

Status review of Foscett Spring Speckled Dace (*Rhinichthys osculus* ssp.)
Oregon Department of Fish and Wildlife
January 2017

Executive summary

Foscett Spring Speckled Dace (*Rhinichthys osculu*) is listed as threatened on the State List of Threatened and Endangered Species ("State List"; OAR 635-100-0125). The listing occurred because Foscett Spring Speckled Dace were listed as threatened under the federal Endangered Species Act (ESA) at the time the state list was created (consistent with 635-100-0105(2)(a)). The recovery of Foscett Spring Speckled Dace was guided by the criteria in the federal Recovery Plan (USFWS 1998). The U.S. Fish and Wildlife Service (USFWS) recently completed a 5-year review of the status of Foscett Spring Speckled Dace and concluded that the recovery criteria had been met, recommending that Foscett Spring Speckled Dace be delisted from the federal ESA (USFWS 2015). This review describes the current status of Foscett Spring Speckled Dace relative to both the state and federal delisting criteria (OAR 635-100-0112; USFWS 1998).

Removing a species from the State List requires a public rulemaking and determinations by the Commission (OAR 635-100-0112). These decisions require an evaluation of the biological status of the species to determine whether (OAR 635-100-0112(1)-(3) and 0105(6)):

1. The species is not, or is not likely to become within the foreseeable future, in danger of extinction throughout any significant portion of its range in this state, or is not at risk of becoming endangered throughout any significant portion of its range in this state;
2. That the natural reproductive potential of the species is not in danger of failure due to limited population numbers, disease, predation or other natural or human-related factors affecting its continued existence;
3. That most populations of the species are not undergoing imminent or active deterioration of their range or primary habitat;
4. That overutilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or is not likely to occur; and
5. That existing state or federal programs or regulations are adequate to protect the species and its habitat.

There are three criteria, identified in the Federal Recovery Plan necessary to federally delist Foscett Spring Speckled Dace and consider them recovered under the federal ESA:

1. Long-term protection to its habitats, including spring source aquifers, spring pools and outflow channels, and surrounding lands, is assured;
2. Long-term habitat management guidelines are developed and implemented to ensure the continued persistence of important habitat features and include monitoring of current habitat and investigations for and evaluations of new spring habitats;
3. Research into life-history, genetics, population trends, habitat use and preference, and other important parameters is conducted to assist in further developing and/or refining criteria 1) and 2), above.

Based on a review of the recovery actions that have been conducted and the best available scientific data, Foscett Spring Speckled Dace meet the biological and non-biological criteria for delisting. The

habitat supporting Foscett Spring Speckled Dace has been sufficiently protected by land purchase, fencing, and regulations against commercial use. Population size of Foscett Spring Speckled Dace fluctuates annually, and is associated with the amount of open-water habitat. To ensure there is sufficient habitat to support Foscett Spring Speckled Dace, the U.S. Bureau of Land Management (BLM), Oregon Department of Fish and Wildlife (ODFW), and USFWS have signed a Cooperative Management Plan that includes actions to: 1) protect and manage these habitats, 2) enhance the habitat, when appropriate, 3) monitor the Foscett Spring Speckled Dace populations and habitats, 4) develop a regular maintenance schedule to increase and maintain suitable open-water habitat and 5) develop an emergency contingency plan to address potential threats from pollutants or the introduction of nonnative species (USFWS et al. 2015).

Introduction

Speckled Dace (*Rhinichthys osculus*) are geographically widespread throughout the western United States and occur in many isolated subbasins and interior drainages in south-central Oregon (Figure 1). The Foscett Spring Speckled Dace is represented by a naturally-occurring population that inhabits Foscett Spring and an introduced population that inhabits Dace Spring, both located on the west side of Coleman Lake in Lake County, Oregon (Figure 2). Foscett Spring Speckled Dace became isolated in Foscett Spring at the end of the most recent pluvial period (9,000-10,000 years ago). Foscett Spring Speckled Dace were listed as threatened under the federal ESA in 1985 (USFWS 1985) because they naturally occur within a single small spring with an extremely vulnerable outflow that was experiencing human disturbance. Foscett Spring is a natural spring that rises from a springhead pool, flows through a narrow spring brook into a series of shallow marshes, and then disappears into the soil of the normally dry Coleman Lake (Figure 2). Dace Spring is artificially constructed and consists of two pools that were excavated in a shallow spring brook.

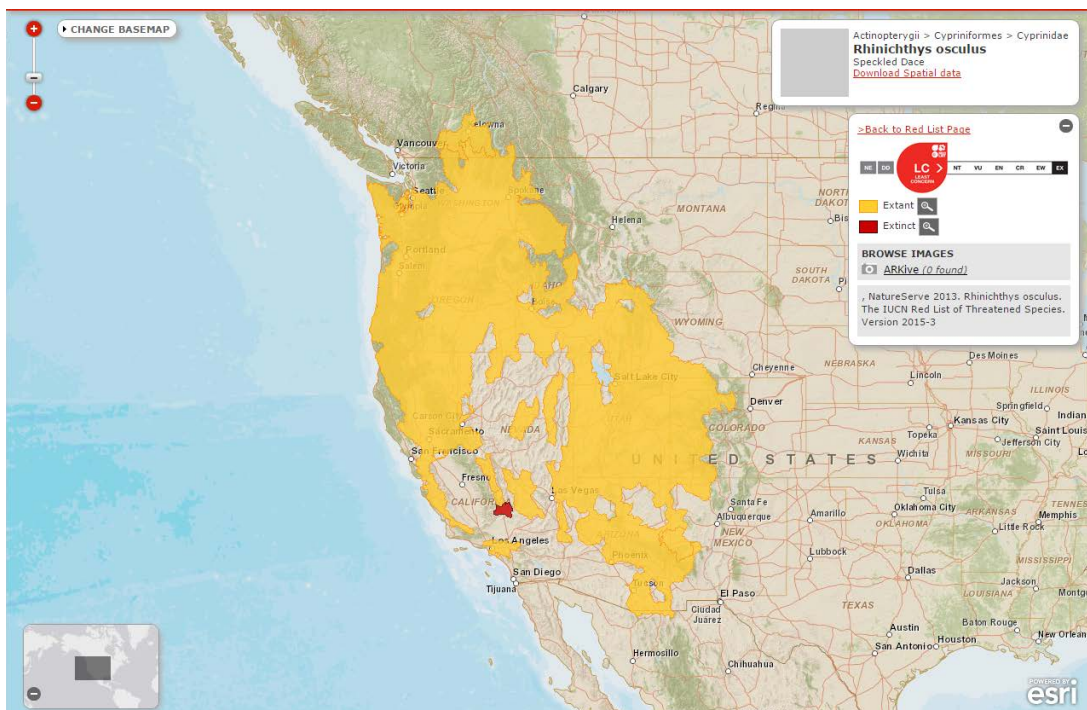


Figure 1. Range of Speckled Dace. Source: NatureServe 2013 ICUN Red List of Threatened Species.

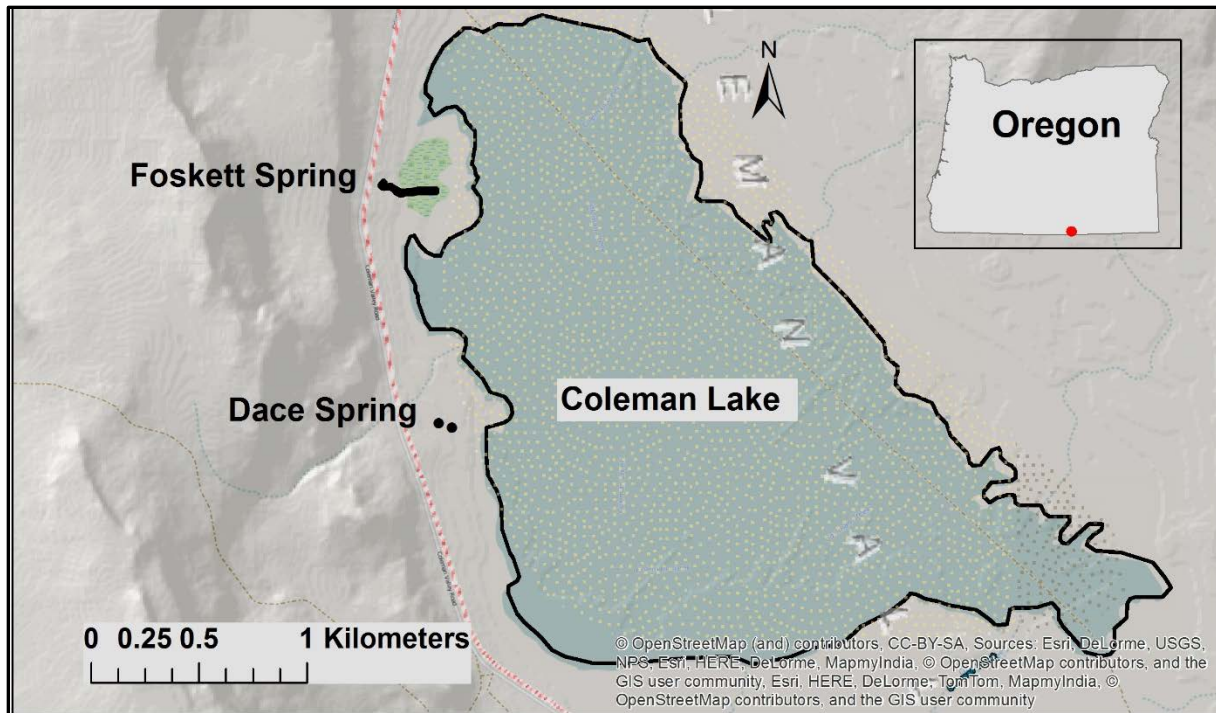


Figure 2. Map showing the location of Foscett and Dace Springs.

Although the Foscett Spring Speckled Dace are relatively abundant, they are naturally at risk of extinction because they are represented by a single natural population that occupies limited habitat. To address this increased risk, ODFW, USFWS, and BLM have signed a Cooperative Management Plan that outlines roles and responsibilities of each organization to ensure the long term persistence of Foscett Spring Speckled Dace (discussed below).

Recovery actions

Substantial progress has been made towards the conservation and long term persistence of Foscett Spring Speckled Dace, primarily as a result of habitat protection and enhancement. In 1987, the BLM acquired the 65-hectare parcel of land containing Foscett and Dace springs and fenced 28 hectares to exclude cattle from the springs. Currently, the BLM manages the lands surrounding the springs consistent with the Lakeview Resource Management Plan (BLM 2003), which identifies Foscett Spring Speckled Dace as a Special Status Species to be managed in accordance with the Federal Recovery Plan.

In 2009, BLM and USFWS completed a habitat enhancement project creating two spring-fed pools at Dace Spring. The Foscett Spring Speckled Dace population in Dace Spring was initially established from an introduction of 100 fish from Foscett Spring in 1979-1980 (Williams et al. 1990); however, this effort failed due to habitat loss (vegetative encroachment) and lack of successful recruitment. In 2010-2011, ODFW introduced 124 Foscett Spring Speckled Dace from Foscett Springs into these ponds; however, survival of these fish was low, due to frequent prolonged algal blooms and resultant anoxic conditions (Scheerer et al. 2012; 2013). In September 2013, BLM excavated flow-through channels to improve water circulation in the Dace Spring ponds and observed immediate improvement in water clarity (algal bloom subsided) and water quality (dissolved oxygen increased from 0.1 ppm to over 4.0 ppm) (Scheerer et al. 2013). In October 2013, ODFW transferred an additional 200 Foscett Spring Speckled

Dace from Foskett Spring into the Dace Spring ponds (100 fish each). ODFW plans to continue transferring Foskett Spring Speckled Dace into Dace Springs as deemed necessary to minimize impacts to the donor population and negative genetic consequences resulting from genetic drift or founder effects in the recipient population.

In 2012, BLM conducted a controlled burn in the tule and cattail marshes of Foskett Spring to reduce the vegetative biomass and in 2013-2014 hand excavated 11 pools, substantially increasing the amount of open-water habitat suitable for Foskett Spring Speckled Dace (Scheerer et al. 2013; 2014). BLM plans to further enhance the open-water habitat by excavating them to a greater depth (>1 m) using an excavator in the winter of 2017.

Two genetics studies were recently completed. Ardren et al. (2010) questioned the taxonomic status of the Foskett Spring Speckled Dace. Speckled Dace from the Warner Basin, including those from Foskett Spring, were found to be closely related, but showed signs of recent isolation from each other. Levels of genetic divergence observed between Speckled Dace from Foskett Spring, compared to other Speckled Dace from the Warner Basin, were in the range typically observed between populations belonging to the same species. This study was followed by a more extensive geographic, taxonomic, and phylogenetic analysis of Speckled Dace from Foskett Spring and adjacent basins (Hoekzema and Sidlauskas 2012). These findings confirmed the conclusion of Ardren et al. (2010) that Foskett Spring Speckled Dace were isolated relatively recently (10,000 years vs. millions of years) and suggest that Foskett Spring Speckled Dace do not constitute a distinct subspecies under a phylogenetic species concept. Using microsatellite loci, which evolve more quickly than mitochondrial loci, Hoekzema and Sidlauskis (2014) found no evidence for recent gene flow, that Foskett Spring Speckled Dace is a genetically distinct population (even though it is not a distinct subspecies), and suggest, with support from their morphological analysis, that Foskett Speckled Dace constitute a distinct evolutionary significant unit under the ESA.

In 2015, BLM, ODFW, and USFWS completed a Cooperative Management Plan for Foskett Spring Speckled Dace to ensure the continued persistence of important habitat features in these spring areas including actions to: 1) protect and manage these habitats, 2) enhance the habitat when appropriate, 3) monitor the Foskett Spring Speckled Dace populations and habitats, 4) develop a regular maintenance schedule to increase and maintain suitable open-water habitat, and 5) develop an emergency contingency plan to address potential threats from pollutants or the introduction of nonnative species (USFWS et al. 2015).

Analysis of State List delisting requirements

State Criterion 1: The species is not, or is not likely to become within the foreseeable future, in danger of extinction throughout any significant portion of its range in this state, or is not at risk of becoming endangered throughout any significant portion of its range in this state

This Criterion has been met. The historical and current range of Foskett Spring Speckled Dace is limited to Foskett Spring and the adjacent Dace Spring (Figure 2). In 2005 and 2007, about half of the population of Foskett Spring Speckled Dace was located in the 33 m² spring pool. The open-water habitat at Foskett Spring has undergone changes resulting in substantially reduced open-water area due to vegetation encroachment between 1997 and 2012. BLM conducted habitat enhancement projects from 2012 through 2015 that excavated vegetation and increased open-water habitat by about 112 m², from 107 to 219 m²; currently (2016) open-water habitat is about 130 m². BLM plans to conduct additional vegetation excavation in 2017.

Historical data on abundance of Foscett Spring Speckled Dace are limited. Bond (1974) made a visual estimate of abundance in 1974 and reported that “*there may be 1,500 to 2,000 fish at Foscett Spring*”. In 1997, the population of Foscett Spring Speckled Dace was estimated to be 27,787 fish (Dambacher et al. 1997). At that time, the majority of the population (97%) occupied a shallow ephemeral open-water pool outside of the existing Foscett Spring enclosure fence. This shallow pool was dry in 1989 (Dambacher et al. 1997). Additional population estimates were obtained by ODFW from 2005 through 2016 in Foscett Spring (Figure 3) and from 2013 through 2016 in Dace Spring (Figure 4).

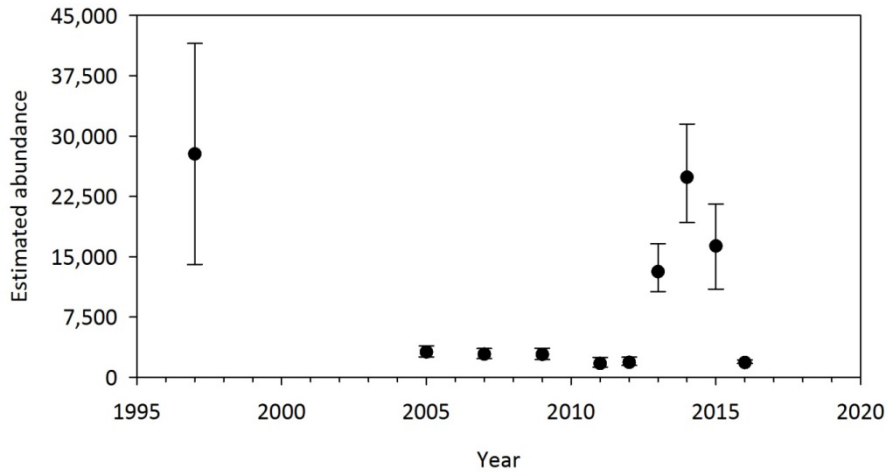


Figure 3. Estimated abundance (number of individual fish) of Foscett Spring Speckled Dace in Foscett Spring from 1997 through 2016. Vertical bars represent 95% confidence limits for each estimate.

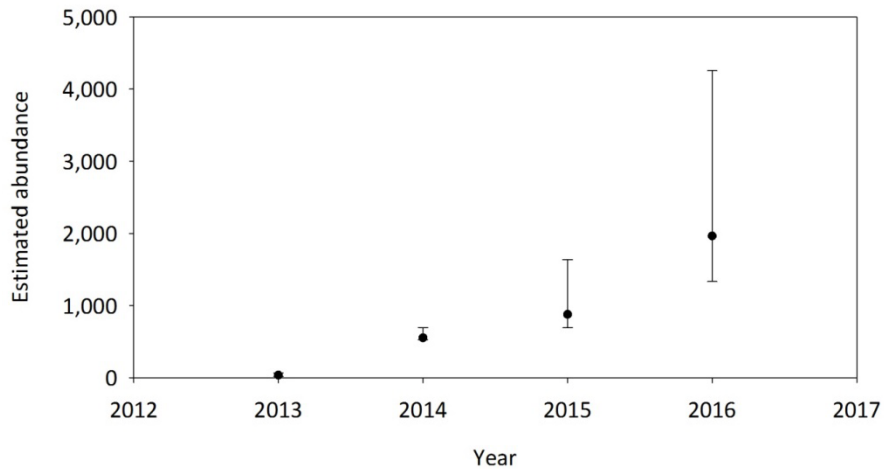


Figure 4. Estimated abundance (number of individual fish) of Foscett Spring Speckled Dace in Dace Spring from 2013 through 2016. Vertical bars represent 95% confidence limits for each estimate.

ODFW observed a reduction in abundance of Foscett Spring Speckled Dace coincident with a qualitatively-assessed decrease in open-water habitat at Foscett Spring from 1997 through 2012 (Dambacher et al. 1997; Scheerer and Jacobs 2005, 2007, 2009; Scheerer 2011; Scheerer et al. 2012). Open-water habitat within the fenced enclosure declined during this period as a result of encroachment of aquatic and terrestrial vegetation, possibly a result from exclusion of native herbivores (e.g., mule deer, antelope). To address this, BLM conducted habitat management at Foscett Spring consisting of burning aquatic vegetation and deepening pools. Following BLM habitat management activities the Foscett Spring Speckled Dace population increased in abundance from about 1,800 individuals in 2011 to more than 24,000 individuals in 2014 (Scheerer et al. 2014). The population declined again in 2015 and 2016 concurrently with a decrease in available habitat as vegetation became re-established (Figure 5). BLM and USFWS are currently planning further habitat management activities to increase open-water habitat. The long term maintenance of habitat is guided by the Cooperative Management Plan signed by ODFW, BLM, and USFWS.

To reduce the risk of extinction of Foscett Spring Speckled Dace associated with a single population in limited habitat, BLM and USFWS created two spring-fed pools at Dace Spring in 2009. In 2010-2011, ODFW introduced 124 Foscett Spring Speckled Dace from Foscett Spring into these ponds. In 2011-2013, ODFW documented evidence of recent recruitment at Dace Spring, but also documented substantial algal blooms, periods of low dissolved oxygen, trapping related mortalities, and low survival. In 2013, BLM modified the fresh water delivery from the spring source so that it passes through the ponds; previously, only a single channel existed. There was an immediate improvement in water clarity and quality in the ponds. In October 2013, ODFW introduced 200 Foscett Spring Speckled Dace from Foscett Spring into the ponds (100 each). In 2014 through 2016, ODFW documented successful recruitment and an increase in abundance of Foscett Spring Speckled Dace at Dace Spring (2016 estimate = 1,964 fish).

As a result of the commitment to maintaining open-water habitat, and in the absence of other threats (disease, demographic stochasticity, etc.), we conclude that the species is not likely to become extinct within its range in the foreseeable future.

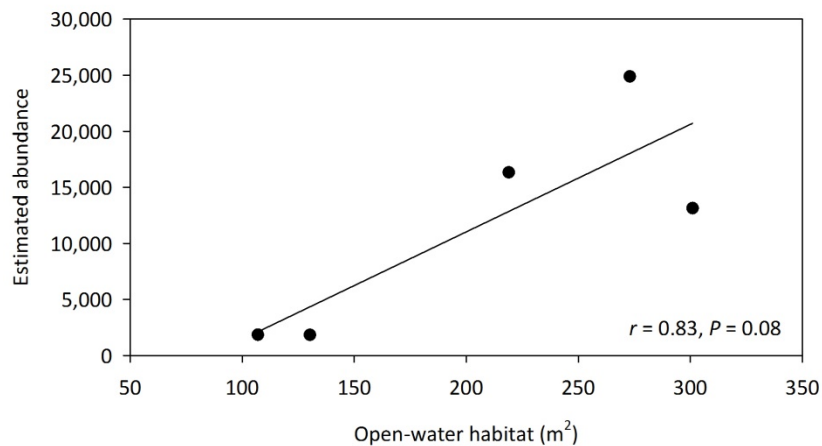


Figure 5. Correlation between open-water habitat and estimated abundance of Foscett Spring Speckled Dace in Foscett Spring from 2012-2016.

State Criterion 2: The natural reproductive potential of the species is not in danger of failure due to limited population numbers, disease, predation or other natural or human-related factors affecting its continued existence.

This Criterion has been met. ODFW has consistently documented annual recruitment (presence of young-of-the-year Foscett Spring Speckled Dace) and a broad size range of individuals, which is indicative of multiple age classes. Foscett Spring Speckled Dace spawning occurs, as evidenced by presence of larval Foscett Spring Speckled Dace, beginning in early spring (March-April) and extending into July. Young-of-the-year Foscett Spring Speckled Dace are more common in the shallow marsh habitats (unpublished data). At Dace Spring, ODFW has documented individuals that grew to adult size and matured in a single year and gained insight into species longevity by noting individuals from 2010-2011 translocations that were present and alive in 2014 (4-5 years old).

The original listing in 1985 stated, "There are no known threats to Foscett Spring Speckled Dace from disease or predation", and there are no additional data available that would change this conclusion. Surveys conducted by ODFW have concluded that Foscett Spring Speckled Dace are in good condition with no obvious external parasites (Scheerer and Jacobs 2005; Scheerer 2011). The Cooperative Management Plan outlines that there will be quarterly field visits to Foscett and Dace springs in the future to determine continued presence of Foscett Spring Speckled Dace, determine general health of the local spring environment (photo points, water quality), and identify threats that necessitate implementation of the emergency contingency plan, which could include the detection of disease and introduced predators. The emergency contingency plan describes steps to take to temporarily secure Foscett Spring Speckled Dace in the event that their persistence is under immediate threat (e.g., from introduction of non-native fish that may threaten them due to predation or act as a disease vector).

State Criterion 3: Most populations of the species are not undergoing imminent or active deterioration of their range or primary habitat.

This Criterion has been met. Foscett Spring Speckled Dace consist of a single known population in Foscett Spring and a conservation population in the artificially constructed Dace Spring. The primary habitat at both these sites is under active management by BLM to maintain open-water habitat and water quality per the Cooperative Management Plan. Actions identified in the Cooperative Management Plan include: 1) protect and manage Foscett Spring Speckled Dace habitat; 2) monitor the habitat and the Foscett Spring Speckled Dace population; 3) enhance the habitat when needed; and 4) implement the emergency contingency plan as needed to address potential threats from the introduction of non-native species, pollutants or other unforeseen threats.

State Criterion 4: Overutilization of the species or its habitat for commercial, recreational, scientific or educational purposes is not occurring or is not likely to occur.

This Criterion has been met. The original federal listing in 1985 stated: "There is no indication that the Foscett Spring Speckled Dace is over-utilized for any of these purposes." No additional data are available to change this conclusion. The BLM manages lands surrounding Foscett and Dace springs consistent with the Lakeview Resource Management Plan (RMP) (BLM 2003). The RMP provides general management direction for Special Status Species, and states that they will manage the Foscett Spring Speckled Dace consistent with the federal Recovery Plan. Current management by BLM includes livestock exclusion (BLM 2003). The BLM plans to consider an action alternative in the next revision of the Lakeview District Resource Management Plan to designate Foscett Spring and Dace Spring as an Area of Critical

Environmental Concern as part of a Resource Management Plan amendment tentatively scheduled for completion in 2017. The proposed designation will identify the boundary, including all occupied habitat, and address appropriate management actions to protect the fish and its habitat including such things as management direction for rights-of-way, motorized and non-motorized access, land disposal, hydrology/water rights, visual resources, recreation, grazing, energy and minerals, noxious weeds, wildlife, and prescribed fire (USFWS et al. 2015). The population abundance of Foskett Spring Speckled Dace is monitored periodically (about every 1-3 years) and no other scientific or educational use currently occurs.

We have no evidence of ground water pumping in the area. A query of the Oregon Water Resources Department database for water rights did not reveal any wells within five miles of Foskett Spring. The closest well listed on the Oregon Water Resources Department database is 5.9 miles away and located along Twentymile Creek, which is located in a different subbasin. No other wells were located closer to Foskett Spring. There are no Oregon Water Resources Department records of established water rights in the vicinity of the springs. Any development of water resources and filing of water rights on BLM affected lands would require a permit from the BLM (BLM 2003). Therefore, the threat from groundwater pumping and lowering of the water table is not considered a reasonably foreseeable threat.

State Criterion 5: Existing state or federal programs or regulations are adequate to protect the species and its habitat.

This Criterion has been met. If Foskett Spring Speckled Dace are state and federally delisted, as proposed by ODFW and USFWS (USFWS 2015), Foskett Spring Speckled Dace will be protected by state regulations and managed under the Foskett Speckled Dace (*Rhinichthys osculus*) Cooperative Management Plan (USFWS et al. 2015) signed by BLM, ODFW, and USFWS. State regulations and programs are in place to regulate take of fish and wildlife (ODFW), protect wetlands and waterways (Oregon Department of State Lands), protect and improve water quality (Oregon Department of Water Quality), regulate water withdrawals and storage (Oregon Water Resources Department), and regulate mining (Oregon Department of Geology and Mineral Industries). Protections under these regulatory mechanisms are not dependent on a species' designation under the State List, especially given ODFW intends to place Foskett Spring Speckled Dace on the Sensitive Species List (OAR 635-100-0040) if they are removed from the State List. Also, BLM has regulatory authority through the Federal Land Policy and Management Act and the Lakeview Resource Management Plan; additionally, BLM will consider designation of an area around Foskett and Dace springs as an Area of Critical Environmental Concern.

Additionally, USFWS et al. (2015) outlines the regulatory authorities of each agency and the actions to be taken by each cooperating agency to ensure the long term persistence of Foskett Spring Speckled Dace through the management and protection of habitat at Foskett and Dace springs. Actions identified in the Cooperative Management Plan include: 1) protect and manage Foskett Spring Speckled Dace habitat; 2) monitor the habitat and the Foskett Spring Speckled Dace population; 3) enhance the habitat when needed; and 4) implement the emergency contingency plan as needed to address potential threats from the introduction of non-native species, pollutants or other unforeseen threats. BLM entered into this agreement by the authority provided through the Resource Management Plan (RMP), which states that all BLM actions in "The Recovery Plan for the Threatened and Rare Native Fishes of the Warner Basin and Alkali Subbasin" (USFWS 1998) will be implemented. Additionally, ODFW would recommend strongly that any land or water development action at or near Foskett and Dace springs

comply with its Habitat Mitigation Policy (OAR 635-415), and Foskett Spring is defined as Habitat Category 1 requiring the highest protection standards.

Analysis of federal recovery criteria

Federal Recovery Plan Criterion 1: Long-term protection to its habitats, including spring source aquifers, spring pools and outflow channels, and surrounding lands, is assured.

This Criterion has been met. The historical and current range of Foskett Spring Speckled Dace is limited to Foskett Spring and the adjacent Dace Spring. Monitoring to date suggests that there is an association between the amount of open-water habitat and Foskett Spring Speckled Dace abundance; therefore, maintenance of sufficient open-water habitat is guided by the Cooperative Management Plan signed by ODFW, BLM, and USFWS (USFWS et al. 2015). See 'Analysis of State List delisting requirements – State Criterion 1' (this document) for more details.

Federal Recovery Plan Criterion 2: Long-term habitat management guidelines are developed and implemented to ensure the continued persistence of important habitat features and include monitoring of current habitat and investigations for and evaluations of new spring habitats.

This Criterion has been met. Long-term habitat management guidelines have been established (USFWS et al. 2015) and are being implemented. BLM and USFWS created two spring-fed pools at Dace Spring in 2009. ODFW introduced Foskett Spring Speckled Dace from Foskett Spring into these pools over multiple years and has documented recruitment and increased abundance of Foskett Spring Speckled Dace at Dace Spring. See 'Analysis of State List delisting requirements – State Criterion 1 and State Criterion 2' (this document) for more details.

Federal Recovery Plan Criterion 3: Research into life-history, genetics, population trends, habitat use and preference, and other important parameters is conducted to assist in further developing and/or refining criteria 1) and 2), above.

This Criterion has been met. Population abundance monitoring has occurred at least every other year since 2005. Information on life-history characteristics have been obtained during population abundance monitoring. Additionally, genetic studies have been conducted to evaluate the taxonomy of Foskett Spring Speckled Dace (Ardren et al. 2010; Hoekzema and Sidlauskas 2014), and methods for evaluating abundance of Foskett Spring Speckled Dace have been established (Peterson et al. 2015). See 'Recovery actions' and 'Analysis of State List delisting requirements – State Criterion 1 and State Criterion 2' (this document) for more details.

Conclusion

Foskett Spring Speckled Dace were listed as threatened under the federal ESA in 1985 because they naturally occur within a single small spring, the outflow of which was extremely vulnerable to destruction and modification, and was experiencing human disturbance. Foskett Spring Speckled Dace were added to the State List at the time it was created because of their federal status. Since listing, a number of recovery actions have been implemented to protect and enhance the habitat across the range of Foskett Spring Speckled Dace. As a result, some of the initial factors that were directly degrading Foskett Spring, such as mechanical modification of the aquatic ecosystem and the use of the springs as livestock watering areas, no longer occur. Open-water habitat in Foskett Spring is limited in

extent and has been substantially reduced in area by the encroachment of aquatic vegetation, likely as a result of the exclusion of grazing ungulates. Maintaining open-water is essential to the survival of the Foscett Spring Speckled Dace. To address this, BLM and USFWS have conducted habitat management projects and have committed to maintaining open-water habitat under the Cooperative Management Plan. The risks associated with a single population with a highly restricted distribution must be appropriately managed in order to confidently state that Foscett Spring Speckled Dace is not likely to become endangered in the foreseeable future. The primary remaining risk factor is the loss of open-water habitat due to the encroachment of aquatic vegetation. This threat is pervasive and recurrent, but active management to maintain open-water is in place and will be sufficient to address this threat. State delisting criteria all appear to be met.

References

- Ardren, W.R., J. Baumsteiger, and C. Allen. 2010. Genetic analysis and uncertain taxonomic status of threatened Foscett Speckled Dace. *Conservation Genetics* 11:1299-1315.
- BLM. 2003. Lakeview Resource Management Plan and Record of Decision. Bureau of Land Management. Lakeview, Oregon.
- Bond, C.E. 1974. Endangered plants and animals of Oregon: I. Fishes. Oregon Agricultural Experiment Station Special Report 205:1-9.
- Dambacher, J.M., A.G. Talabere, D.L. Hill, and D.F. Markle. 1997. Foscett Speckled Dace investigations. Draft Fish Research Progress Report. Oregon Department of Fish and Wildlife.
- Hoekzema, K.H., and B.L. Sidlauskas. 2014. Molecular phylogenetics and microsatellite analysis reveals cryptic species of Speckled Dace (Cyprinidae: *Rhinichthys osculus*) in Oregon's Great Basin. *Molecular Phylogenetics and Evolution* 77:238-250.
- Peterson, J.T., P.D. Scheerer, and S. Clements. 2015. An evaluation of the efficiency of minnow traps for estimating the abundance of minnows in desert spring systems. *North American Journal of Fisheries Management* 35:491-502.
- Scheerer, P.D., S. Clements, and J.T. Peterson. 2012. 2012 Foscett Speckled Dace investigations. Oregon Department of Fish and Wildlife – Progress Reports. Corvallis, Oregon.
- Scheerer, P.D., and S.E. Jacobs. 2005. Hutton Spring tui chub and Foscett speckled dace investigations. Fish Research Progress Report, Contract E-2-37. Oregon Department of Fish and Wildlife.
- Scheerer, P.D., and S.E. Jacobs. 2007. Hutton Spring tui chub and Foscett speckled dace investigations. Fish Research Project 134206M085, Annual Progress Report. Corvallis, Oregon.
- Scheerer, P.D., and S.E. Jacobs. 2009. Foscett Speckled dace investigations. Fish Research Project 13420-08-J814, Annual Progress Report. Corvallis, Oregon.
- Scheerer, P.D. 2011. 2011 Foscett Speckled dace investigations. Fish Research Project 13420-08-J814, Annual Progress Report. Corvallis, Oregon.

- Scheerer, P.D., J.T. Peterson, and S. Clements. 2013. 2013 Foscett Speckled Dace investigations. Oregon Department of Fish and Wildlife – Progress Reports. Corvallis, Oregon.
- Scheerer, P.D., J.T. Peterson, and S. Clements. 2014. 2014 Foscett Speckled Dace investigations. Oregon Department of Fish and Wildlife – Progress Reports. Corvallis, Oregon.
- USFWS. 1985. Determination of threatened status for Hutton tui chub and Foscett speckled dace. Federal Register 50:12302-12306.
- USFWS. 1998. Recovery plan for the native fishes of the Warner Basin and Alkali Subbasin. U.S. Fish and Wildlife Service. Portland, Oregon.
- USFWS. 2015. Foscett Speckled Dace (*Rhinichthys osculus* ssp.) 5-year review: summary and evaluation. U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS, BLM, and ODFW. 2015. Foscett Speckled Dace (*Rhinichthys osculus* ssp.) Cooperative Management Plan.
- Williams, J.E., M.A. Stern, A.V. Munhall, and G.A. Anderson. 1990. Conservation status of the threatened fishes in Warner Basin, Oregon. Great Basin Naturalist 50:243-248.