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Case Study: Successful Collaboration for Columbia Spotted Frog Conservation in Northern and Central Nevada

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Columbia spotted frogs have benefited from collaborative conservation. This species was removed from consideration for federal listing largely because of these successful cooperative efforts. (Photo courtesy of Teri Slatauski, Nevada Department of Wildlife.)

INTRODUCTION

Species Description and Life History

So what's a "spotted frog"? The Columbia spotted frog (*Rana luteiventris*) belongs to the anuran family of true frogs, or Ranidae. Frogs in this widely distributed family are smooth moist-skinned, and have large powerful hind legs. There are only three other true frogs native to Nevada: the northern leopard frog (*Lithobates pipiens*), relict leopard frog (*Lithobates onca*), and Sierra Nevada yellow-legged frog (*Rana sierrae*). Two additional frog species have been successfully introduced into Nevada, the red-legged frog (*Rana aurora*) native to California and the bullfrog (*Lithobates catesbeianus*) from east of the Rockies.

Columbia spotted frogs are slim-waisted and long-legged amphibians with webbed hind feet. Adults are from 2 to 4 inches in length (snout to vent), with females being larger than males. The dorsal (upper side or back) color of these frogs ranges from light brown, dark brown or gray, with small spots (Figure 1). Ventral (underside or abdominal) coloration differs geographically, ranging from yellow to salmon (Figure 2), but very young individuals may have nearly white undersides.

This species ranges throughout the Great Basin, northern Rocky Mountains, British Columbia and southeast Alaska. However, research indicates that frogs in southeastern Oregon, southwestern Idaho, and northeastern and central Nevada are a distinct genetic population.

In Nevada, Columbia spotted frogs are found closely associated with slow-moving or ponded surface waters that are nonturbid (clear) and have little or no vegetation canopy cover. Habitats of viable populations typically include springs, often with floating vegetation, and larger bodies of pooled water (including oxbows, lakes, stock ponds, beaver ponds, seeps in wet meadows and backwaters). The frogs apparently require a deep silt or muck substrate (soil) for hibernation and torpor (a state of decreased physiological activity, including reduced body temperature and energy expenditure). Females may lay only one egg mass (Figure 3) per year, with extreme yearly fluctuations in egg mass size. Successful egg production, viability and metamorphosis (transformation from tadpole to adult stage) of spotted frogs are influenced by habitat variables such as temperature, depth and pH of water, cover, and the presence or absence of predators (especially fish and bullfrogs).

Threats to Spotted Frogs

In the Great Basin, Columbia spotted frogs are found in naturally fragmented habitats that are seasonally dry. Such habitats are sensitive to disturbance, both natural and human-caused, thus increasing the chance of local extirpation (population elimination) of frogs. The elimination, fragmentation, and/or degradation of any use area, such as adult foraging range, winter hibernaculum (hibernation shelter) and breeding pool, will have a negative effect on local populations because of the wide use of riparian areas by adult frogs. These effects on metapopulations (groups of spatially separated populations) may result in widespread declines. If critical habitat corridors between population units are eliminated, dispersal from one population unit to another cannot occur. Reduction in spotted frog distribution has been attributed to the impacts from development of water resources and the introduction of nonnative fish and amphibian predators. Other specific threats to the frog include improper livestock grazing, mining, overharvest of beaver (*Castor canadensis*), disease, climate change, drought and wildfire (USFWS 2013a).

HISTORY OF ENDANGERED SPECIES ACT STATUS

In 1989, the U.S. Fish and Wildlife Service (USFWS) was petitioned to list the spotted frog (referred to originally as *Rana pretiosa*) under the Endangered Species Act of 1973, as amended. The USFWS ruled on April 23, 1993, that listing of the spotted frog was warranted and designated the species as a candidate for listing. In 1997, after species-specific genetic and geographic differences confirmed a Great Basin distinct population segment, the

Figure 1. Dorsal coloration of Columbian spotted frog. (Photo courtesy of Rachel Van Horne, U.S. Forest Service.)

Figure 3. Columbia spotted frog egg mass. (Photo courtesy of Teri Slatauski, Nevada Department of Wildlife.)

Figure 2. Ventral coloration of Columbia spotted frog. (Photo courtesy of Brad Bauman, Nevada Department of Wildlife.)

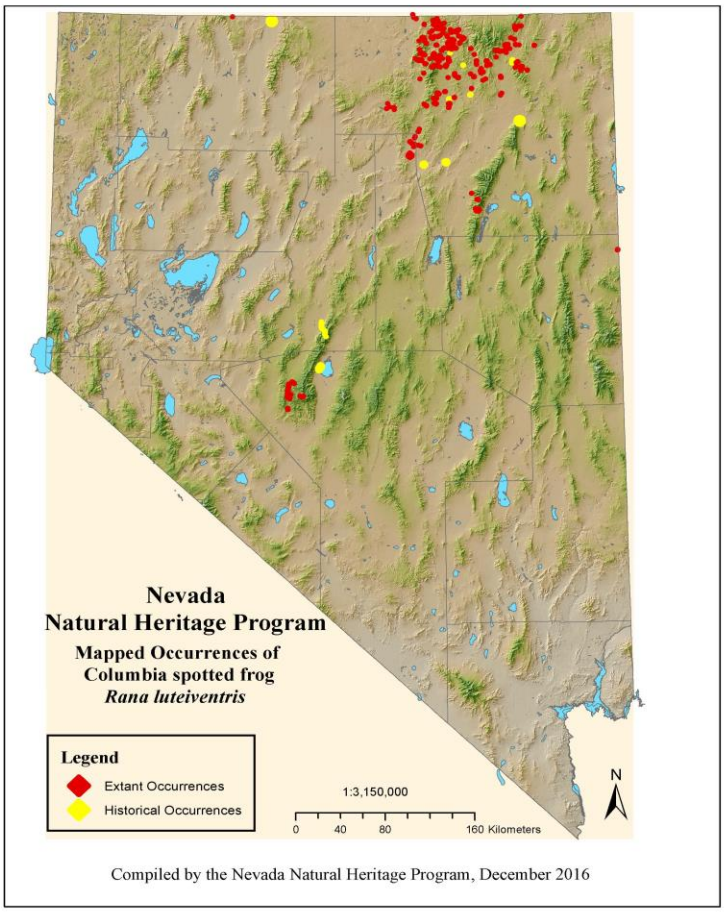

Figure 4. Distribution of the Great Basin distinct population segment of the Columbia spotted frog. "Extant" populations are those currently in existence.

USFWS conferred a high listing priority designation (Priority 3) for the Great Basin population, with Category 1 being the highest priority. However, the frog was precluded from listing due to emphasis on even higher priority species like the greater sage-grouse (*Centrocercus urophasianus*). The major impetus behind the petition was the reduction in distribution apparently associated with the threats mentioned above. This ranking category included Great Basin Columbia spotted frog populations in both northeastern Nevada and the Toiyabe Range in central Nevada (Figure 4). In the Dec. 6, 2007 Candidate Notice of Review, the USFWS announced a change in priority for the Great Basin spotted frog from Category 3 to Category 9, and this determination was maintained in subsequent years. [Note: The only other Columbia spotted frog populations in Nevada are located in the eastern portion of White Pine County near the Nevada-Utah border and are geographically and genetically associated with the West Desert population in Utah. These populations were withdrawn from federal candidate status in April 1998.]

COLLABORATION HISTORY

From 1999 to 2002, two Columbia Spotted Frog Technical Teams, comprised of several cooperating entities including the USFWS, Nevada Department of Wildlife, Bureau of Land Management, U.S. Forest Service, Nevada Natural Heritage Program, Nye County, Brigham Young University, and University of Nevada Cooperative Extension and Biological Resources Research Center, collaborated to write a conservation plan for this species. Upon interagency signature approval in 2003, a 10-year Conservation Agreement and Strategy (Conservation Agreement) was adopted for each of the affected Nevada spotted frog population segments (Northeast Nevada and Toiyabe subpopulations). During this 10-year period, the Technical Team for each Conservation Agreement was charged with implementing the conservation plan, evaluating the results, and changing the plan as necessary to meet the stated goals. Survey and monitoring activities by these teams were designed to increase knowledge of spotted frog distribution, populations and habitat.

The purpose of the collaborative approach was to “ensure long-term conservation and expedite conservation actions.” The Technical Teams that implemented the Conservation Agreement approach were comprised of core participants from the partners identified above and later joined by the Natural Resources Conservation Service. Although there were separate Conservation Agreement documents for the Northeast Nevada and Toiyabe spotted frog populations, they were similar in content and approach. Cooperators had well-defined legal or other authorities and technical support capabilities. Each Conservation Agreement document was developed using a step-down outline based on best science available at the time and a commitment to adaptive management. This process provided the Technical Teams sufficient flexibility to modify their strategies at the working group level based on emergence of new information and/or changing conditions. During each year of the agreements, the Technical Teams developed annual work plans that included detail on field level coordination and implementation. Meeting at least twice annually, the teams reviewed and evaluated conservation progress, tracking accomplishments through implementation tables that included responsibilities for actions; completion timelines; and potential funding sources (primarily state and federal) for monitoring, research and conservation projects.

CONSERVATION AGREEMENT AND STRATEGY IMPLEMENTATION

Following the tasks outlined in the Conservation Agreements, biologists from the U.S. Forest Service, Nevada Department of Wildlife, and USFWS conducted presence/absence surveys, mark/recapture studies and egg mass surveys, and measured descriptive habitat characteristics. Sentinel sites, areas from which in-depth data are gathered, were established and long-term monitoring plans developed and implemented. This collaborative work resulted in standardized sampling methods and protocols

for disease prevention, a necessary precaution when working with sensitive amphibians. Results were summarized in annual reports, and conservation projects were planned and, in some cases, implemented. To ensure corporate memory, a data repository was also established.

The increased amount of population and habitat monitoring that resulted from the Conservation Agreements has improved the cooperators' knowledge of the spotted frog's distribution and also increased knowledge of population demographics for frogs in several locations. Also, recent studies found that improved livestock grazing management, especially changes in the timing and duration of livestock grazing and incorporating rest-rotation grazing strategies, have improved riparian habitat conditions and water quality in some areas of occupied and potential Columbia spotted frog habitat (Booth et al. 2012; Dalldorf et al. 2013; Swanson et al. 2015). Restoration and creation of new pond habitat as outlined in the Conservation Agreement action plans has resulted in additional habitat being occupied by spotted frogs throughout the Great Basin, as well as other parts of the species' range. For example, in central Nevada, a habitat enhancement project in Indian Creek Valley (Nye County) consisted of construction or augmentation of 22 ponds in 2004 and 14 more in 2009. All of these ponds are currently occupied by Columbia spotted frogs, and verified breeding activity (as evidenced by egg masses or tadpoles) has occurred in 77 percent of them (USFWS 2015a). In northern Nevada, adult frog numbers tripled in a private land pond that was excavated to improve habitat quality. And in a nearby private land exclosure, livestock are being used as a tool to improve spotted frog habitat by reducing rank vegetation (personal communication with Jeff Petersen, Nevada Department of Wildlife).

Conservation efforts have been occurring in many areas across the range of the Columbia spotted frog in the past decade, most of them as the result of the Conservation agreements. Due to the success of Nevada's first 10-year Conservation Agreement experience, a revised agreement was signed in February 2015 to ensure collaborative conservation of the frog for an additional 10 years (Mellison et al. 2015).

OUTCOMES

The results of this collaborative effort were at least partially responsible for the listing priority of spotted frogs being downgraded from a Priority 3 to a Priority 9 in 2007 (USFWS 2007). In 2013, the USFWS concluded in its annual Candidate Notice of Review that "*Extensive surveys and monitoring since 1993 have revealed that Columbia spotted frog populations within the Great Basin* distinct population segment *are more widespread and common than previously known"* (USFWS 2013b). More specifically, the historical documentation of 65 known occupied watersheds prior to 1993 has increased to 165 watersheds known to be occupied by Columbia spotted frogs.

On October 7, 2015, the USFWS determined that the Great Basin distinct population segment of the Columbia spotted frog did not warrant federal protection under the Endangered Species Act (USFWS 2015b). The USFWS also removed the frog from the federal candidate species list after analyzing the best available scientific and commercial data. Much of this data was gathered by the collaborative group of federal, state and local conservation partners. Their data demonstrated that the threats impacting spotted frogs are not as widespread throughout the species' range as previously thought, and that Great Basin spotted frog populations are much more varied and robust than was previously understood. This conclusion is based on the results of egg mass counts and tag/recapture studies (USFWS 2015a).

"Sound science conducted by our conservation partners starting as early as 2003 to learn more about the Columbia spotted frog distinct population segment has shown us that this tenacious amphibian is not only persisting, but thriving throughout its Great Basin home," said Ted Koch, Reno USFWS State Office Field Supervisor. "The collaborative teamwork

among agencies and with our state and local partners to implement a long-term comprehensive conservation strategy demonstrates a model commitment to ground-level conservation that will continue to protect the frog and its habitat, as well as benefit many other Great Basin aquatic species well into the future."

FUTURE OUTLOOK

Beaver management is an important component for sustaining spotted frog habitat and populations into the future. Beavers create small pools of slow-moving water that function as sites for frog reproduction (Arkle and Pilliod 2015). Another function of the pools behind beaver dams is the establishment and maintenance of adjacent wet meadows that provide foraging habitat and protective cover for the frogs (Figure 5). Beaver populations have made an astounding comeback since they were nearly extirpated in the early 1800s. Extrapolating from harvest data (Espinosa and Woolstenhume 2014), sustained moderate beaver harvest over the last 40 years has not negatively impacted the size or spatial extent of Nevada's beaver population, estimated at 71,000 in 2014.

Figure 5. Columbia spotted frog habitat provided by beaver activity. (Photo courtesy of Rachel Van Horne, U.S. Forest Service.)

The collaborative Conservation Agreement approach has ensured the implementation, documentation and maintenance of key conservation actions. These actions can provide justification for conservation funding and program support for conservation actions. They also serve as a foundation for local, community-based conservation programs that are likely to be more effective than "top-down" approaches from the federal level. Effective conservation management efforts that reduce threats and enhance habitat, combined with ongoing data collection that indicates an increase in the spotted frog population, have assured the U.S. Fish and Wildlife Service that Columbia spotted frogs can persist in the Great Basin without the need for additional federal regulation.

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