</sup> A) Present or threatened destruction, modification or curtailment of its habitat or range;  
B) Overutilization for commercial, recreational, scientific, or educational purposes;  
C) Disease or predation;  
D) Inadequacy of existing regulatory mechanisms;  
E) Other natural or manmade factors affecting its continued existence.

<sup>b</sup> Also known as Ralph's Warm Springs Marsh.

years ago (Rissler *et al.* 2001). However, this survey was limited to seasonal distributions across the summer and fall of 1997, and spring of 1998<sup>c</sup>. This study did provide estimates for fish captured, but did not estimate population due to sampling limitations.

The U.S. Geological Survey has just completed the second of a three-consecutive year effort to collect Independence Valley speckled dace population data in accordance with downlisting criteria. A final report is not expected until late in 2008.

*Downlisting Criterion No. 2* – Nonnative fishes no longer adversely affect the long-term survival of the Independence Valley speckled dace.

This criterion is addressed by Factor C: *Disease or Predation*.

This criterion cannot be demonstrated as nonnative fishes continue to inhabit a portion of potential habitat for the Independence Valley speckled dace. In studies conducted in 1997 and 1998, Rissler *et al.* (2001) found a number of the modified spring areas and associated canals were inhabited by the nonnative largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*). Furthermore, the relative abundance of speckled dace in these areas was determined to be extremely low when compared to the rest of the Complex, suggesting predation of Independence Valley speckled dace, although the cause of this predation has been subject to debate<sup>d</sup>.

Field surveys of pond areas and some of the associated canals by Nevada Department of Wildlife in March and August of 2007 also indicated the presence of largemouth bass, bluegill, mosquitofish (*Gambusia affinis*), and American bullfrog (*Lithobates catesbeianus*), all of which are not native to Nevada (Petersen 2007). Areas where largemouth bass and bluegill were observed did not result in significant captures of Independence Valley speckled dace. However, a stomach analysis of largemouth bass captured in the canal flowing out of Pond 6 indicated these fish preyed primarily on aquatic insects and mosquitofish.

Of note, recent studies appear to lack a quantifiable understanding of the effects of nonnative species on the long-term survival of Independence Valley speckled dace. This is particularly true for the nonnative mosquitofish, which only recently has become established in the Complex. This information gap may also apply somewhat to the other nonnative

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<sup>c</sup> USGS conducted additional surveys in the Warm Springs marsh in the spring of 1999 that focused on collection of Independence Valley tui chub (*Gila bicolor isolata*).

<sup>d</sup> Rissler *et al.* (2001) have also indicated that temperature in springs may be too warm for speckled dace, but not for tui chub, which was found to be much more prevalent before nonnative fishes became established as found by Hubbs *et al.* (1974).

species that have been established longer (i.e., largemouth bass, bluegill, and bullfrog). Further studies are needed to distinguish these effects.

In addition to the issues already discussed, this criterion may be flawed in several ways. First, only nonnative fishes are specifically mentioned; however, bullfrogs are prevalent in several areas and may predate on speckled dace. Also, this criterion does not specify the measures of adverse effects by nonnative fishes on the long-term survival of Independence Valley speckled dace. This criterion should be modified so that adverse effects are clearly defined in terms of specific population parameters (e.g., predation rate, recruitment, survival). Moreover, a general time frame should be established for what constitutes “long term” (e.g., 100 years).

#### Delisting Criteria<sup>e</sup>

The Independence Valley speckled dace may be considered for delisting provided that all reclassification (i.e., downlisting) and recovery (delisting) criteria have been met:

*Delisting Criterion No. 1* – Independence Valley speckled dace occupy at least 75 percent of the total available habitat after enhancement, if needed, within the Independence Valley Warm Springs system.

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

Delisting Criterion No. 1 cannot be demonstrated due to confusion over terminology, language, and a lack of data (see discussion on downlisting criteria).

The historical distribution of Independence Valley speckled dace may never be known (U.S. Fish and Wildlife Service 1998). It is also unclear if all wetted areas of the Warm Springs Complex (i.e., the ponds, canals, seeps, and marsh) can be considered “available habitat”. At the time this criterion was developed, there were no detailed maps of these features and so it was not quantified. It is anticipated that a clear understanding of available habitat will be provided as a part of the most recent surveys by the U.S. Geological Survey.

A specific definition for what constitutes “available habitat” needs to be developed. For example, there is a significant amount of margin habitat associated with the marsh that is dominated by emergent vegetation and which may not constitute “available habitat” in that it does not meet dace

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<sup>e</sup> The Recovery Plan refers to this as “Recovery Criteria”.

life history requirements. Also, the use of the term “enhancement”<sup>f</sup> is confusing, as well as what areas are in need of it. The use of the term “if needed” can lead to more confusion as this determination may vary from one person to another. This criterion should be modified so that the meaning of these terms is clear.

Determining the level of Independence Valley speckled dace occupancy may also be problematic depending on the season it is measured. Seasonal surveys conducted by U.S. Geological Survey have indicated Independence Valley speckled dace are more widely distributed during the spring than the summer and fall (Rissler *et al.* 2001). For instance, we roughly estimated available habitat in the spring to be over 220 hectares (544 acres)<sup>g</sup>. By comparison, total available habitat in the summer was about 150 hectares (370 acres), about a 30 percent reduction. Thus, a comparison of population indices across seasons may be problematic due to differences in sampling efficiency and extent of habitat.

Standard procedures for conducting population surveys for Independence Valley speckled dace need to be established. Spring appears to be the best time to survey for Independence Valley speckled dace because the fish is more widely-distributed and easier to catch, likely due to spawning activity.

*Delisting Criterion No. 2* – The population exists at the aforementioned level (downlisting criteria) for a minimum of one generation (approximately 7 years).

This criterion addresses all factors.

Delisting Criterion No. 2 cannot be demonstrated due to a lack of data. There has been no comprehensive effort to survey Independence Valley speckled dace over 7 consecutive years. The best and most recent information available on the Independence Valley speckled dace population is a report by the U.S. Geological Survey describing results from surveys conducted between 1997 and 1998 (Rissler *et al.* 2001).

*Delisting Criterion No. 3* – Long-term protection of speckled dace populations from nonnative fish and other factors, and speckled dace habitat at Independence Valley Warm Springs is guaranteed.

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<sup>f</sup> We speculate this refers to the restoration of the Warm Springs Complex to resemble pre-settlement times. This would likely be a series of small, unimpounded springs that naturally drain into a large marsh area without canals.

<sup>g</sup> Estimated using data from Rissler *et al.* (2001). We used the number of minnow sets as an indicator of wetted habitat, and assumed that each minnow set covers a 75 x 75 meter plot or 0.5625 hectares. The estimated number of springtime minnow sets was 394 compared to 270 summer minnow sets. A more precise estimate of available or potential and occupied habitat is anticipated as a result of current survey efforts.

This criterion addresses all factors.

Delisting Criterion No. 3 cannot be demonstrated as there are no long-term management plans being developed or implemented which address this goal. There are no plans for transferring this private area to public ownership or securing a conservation easement.

This criterion specifies guaranteed long-term protection of Independence Valley speckled dace and habitat from threats. This does not specify how such protection measures would be defined, therefore, is not measurable. Other recovery plans usually specify development and implementation of a management plan by responsible parties, typically the state resource agency. Also, the Warm Springs Complex is an area currently under private ownership, and thus it may never be possible to guarantee long-term protection.

## **2.3 Updated Information and Current Species Status**

### **2.3.1 Biology and Habitat**

#### Description

Speckled dace are members of the minnow family of fishes (Cyprinidae) that occupy many waters of western North America. They are able to occupy a wide variety of habitats ranging from cold streams and rivers with rocky substrates to small thermal springs with silt substrates. 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. Isolation of populations has permitted genetic divergence and resulted in a number of morphologically-distinct forms recognized as subspecies. Their diet consists primarily of small invertebrates, insects, and zooplankton (Moyle 2002).

Speckled dace tend to be small species (approximately 90 millimeters [3.5 inches] or less in total length as measured from the tip of the snout to the end of the tail fin) and are distinguished by subterminal mouths (below and slightly behind the tip of the snout), small scales, thick tails (caudal peduncle), and slender bodies. Their color is a highly variable shade of olive, but usually consists of dark blotches on the rear half of the fish that often combine to form a dark lateral (side) band (Moyle 2002). 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).

Independence Valley speckled dace and its close relative, the federally endangered Clover Valley speckled dace (*Rhinichthys osculus oligoporus*), 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 immediately to the north. A connection between the valleys was thought to have occurred prehistorically, during the Pleistocene; however, no evidence of any recent connection has been found. Presumably, these subspecies have been separated for thousands of years (Hubbs *et al.* 1974, Hubbs and Miller 1972). Independence Valley and Clover Valley speckled dace are distinguished from the Lahontan speckled dace by their less developed lateral line system on both the body and the head. The Independence Valley speckled dace is further distinguished from the Clover Valley speckled dace by a more laterally-compressed body, a deeper caudal peduncle, fewer pectoral fin rays, and a straighter and more oblique mouth (Hubbs and Miller 1972).

### Distribution

The historical distribution of Independence Valley speckled dace is unknown, although it is believed that it occupied all of the streams and wetlands maintained by local discharge for the Warm Springs Complex in Independence Valley, Nevada (U.S. Fish and Wildlife Service 1998). The Complex is composed of a series of spring-fed ponds, seeps, ditches (for flow conveyance), and associated marsh (Figure 1). A total of eight spring-fed ponds have been delineated for research purposes, referred to as Areas 1 through 8. The ponds are labeled sequentially, from south to north. The extent of the hydrologic connection for Pond 8 (also known as the North Pond) with the rest of the Complex is unclear.

Pond and spring areas typically have open water but are often dominated by aquatic vegetation consisting of *Typha spp.* (cattails) and *Cyperaceae spp.* (bulrush and sedges) along the margins. Other aquatic biota observed include algae, water boatman, water mites, debris-cased caddisflies, adult dragonflies, water striders, and snails (Petersen 2007). Although the entire Complex has been fenced to exclude cattle, a small level of impacts from past grazing has been observed.

The first documented fish survey in the Warm Springs Complex was done in 1965 by Hubbs *et al.* (1974). The survey was believed to be restricted to the small springs/ponds, canals, and a small portion of the marsh of the Warm Springs Complex on private land supporting ranching operations (Hubbs *et al.* 1974; Vinyard 1984). All survey efforts up until the time of listing indicated the subspecies was so scarce that it was difficult to collect a good series of samples. Vinyard (1984) further noted the subspecies was only found in shallow waters not inhabited by predatory bass and bluegill.

A limited number of population surveys conducted since listing of the subspecies contribute to our current understanding of the distribution of Independence Valley speckled dace, as described below (in chronological order).



**Figure 1. Warm Springs Complex with spring areas labeled. Credit: Google Earth Mapping Service.**

Heinrich (1992) reported capturing one Independence Valley speckled dace using a dipnet during an abbreviated survey of shallow portions of the marsh area. However, no index of population size (such as catch-per-unit effort) was provided. He speculated that more Independence Valley speckled dace were abundant amongst the abundant aquatic vegetation.

In October 1994, Nevada Department of Wildlife and the Service collected and released 5 individuals and observed approximately 20 more in the extensive marsh area (U.S. Fish and Wildlife Service 1998).

Johnson (1996) conducted a systematic fish survey of all delineated spring areas in the Warm Springs Complex<sup>h</sup> with emphasis on tui chub. Surveys were

<sup>h</sup> Johnson's naming convention for ponds differed slightly from that of Rissler *et al.* (2001) as follows:

	Differences in Naming Convention			
Johnson 1996	Areas 4 and 5	Area 5	Area 6	None
Rissler <i>et al.</i> 2001	Area 4	Area 4	Area 5	Area 6

conducted in early June and late August and involved the use of dipnets, hook and line, and minnow traps. He reported four spring areas or ponds as being fishless (Areas 1, 3, 4, and 8) and reasoned this to be attributable to winter freeze or a lack a hydrologic connection between ponds. Angled bass were found in Area 6 and ranged in total length from 106 to 225 millimeters (4.2 to 8.9 inches). Johnson also indicated that the associated marsh harbored Independence Valley speckled dace in the general areas they have been documented in previous surveys.

In results from surveys conducted across three seasons (summer and fall of 1997 and spring of 1998), Rissler *et al.* (2001) reported the distribution of Independence Valley speckled dace as being more widespread than previously believed. Using baited minnow traps set throughout the Warm Springs Complex (including the marsh) in a grid fashion, they showed occupancy of 58 hectares (143 acres) for summer 1997, 94 hectares (232 acres) for fall of 1997, and 186 hectares (460 acres) in spring of 1998. Collectively across seasons, occupancy was 219 hectares (540 acres) of the marsh. This is the vast majority of the total wetted area (greater than 4 centimeters or 1.6 inches in depth) in the marsh. As the marsh clearly dominates the Complex in comparison to the springs, canals, and seeps, this indicates a prevalent distribution. However, a precise estimate of the area of all features has yet to be done.

The U.S. Geological Survey is currently in the second year of a three-consecutive year survey effort for Independence Valley speckled dace funded by the Service's Quick Response Program/Science Support Program fund. Data collection is, by design, specific to the downlisting criteria in the Recovery Plan. To date, none of the data or any reports for this effort have been made available, and is pending a third year of data collection and internal peer review. However, incidental observations suggest a similar population distribution as the 1998 spring-time survey as reported in Rissler *et al.* (2001). In summary, speckled dace are found throughout most of the wetted areas of the Warm Springs marsh, but are not found in the springs and canals that are occupied by predatory largemouth bass and bluegill.

Petersen (2007) conducted a fish survey of the ponds and associated canals of the Complex in March and August of 2007, using a combination of baited minnow traps and electrofishing (canals only). He was not able to sample Areas 1 and 3 due to low water. He did not capture any fish in Areas 5, 6, and 7 during both seasons. He also found Independence Valley speckled dace occupied Areas 2, 4, and 8 (also referred to as the North Pond). Largemouth bass and/or bluegill were visually observed in Areas 5, 6, and 7.

### Abundance

It is difficult to fully characterize the abundance of the Independence Valley speckled dace. Like most animal populations, numbers of Independence Valley speckled dace fluctuate annually due to biotic and abiotic factors. Further, survey methods have varied by location and year, which means only general comparisons

among the populations can be made. A population estimate of the subspecies may not be practical due to sampling limitations.

During a seasonal assessment, Rissler *et al.* (2001) captured 400 speckled dace in the summer of 1997, 447 in the fall of 1997, and 9,633 in the spring of 1998. Inspection of the length-frequency distributions from Rissler *et al.* (2001) indicate the presence of at least two age classes with adult stage being greater than 45 mm (1.8 inches) fork length. All fish were captured in the Complex marsh. A significant difference existed in the spring abundance versus the fall and summer periods. Springtime captures were 20 times higher than that of the fall and summer. Rissler indicated that survey methods probably attracted only a small fraction of fish inhabiting the marsh, "... suggesting that there were substantially more speckled dace [in the Complex] than the 9,633 captured in the springtime 1998" (Rissler *et al.* 2001:6). The adaptability of the species and ability to inhabit a broad range of habitat types may allow it to survive in areas of the Complex that are inaccessible to largemouth bass and bluegill, which prefer deeper waters and minimal emergent vegetation.

#### Habitat or Ecosystem Conditions

General habitat conditions in the Warm Springs Complex appear to have remained largely unchanged since the time of listing. We are unaware of studies that have assessed habitat or ecosystem conditions in detail. In general, habitat assessments have been limited to qualitative descriptions of emergent and aquatic vegetation and surface water conditions (Rissler *et al.* 2001; Johnson 1996; Petersen 2007). The dimensions of pond areas have also been estimated (e.g., Johnson 1996). Data for some basic water quality parameters have been recorded for dissolved oxygen, hardness, water temperature, and pH (Johnson 1996).

As evidenced by the wide-spread distribution of Independence Valley speckled dace from Rissler *et al.* (2001), it appears that habitat conditions in the Complex marsh are well suited to the subspecies' life history requirements. However, conditions are less favorable for the dace in areas where there is noticeable velocity and occupation by predatory largemouth bass (Petersen 2007).

Of note, wetted areas of the Warm Springs Complex have shown seasonal variation, with it being largest during the spring (edge areas may become dry during summer and fall) (Rissler *et al.* 2001). Johnson (1996) also found evidence of a seasonally shrinking habitat in Area 7, which was sampled in June and was found to be too shallow to support fish two months later. In the fall of 2007, Petersen (2007) was unable to conduct fish surveys in Areas 1 and 3 due to a lack of water. These are areas which were previously sampled in the spring (e.g., Rissler *et al.* 2001).

### Genetics

No genetics analysis has been completed for Independence Valley speckled dace.

### Taxonomy

No taxonomic changes have been made for Independence Valley speckled dace.

### Associated Species

Additional information about other species relevant to the Independence Valley speckled dace is that historically, it was co-located largely within the same range as the Independence Valley tui chub (*Gila bicolor isolate*; Hubbs and Miller 1972). This suggests that these two species shared similar habitat preferences (although this needs to be verified with additional research). The threats to the speckled dace that have exacerbated over the last century have also caused problems to tui chub to the point when, several decades ago, it was assumed to have gone extinct (Williams *et al.* 1985; Minckley and Douglas 1990). This finding was largely based on the survey work of Dr. Gary Vinyard (1984), which attributed this extinction to limited distribution, habitat disturbance, and introductions of nonnative fishes. The bass and bluegill are purported to have been stocked into the Warm Springs Complex ponds between 1960 and 1966 (Vinyard 1984), and are believed to be a contributing factor to the chub's decline.

Interestingly, tui chub (assumed to be the Independence Valley subspecies), were re-discovered beginning in 1992, but were localized in the immediate outflow of two small springs feeding the Warm Springs Complex. Surveys conducted since the listing of Independence Valley speckled dace have validated the presence of tui chub as described below.

Heinrich (1992) found chubs in good numbers and were easily captured using a dipnet in most of the spring outflows of the Warm Springs Complex. Three chubs were collected and preserved. Heinrich (1992) speculated that an earlier study by Vinyard (1984), in which chubs were not commonly found, may have been due to sampling limited only to the main spring (Area 6).

As part of the first systematic survey of the Complex's springheads, Johnson (1996) found numerous tui chub in Areas 2 and 4, suggesting a potential connection via an old irrigation ditch.

The most extensive assessment of the tui chub population in the Warm Springs Complex is from Rissler *et al.* (2001). In the marsh, they captured a total of 141 fish across three seasons. Tui chub occupancy was estimated to be 190 hectares (470 acres). Like Independence Valley speckled dace, tui chub captures were highest during the spring season. For spring areas, tui chub were found in Areas 2

and 4. The population estimate for Area 2 was 271 with a 95 percent confidence range of 157 to 509. The population estimate for Area 4 was 319 with a 95 percent confidence range of 166 to 671.

In the fall of 2007, Petersen (2007) collected significant numbers of tui chub in several of the spring areas of the Warm Springs Complex. In Area 2, he sampled 50 chub, but was unable to estimate the population. For Area 4, he estimated the tui chub population to be 239 with a 95 percent confidence interval of 222 to 256.

As a part of a three-year survey, the U.S. Geological Survey is collecting tissue samples from the tui chub that will be later used for validating the identity of the subspecies. These samples are currently being stockpiled at the Genomic Variation Lab at the University of California-Davis.

### Summary

In summary, the distribution of Independence Valley speckled dace is more widespread than previously thought at the time of listing. This is **not** to say that their range has expanded—in all likelihood the subspecies was always prevalent in the marsh, but was not detected in earlier surveys. A lack of information at this time prevents us from determining trends.

### **2.3.2 Five Factor Analysis**

At the time of listing, the threats to Independence Valley speckled dace included limited distribution, competition and predation by nonnative fishes, and habitat manipulation (54 FR 41448). Existing threats are as follows:

#### **2.3.2.1 Factor A – Present or threatened destruction, modification or curtailment of its 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 (54 FR 41448). Since then, new information has been obtained questioning the extent of these threats. The current status of these threats is described below.

#### Limited Distribution

Based on the results from Rissler *et al.* (2001), it appears the distribution of Independence Valley speckled dace is much more widespread than previously believed. The dace were found to occupy the majority of the marsh (219 hectares or 544 acres), which is the dominant feature of the Complex. However, they were not found in the pond areas and associated canals in significant numbers.

The U.S. Geological Survey has just completed the second year of a three-consecutive year study of the Warm Springs Complex. Preliminary results on distribution of the dace are similar to that from Rissler *et al.* (2001) (G. Scopettone, U.S. Geological Survey, pers. comm., 2007). For these reasons, limited distribution may not be seen as a viable threat. This, however, is pending final results from this latest study.

### Habitat Manipulation

Neither the dace nor their habitat were known to science before settlers moved into the area and began manipulating springs to facilitate irrigation. Therefore, the precise limits of the historically-occupied habitat have not been identified.

The specific habitat requirements of Independence Valley speckled dace have not been formally described. However, information gathered about dace occupying other springs within northern Nevada indicates these speckled dace occupied all of the streams and wetlands maintained by local spring discharge (NDOW 2006). This suggests significant overlap in the habitat preferences between Independence Valley speckled dace and other dace subspecies. The Service thus assumes that these other dace subspecies may serve as adequate surrogates for Independence Valley speckled dace. Thus, it is believed that that much of the Warm Springs Complex marsh where there is adequate water may be potential habitat for the Independence Valley speckled dace. This area has abundant emergent vegetation that provides cover and appears to possess characteristics in support of spawning and other life history requirements (Rissler *et al.* 2001).

The land surrounding the Warm Springs Complex is subject to private management. Currently, the area is fenced to exclude cattle (although some trespass cows are occasionally observed). The existing landowner has not indicated any long-term management goals for this area. It is possible that this could include destructive actions like intensive cattle grazing or water exportation. Elevated levels of cattle grazing may result in changing, reducing, or eliminating wetland-associated vegetation which may result in reductions in shade and cover (Platts 1991). In addition, intense grazing can cause bank erosion which contributes sediments. Grazing affects soils by reducing litter production, increasing amount of bare ground, increasing soil compaction, decreasing water infiltration rate, reducing fertility, and increasing erosion (Belsky *et al.* 1999). Another possibility is for the springs to become used for water exportation, which could reduce the water table in the valley and lead to reduction in the size of the marsh.

With this uncertainty on grazing management or potential water exportation, it is difficult to predict what future habitat conditions may be. Therefore, habitat manipulation must still be considered a potential threat to Independence Valley speckled dace.

Some level of habitat restoration may be needed to eliminate or control predatory non-native fish species. For example, spring areas have been impounded which has created habitat favorable for largemouth bass and bluegill. Restoring these areas to a free-flowing system as it was historically will help reduce this threat.

#### **2.3.2.2 Factor B – Overutilization for commercial, recreational, scientific, or educational purposes:**

At the time of listing, the collection of speckled dace for scientific purposes was determined to have no effect on population viability (54 *FR* 41448). Since then, there have been no additional threats identified due to overutilization for commercial, recreational, scientific, or educational purposes. Currently, we do not consider overutilization for commercial, recreational, scientific, or educational purposes a threat to Independence Valley speckled dace. The State of Nevada designated Independence Valley speckled dace as endangered, resulting in prohibition of the take or possession of the fish. The only utilization of Independence Valley speckled dace is for scientific purposes, and the Service and Nevada Department of Wildlife will closely monitor take through a carefully managed permit process to ensure that it does not become a threat.

#### **2.3.2.3 Factor C – Disease or predation:**

Disease and predation were listed as threats to Independence Valley speckled dace populations at the time of listing (54 *FR* 41448) and are still considered threats on various levels.

Disease has not been assessed nor documented in Independence Valley speckled dace populations. However, a number of diseases are known to occur naturally in other speckled dace populations in the Great Basin. These are not believed to have a substantial impact on population viability. The establishment of nonnative fishes in the Complex spring areas and associated canals may provide an avenue for foreign diseases to be introduced. Such introductions of disease have occurred in other portions of Nevada. Minckley and Deacon (1968) reported the introduction of foreign parasites into the Moapa River system in southern Nevada which apparently accompanied the establishment of nonnative fishes in the local springs and streams. Analysis of native fishes in the Moapa Valley showed that these parasites have successfully infected the local fish community and may be depressing population numbers.

Predation of Independence Valley speckled dace by nonnative species is a major concern. Sport fishes introduced into North America have frequently been reported as preying upon or competing with native fishes. In many instances, nonnative species have caused the native fishes to be eliminated (Moyle 2002, Taylor *et al.* 1984).

Hubbs *et al.* (1974) observed largemouth bass, bullfrogs, and a single carp (*Cyprinus carpio*) in the first documented fish survey of the Warm Springs Complex in 1965. Since then, Heinrich (1992), Johnson 1996, Rissler *et al.* (2001), and Petersen (2007) have all observed bass, bluegill, and bullfrogs in several pooled spring areas of the Warm Springs Complex.

It is believed that the introduction of largemouth bass and bluegill have significantly impacted the native fishes occupying springs in northeastern Nevada (U.S. Fish and Wildlife Service 1998). The presence of predatory species in springs occupied by the Independence Valley speckled dace is noted as being a major factor depressing their population numbers (Hubbs *et al.* 1974, Vinyard 1984). This contention has support in fish survey results by Rissler *et al.* (2001) showing an absence of dace in those areas inhabited by largemouth bass. However, it has also been argued that these deeper pond areas may be poor habitat for the speckled dace. Vinyard (1984) indicated support for the account by Hubbs *et al.* (1974) that Independence Valley speckled dace may have never been abundant in spring outflow channels, and that their restriction to the marsh may reflect a pre-existing condition rather than a reduction of habitat occupied since since the introduction of nonnative fishes. Petersen's analysis of the stomach contents of 15 bass produced mostly damselfly, dragon fly adults and larvae, and mosquitofish, but no dace (Petersen 2007).

In summary, the level of predation that occurs on Independence Valley speckled dace and the long-term effects to the population are unknown. A more thorough assessment of predation is needed. Until this is available, predation should still be recognized as a serious threat due to its generally recognized adverse impacts to other native fishes.

#### **2.3.2.4 Factor D – Inadequacy of existing regulatory mechanisms:**

Inadequacy of existing regulatory mechanisms was not considered a threat to Independence Valley speckled dace populations at the time of listing (54 *FR* 41448). A number of Federal and State regulations provide varying levels of protection for this species, as described below.

## Federal Laws

### *Clean Water Act*

In general, the term “wetland” refers to areas meeting the U.S. Army Corps of Engineers’ criteria of having hydric soils, hydrology (either sufficient flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any actions within Independence Valley speckled dace habitat that has the potential to impact waters of the United States would be reviewed under the Clean Water Act, as well as the National Environmental Policy Act and the Endangered Species Act. These reviews would require consideration of impacts to the dace and its habitat, and when significant impacts could occur, mitigations would be recommended. The Service believes the Clean Water Act alone is not adequate to protect Independence Valley Speckled Dace and its habitat. A potential major threat to the subspecies, described earlier, relates to nonnative fishes found within occupied habitat. In this instance, the Clean Water Act does not address the issue.

### *Endangered Species Act*

The Endangered Species Act (Act) is the primary Federal law providing protection for the Independence Valley speckled dace since its listing. The primary sections of the Act affecting the status of the species are sections 7, 9, and 10 as discussed below.

Section 7 of the Act requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species, and provides the mechanisms for authority of incidental take where such take will not jeopardize the species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers or distribution (50 CFR § 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of fish or wildlife from a project. Incidental take refers to taking that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant (50 CFR § 402.02). While projects that are likely to result in adverse effects often include minimization measures, the Service is limited to requesting minor modifications in the project description. In instances where some incidental take is unavoidable, we require that additional measures be performed by the project proponents to minimize negative impacts.

We are unaware of any section 7 consultations that have occurred in the Warm Springs Complex since listing. In the event a proposed action with a Federal nexus could affect Independence Valley speckled dace, authorization of take would be subject to implementation of measures to reduce impacts to the species. Thus, application of section 7 generally appears to be an effective regulatory tool for conservation of Independence Valley speckled dace, and we believe it is still needed to ensure the conservation and recovery of the subspecies.

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR §17.3). Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR §17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. We are unaware of any section 9 violations associated with activities consultations that have occurred in the Warm Springs Complex since listing.

Section 10 of the Act authorizes scientific permits for research or to enhance the survival and recovery of listed species (e.g., via Safe Harbor Agreements); incidental take permits for non-Federal parties based on a habitat conservation plan that will not appreciably reduce the likelihood of survival and recovery of the listed species; and experimental populations outside a species' current range. The Service provides research permits under conditions that are protective of the Independence Valley speckled dace population. We have no reason to believe that these activities are detrimental to the Independence Valley speckled dace population. As of the date of this review, no non-Federal parties have sought Safe Harbor Agreements or incidental take permits for Independence Valley speckled dace. If important causes of take are identified that are appropriate for application of the incidental take authorizations for non-federal parties under section 10, we will encourage the involved parties to enter into negotiations under that section.

Probably the most important indirect effect of ongoing regulation under the Act is the growing awareness of endangered species issues on behalf of the current landowner. Once better information is obtained on the life history requirements of Independence Valley speckled dace and its threats, the Service expects to engage the landowner in a conservation strategy that may include a Safe Harbor Agreement, which could help facilitate delisting.

In conclusion, to date there has been little need to apply existing authorities under the Act. However, it is anticipated that future applications may require these authorities, especially section 10.

#### State Laws

The Independence Valley speckled dace is protected as a State of Nevada endangered species (NAC 503.065). The Nevada Department of Wildlife requires a permit to authorize scientific collections of this fish (NRS 503.597 and 503.650 and NAC 503.094). This agency also regulates the introduction, transplanting or exporting of wildlife, including nonnative fishes on public and private lands

#### **2.3.2.5 Factor E – Other natural or manmade factors affecting its continued existence:**

At the time of listing, vandalism and nonnative fish were identified as natural or manmade threats affecting the continued existence of Independence Valley speckled dace populations (54 *FR* 41448). We still consider vandalism to be a potential threat to the Independence Valley speckled dace habitats because all available habitats are located on privately-owned land. These threats as well as several additional threats have been identified since the time of listing are discussed below.

#### Nonnative Fish

Nonnative fish are still considered a threat to Independence Valley speckled dace populations, as discussed in sections 2.2.4 and 2.3.2.3. Independence Valley speckled dace populations have been affected by introduction of nonnative fishes, specifically largemouth bass and bluegill. The specific interaction between Independence Valley speckled dace and nonnative fishes is not known. However, Johnson (1996) and Rissler et al. (2001) reported that dace were rare to non-existent in areas with largemouth bass and bluegill, i.e., in the spring areas. These nonnative fishes occupy only a relatively small portion of the Warm Spring Complex's pond areas and canals, and dace are found in relative higher numbers in the Complex's marsh.

In surveys conducted in 2006 and 2007 by the U.S. Geological Survey, a new nonnative fish, mosquitofish, was observed to inhabit portions of the Complex (G. Scopettone, pers. comm., 2007). Until further analysis of these data are available, it remains unclear what effect, if any, this newly introduced species will have on the dace population.

### Vandalism

Vandalism has never been reported to affect rare aquatic species in Nevada. However, we believe that threats of vandalism have been made that, if carried out, may reduce or eliminated populations of rare species with a limited distribution. For example, a population that occupies a small water body could be seriously impacted by the use of poisons (e.g., household bleach). However, given the widespread distribution of Independence Valley speckled dace throughout the Warm Springs Complex, it is believed that acts of vandalism would likely be localized and thus have minimal impact on the population as a whole.

### Groundwater Withdrawal

Groundwater withdrawal is a new threat not identified at the time of listing. Groundwater withdrawal could severely reduce the amount of discharge from all spring systems occupied by the Independence Valley speckled dace. Reducing the discharge issuing from the springs could diminish valuable habitat and further limit the distribution of the fish. As the area around the Warm Springs Complex is under private ownership, groundwater pumping may be a possible threat.

### Catastrophic Events

Catastrophic events that can impact an entire subwatershed such as drought, fire, or a combination thereof, have the potential to seriously affect Independence Valley speckled dace whose distribution is confined to that valley. Drought could result in a lowering of the water table, which could result in reduced flows out of the springs feeding the Warm Springs marsh and reducing available aquatic habitat. A significant fire would directly increase water temperature that may result in fish mortalities. In addition, fire would destroy vegetation of the marsh system that provides structure and shading to the system. The influx of ash would also affect water quality. Due to the stochastic (random and/or unpredictable) nature of such events, it is difficult to quantify the potential effects to the dace population. We believe it may be prudent to examine prospects for establishing a refuge population(s) to help address this issue.

## Climate Change

Global warming is becoming more and more of a concern with regards to biological effects. At the continental and regional scale, numerous long-term changes in climate have been apparent and include widespread changes in precipitation amounts, wind patterns, and aspects of extreme weather (e.g., droughts, heavy precipitation, and heat waves) (Intergovernmental Panel on Climate Change 2007).

However, quantifying the potential site-specific effects to the Independence Valley speckled dace population, and the time scale at which they would occur, is difficult. The subspecies is geographically isolated and relies on a series of springs as a water source. Difficulties remain in reliably simulating and attributing global warming effects at smaller, localized scales. Natural climate variability is relatively larger-scaled, thus making it harder to distinguish changes expected due to external, human-related sources (Intergovernmental Panel on Climate Change 2007). Our concern with this threat is linked to the extent that global warming may affect the water supply of the Warm Springs Complex through lowering groundwater levels and the frequency/intensity of fires in the area.

## **2.4 Synthesis**

Up until the time of Independence Valley speckled dace listing in 1989, it appears that none of the population surveys covered the entire Warm Springs Complex, which likely is the historical distribution of the subspecies. Surveys conducted since then indicate that the distribution of Independence Valley speckled dace is much more widespread than previously thought. Earlier surveys focused on the springs and canals of the Warm Springs Complex, but failed to assess the population in the associated marsh, a significant component of the Complex. Moreover, the latest information suggests population numbers are high, consisting of several age-groups.

Despite the favorable results from fish surveys, there are ongoing threats to the subspecies that should be addressed prior to recommending a change in status. The primary threats at the time of listing which still occur today included competition and predation by nonnative fishes, and the potential for habitat manipulation on surrounding private lands (54 *FR* 41448). Several new threats since listing include catastrophic events such as drought and fire. In addition, our ability to assess the status and threats to the Independence Valley speckled dace is compromised by the lack of information on its habitat affinities and vulnerability to predation. Because these threats pose significant ongoing and potential risks to the continued well-being of Independence Valley speckled dace populations, we believe this subspecies continues to meet the definition of endangered and no change in status is recommended at this time.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

We recommend that Independence Valley speckled dace remain listed as endangered.

- Yes, downlist to Threatened
- Yes, uplist to Endangered
- Yes, delist
- No, no change is needed

#### 3.2 New Recovery Priority Number

We recommend that the recovery priority number be changed from its current number of 6C (high degree of threat, low recovery potential, economic conflict) to 9C (moderate degree of threat, high recovery potential, economic conflict). The rationale for this recommended change is due to recent evidence showing that Independence Valley speckled dace are much more widely distributed than previously thought. In addition, surveys show the primary threat from predatory nonnative fish may be isolated to a small portion of the Warm Springs Complex. With the implementation of protective measures for habitat and the species, there is a high likelihood of meeting the delisting criteria. Delisting the speckled dace would likely require the development and implementation of long-term management for the subspecies to ensure long-term persistence. Long-term management would likely involve containment or removal of predaceous nonnative fishes (i.e., the bass and bluegill) and protection of existing spring areas. In the event that affected lands remain in private ownership, such management probably would require the participation of the Nevada Department of Wildlife and private landowner(s). Involvement of the Nevada Department of Wildlife is critical due to their expertise and capabilities in nonnative fish removal or containment. If appropriate monitoring and management are implemented over the next 5 years, upon our next 5-year review we may consider recommending that the subspecies be downlisted to threatened.

### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. The Service should consider formally assembling a Recovery Implementation Team (RIT) for Independence Valley speckled dace with representatives from the Service, U.S. Geological Survey, Nevada Department of Wildlife, and landowner (currently, Newmont Mining Corp.). The RIT should meet periodically (at least once a year). Lead agencies then could implement decisions of the RIT by working closely with appropriate Federal

agencies, State agencies, and the private landowner(s). The purpose of the RIT would be several-fold, including, but not limited to:

- a. define downlisting and delisting criteria in measurable terms;
  - b. determine standardized methods to collect Independence Valley speckled dace data in accordance with downlisting and delisting criteria;
  - c. assess the level of threat from predatory fishes to the long-term survival of the species;
  - d. identify strategies for habitat restoration and removal of threats;
  - e. identify strategies for long-term management and identify roles/responsibilities;
  - f. identify possible funding sources or methods by which Independence Valley speckled dace population surveys can be continued in accordance with delisting criteria (i.e., for four more consecutive years); and
  - g. share information on upcoming activities and past accomplishments.
2. The Service or U.S. Geological Survey should use Geographic Information Systems to map, stratify, and quantify seasonal habitat for major features of the Warm Springs Complex (i.e., springs, canals, seeps, and marsh).
  3. The Service should determine the feasibility of the landowner's willingness to sell critical portions of the Warm Springs Complex to the State or Bureau of Land Management, and provide assistance in identifying sources of funding. Alternatively, there should be some exploration of a conservation agreement/conservation easement or Safe Harbor Agreement with the private landowner.
  4. Strategies should be developed as needed to remove predatory nonnative fishes (i.e., largemouth bass and bluegill). If practicable, these strategies should be implemented and the areas monitored for at least 3 years to determine level of success. A pilot study on a smaller pond (e.g., Area 5) should be pursued prior to removal efforts on the larger Area 6.
  5. Other recommendations include exploring the possibility of establishing and managing a refugia population for Independence Valley speckled dace in the event of a catastrophic event or disease affecting the Warm Springs Complex; collecting and storing tissue samples pending interest as a part of a genetics assessment; and collecting information on the tui chub population to pursue a formal assessment of this subspecies to verify its identity.

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U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW OF INDEPENDENCE VALLEY SPECKLED DACE

Current Classification: Endangered  
Recommendation resulting from the 5-Year Review

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

Review Conducted By David Potter and Jody Brown

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 7/2/08

REGIONAL OFFICE APPROVAL:

**Acting** Lead Regional Director, Fish and Wildlife Service

Approve  Date 7/10/08