U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Rana luteiventris*

COMMON NAME: Columbia Spotted Frog, Great Basin Distinct Population Segment (DPS)

LEAD REGION: 8

INFORMATION CURRENT AS OF: March 31, 2015

STATUS/ACTION

____ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
_X__ Continuing candidate
___ Non-petitioned
_X__ Petitioned - Date petition received: _1989
_ 90-day positive - FR date: _1989
_ 12-month warranted but precluded - FR date: _1993
_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)?
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions?
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

___ Listing priority change
Former LP: _9__
New LP: ___

Date when the species first became a Candidate (as currently defined): _1993

_X__ Candidate removal: Former LPN: _9__
_X__ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
____U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
___ F – Range is no longer a U.S. territory.
___ I – Insufficient information exists on biological vulnerability and threats to support

listing.
___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: amphibian

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Nevada, Idaho, and Oregon

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Nevada, Idaho, and Oregon

LAND OWNERSHIP: An estimated 71 percent of all known currently occupied habitat for Columbia spotted frogs in the Great Basin occurs on federally-managed lands. The Humboldt-Toiyabe National Forest (HTNF) in Nevada is the only national forest which has occupied Columbia spotted frog habitat within the Great Basin DPS. Occupied habitat on BLM-managed lands include the Elko and Battle Mountain District Offices in Nevada; Lakeview, Burns, and Vale District Offices in Oregon; and Jarbidge, Bruneau, and Owyhee Field Offices in Idaho. The Service's Malheur National Wildlife Refuge in south central Oregon currently has a small population. Columbia spotted frogs occur on the Yomba-Shoshone Reservation in central Nevada and the Duck Valley Indian Reservation straddling the border of Nevada and Idaho (2.1 percent). The States manage approximately 3.3 percent of occupied habitat, and nearly 23 percent of known occupied habitat occurs on private lands including a substantial amount in southwestern Idaho.

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BIOLOGICAL INFORMATION

Species Description

Ranids typically are characterized as slim-waisted, long-legged, smooth-skinned jumpers with webbed hind feet and usually with a pair of dorsolateral folds (glandular folds) that extend from behind the eyes to the lower back. Adult Columbia spotted frogs measure between 5 and 10 centimeters (cm) (2 and 4 inches (in)) from snout to vent, with females being larger than males (Bull 2005, pp. 20–22; Tait 2007, pp. 17–18). Dorsal colors and pattern include light brown, dark brown, or gray, with small spots (Stebbins 2003, pp. 66, 229–230). Ventral coloration can differ among geographic population units and may range from yellow to salmon; however, very young individuals may have quite pale, almost white, ventral surfaces (Stebbins 2003, pp. 66, 229–230). The throat and the ventral region are sometimes mottled. The head may have a dark

mask with a light stripe on the upper jaw, and the eyes are turned slightly upward. Adult male frogs have swollen thumbs with darkened bases (Stebbins 2003, pp. 66, 229–230).

Taxonomy

Spotted frogs (*Rana pretiosa*) were first described by Baird and Girard (1853, pp. 378–379) and later split into two subspecies, *R. pretiosa pretiosa* and *R. pretiosa luteiventris* (Thompson 1913, pp. 53–56). The Service accepts species-specific genetic and geographic differences in Columbia spotted frogs based on Green *et al*. (1996, pp. 377–388; 1997, pp. 2–7), Bos and Sites (2001, pp. 1505–1511), and Funk *et al*. (2008, pp. 201–202), which define populations in western Washington and Oregon and northeastern California as Oregon spotted frogs (*R. pretiosa*) and the remainder of the populations as Columbia spotted frogs (*R. luteiventris*) (Figure 1; Funk *et al*. 2008, pp. 201–202). Based on further geographic and genetic characterization, Columbia spotted frogs in southwestern Idaho, southeastern Oregon, and northeastern and central Nevada are part of the Great Basin population of Columbia spotted frogs (Figures 1 and 2; Funk *et al*. 2008, pp. 201–202). It was previously thought that populations in northeastern Oregon were part of the Great Basin population; however, Funk *et al*. (2008, pp. 201–202; Figures 1 and 2) found that these populations belong to the Northern population. A small population on the border of eastern White Pine County, Nevada, and western Toole County, Utah, has been determined to be part of the Utah population of Columbia spotted frogs through phylogenetic data (Funk *et al*. 2008, pp. 201–202; Figures 1 and 2). The Committee on Standard and Scientific Names recently changed the genus name for many North American frogs from *Rana* to *Lithobates*; however, Columbia spotted frogs maintained the genus name *Rana* (Crother 2012, pp. 20–21). We have carefully reviewed available taxonomic information to reach the conclusion that the species *R. luteiventris* is a valid taxon.

Columbia spotted frogs in Nevada, southwestern Idaho, and most populations in the southeastern Oregon portion of the Great Basin are geographically separate from the remainder of the species (Figures 1 and 2; Funk *et al*. 2008, p. 204). The largest of Nevada's three population areas is the Jarbidge-Independence Range in Elko and Eureka Counties as well as southern Owyhee and Twin Falls Counties, Idaho. A smaller population of Columbia spotted frogs is located in the Ruby Mountains about 80 kilometers (km) (50 miles (mi)) south of the Jarbidge-Independence Range population. However, these two populations are isolated by lack of suitable habitat and hydrologic connectivity. The Toiyabe Mountains population is isolated nearly 320 km (200 mi) southeast of the Ruby Mountains and Jarbidge-Independence Range populations and represents the southern-most extremity of its range (Figures 1 and 2). The Owyhee population of Columbia spotted frogs appears to be widely distributed throughout southwestern Idaho (Owyhee County) and southeastern Oregon (Malheur County). Scattered populations also occur in northern Nevada (Humboldt County) and southeastern Oregon (Lake, Malheur, and Harney Counties), but these populations are generally small, with a few exceptions, and appear to be isolated from each other and from other populations in southwestern Idaho and northeastern Nevada by either natural or human-induced habitat disruptions (Robertson and Funk 2011, pp. 5–9; Robertson and Funk 2012, p. 6).

All four Great Basin populations are geographically isolated and separate from the main continuous Northern population of Columbia spotted frogs in the central mountains of Idaho by the Snake River Plain and adjacent lowlands in eastern Oregon. The Owyhee population in southwestern Idaho is approximately 125 km (75 mi) from the Northern population in central Idaho. Occupied habitat in the Northern population is characterized generally by conifer forests and high elevation lake environments within the Blue Mountains and Middle Rockies Ecoregions IDFW 2005, pp. 1–13; ODFW 2006, pp. 112–132) while habitat for the Great Basin population is characterized by sagebrush steppe and their associated stream and pond environments within the Owyhee Uplands, Northern Basin and Range, and Central Basin and Range Ecoregions (IDFW 2005, pp. 1–13; ODFW 2006, pp. 204–221; NDOW 2012a, pp. 84–85). However, Columbia spotted frog populations within the Northern and Great Basin DPSs converge in east-central Oregon in the vicinity of State Highway 20. In this area, Columbia spotted frogs from the Northern and Great Basin populations are in close proximity to each other (Figures 1 and 2; Robertson and Funk 2012, pp. 6, 20). Furthermore, the Great Basin population is both hydrologically and geographically separated from isolated populations in Utah (Figures 1 and 2). The population in the Ruby Mountains (Lahontan Basin) is approximately 145 km (90 mi) from the West Desert population (Bonneville Basin) near Ibapah, Utah. As detailed below, geographic isolation of the Great Basin population is supported by genetic analyses.

Three earlier genetic studies were conducted on Columbia spotted frogs, which have improved our knowledge of the distribution and genetic structure of the species (Green *et al*. 1996, pp. 374–390; Green *et al*. 1997, pp. 1–8; Bos and Sites 2001, pp. 1499–1513). The strongest genetic evidence that Columbia spotted frog populations in the Great Basin are genetically discrete from other Columbia spotted frogs comes from Funk *et al*. (2008, pp. 198–210) who examined mitochondrial DNA (mtDNA) sequence variation throughout the extant range of Columbia spotted frogs. These data indicate three distinct major clades (a clade is a group of taxa sharing a closer common ancestry with one another than with members of any other clade): Northern, Great Basin, and Utah (Figure 1; Funk *et al*. 2008, pp. 201–202). The three clades are nearly as divergent from each other as they are from Oregon spotted frog, a closely related but separate species (Funk *et al*. 2008, p. 202). Additionally, within each major clade, well-defined nested clades are also evident. The Great Basin clade has two well-defined nested clades in southwestern Idaho-Nevada and southeastern Oregon (Figure 1; Funk *et al*. 2008, p. 202). This area of southeastern Oregon has been identified as a natural zone of hybridization for other species, such as butterflies and birds (Remington 1968, pp. 321–428). These two nested clades are also the most divergent among the nested clades indicating the effects of small isolated populations in southeastern Oregon (Funk *et al*. 2008, p. 205). The authors also found one location in east-central Oregon where there is an overlap between the Northern and Great Basin clades (Figure 1; Funk *et al*. 2008, p. 204). However, a more recent study using microsatellite markers found that this site (Kingsbury Gulch) belongs in the Northern clade (Robertson and Funk 2012, p. 5).

Habitat/Life History

Columbia spotted frogs are highly aquatic and are closely associated with clear, slow-moving streams (lotic) or ponded (lentic) surface waters with permanent hydroperiods and relatively cool

midday water temperatures between 6–24 Celsius (C) (43–75 Fahrenheit (F)) (Munger *et al*. 1996, p. 8; Reaser 1997a, pp. 32–33; Reaser and Pilliod 2005, p. 561; Welch and MacMahon 2005, p. 477; Arkle and Pilliod 2015, pp. 9–11). Habitat with permanent hydroperiods accounted for 83 percent of all detections made within the Great Basin (Arkle and Pilliod 2015, p. 13). In addition to permanently wet habitat, Arkle and Pilliod (2015, pp. 9–11, 15, 32) also found that lotic habitats, particularly streams with beaver ponds, deep maximum depth (greater than 0.5 m), abundant shoreline vegetation, and non-salmonid fish species (*e.g*., speckled dace *Rhinichthys osculus*) have the greatest probability of being occupied by Columbia spotted frogs within the Great Basin. Lotic habitats generally have greater habitat connectivity and more permanent hydroperiods as compared to isolated ponds (Arkle and Pilliod 2015, pp. 9–11, 15, 32). Deeper habitats tend to be associated with more permanent hydroperiods, are important for escape cover from predators, and are vital for overwintering habitat (Arkle and Pilliod 2015, pp. 9–11, 15, 29). Emergent shoreline vegetation provides: (1) quality foraging areas; (2) cover from predators; (3) areas for thermoregulation; (4) egg mass deposition areas; (5) and larval rearing habitat (Arkle and Pilliod 2015, pp. 9–11, 16). Occupied habitat with non-predatory fishes represents habitats with permanent hydroperiods and at least temporary connectivity with other waterbodies (Arkle and Pilliod 2015, pp. 9–11, 15, 29).

Reproducing populations have been found in habitats characterized by springs, floating vegetation, and larger bodies of pooled water with permanent hydroperiods (*e.g*., oxbows, lakes, stock ponds, beaver-created ponds, seeps in wet meadows, backwaters) (Reaser and Pilliod 2005, pp. 560–561; Hossack *et al*. 2013a, pp. 1415–1416). Hossack *et al*. (2013a, p. 1415) reported that larger breeding sites (ponds greater than 0.15 ha) with permanent hydroperiods and low human impacts explained much of the variation in population growth across the entire range of Columbia spotted frogs. Pilliod and Scherer (2015, pp. 14, 45) also found more egg masses as ponds increased in size at the Sam Noble Springs site in southwestern Idaho.

Columbia spotted frogs occur in areas with relatively harsh winter conditions making overwintering habitat an important requirement for survival. Important components of overwintering habitat include areas which do not freeze completely, adequate dissolved oxygen levels, and limited risk from predation and scouring (Bull and Hayes 2002, pp. 142–146). A deep silt or muck substrate may be required for Columbia spotted frog hibernation and torpor (a state of lowered physiological activity, usually occurring during colder months) (Bull 2005, p. 12; Reaser and Pilliod 2005, p. 561). Columbia spotted frogs will use areas where water does not freeze, such as spring heads and undercut streambanks with overhanging vegetation (Bull 2005, p. 12; Reaser and Pilliod 2005, p. 561; Hatch *et al.* 2002, p. 30); however, they can overwinter underneath ice-covered streams and ponds (Bull and Hayes 2002, p. 143; Tattersall and Ultsch 2008, pp. 122–123; Hatch *et al.* 2002, p. 29). Winter can be a time of high mortality further emphasizing the importance of habitat connectivity, permanent hydroperiods, adequate depth and dissolved oxygen (Bull and Hayes 2002, pp. 143–146; Hatch *et al*. 2002, pp. 25–26).

Males become sexually mature 1–2 years earlier than females, usually at age 2 or 3 (greater than 4.5 cm for males and 6.0 cm for females) (Reaser and Pilliod 2005, p. 561). Columbia spotted frogs employ a scramble mating system in which males race for access to females and there is little opportunity for female choice or male combat (Greene and Funk 2009, p. 244). Breeding

occurs once a year in the spring for Columbia spotted frogs with timing being a factor of latitude, elevation, and annual weather (Reaser and Pilliod 2005, p. 560). Consecutive year breeding has been documented in females in northeastern Oregon (Bull 2005, p. 27). Females lay eggs once minimum daily water temperatures are between 2.5–12.9 C (36.5–55.2 F) and average daily water temperatures are between 9.6–16 C (49.3–60.8 F) (Bull and Shepard 2003, p. 109; Tait 2007, p. 8). Females lay one egg mass consisting of 150–2,400 eggs, usually in the warmest areas of a pond, and typically in shallow water (10–20 cm; 4–8 in) (Bull and Shepherd 2003, pp. 109–112; Bull 2005, pp. 8, 11; Reaser and Pilliod 2005, p. 560; Pearl *et al*. 2007a, pp. 87–89). Eggs generally hatch between 8–21 days after being laid depending on water temperature, and tadpoles usually metamorphose by mid- to late summer; however, they have been observed in the tadpole stage as late as October (Bull 2005, p. 7; Reaser and Pilliod 2005, p. 560). There is no evidence of overwintering in the tadpole stage (Reaser and Pilliod 2005, p. 560). Successful egg production and the viability and metamorphosis of Columbia spotted frogs are dependent on habitat variables such as hydroperiod, temperature, depth, and pH of water; cover; and the presence or absence of predators (Munger *et al*. 1996, p. 8; Reaser 1997b, pp. 21–22; Bull 2005, p. 7; Reaser and Pilliod 2005, pp. 561–562). Once they become adults, male Columbia spotted frogs have lower survival rates than females, possibly due to the smaller sizes attained by males or behavioral differences particularly during the breeding season, making them more susceptible to predation (Turner 1962, p. 328; Licht 1974, p. 621, 625). While the oldest frogs documented were 12–13 years old, most males live 3–4 years and females typically survive 5–8 years (Reaser 2000, pp. 1161–1162; Bull 2005, p. 27). Female growth rates are higher than males with sexual dimorphism occurring in frogs at 2 years of age (Bull 2005, pp. 20–26).

While Columbia spotted frogs can show strong site fidelity, individuals are capable of travelling relatively large distances if adequate habitat is available (Bull 2005, pp. 13–15; Reaser and Pilliod 2005, p. 561). Radio telemetry and mark-recapture studies of Columbia spotted frogs have shown movement up to 6 km (3.7 mi) or more for breeding, overwintering, foraging, or predator avoidance (Engle 2000b, p. 34; Bull and Hayes 2001, pp. 120–122; Pilliod *et al*. 2002, pp. 1855–1859; Bull 2005, pp. 13–16; Funk *et al*. 2005a, p. 14; C. Mellison 2012, unpublished data). Columbia spotted frogs have also been documented moving under ice-covered habitat during winter months further emphasizing the importance of connected habitat (Bull and Hayes 2002, p. 143; Hatch *et al*. 2002, p. 29). Movement usually occurs along shoreline habitat or riparian corridors; however, overland movement has been documented in higher elevation sites or after rain events in more xeric habitats (Pilliod *et al*. 2002, pp. 1859; Pilliod *et al*. 2015a, p. 18).

Adult Columbia spotted frogs feed day or night and are opportunistic feeders, consuming many types of insects, mollusks, and even other amphibians (Turner 1959, pp. 405–413; Miller 1978, pp. 243–248; Whitaker *et al*. 1983, pp. 149–153; Munger 2003, pp. 5–6; Bull 2005, pp. 16–19; Reaser and Pilliod 2005, p. 561). Bull (2005, pp. 16–19) conducted a diet analysis of adult Columbia spotted frogs in northeastern Oregon where the most common insects consumed were beetles (21 percent), ants or wasps (21 percent), and flies (10 percent). Columbia spotted frog tadpoles are grazers, which consume algae and detritus (Reaser and Pilliod 2005, p. 560).

Historical Range/Distribution

Extensive surveys and monitoring since 1993 have revealed that Columbia spotted frog populations are much more widespread than what was previously known (and at the time of Candidacy). While some sites and watersheds are no longer occupied, Columbia spotted frogs are well distributed as compared to the known historical distribution throughout southwestern Idaho and northeastern Nevada with isolated and disjunct populations in southeastern Oregon and central Nevada. In general, the historical range for the Great Basin DPS of the Columbia spotted frog is similar to the current range.

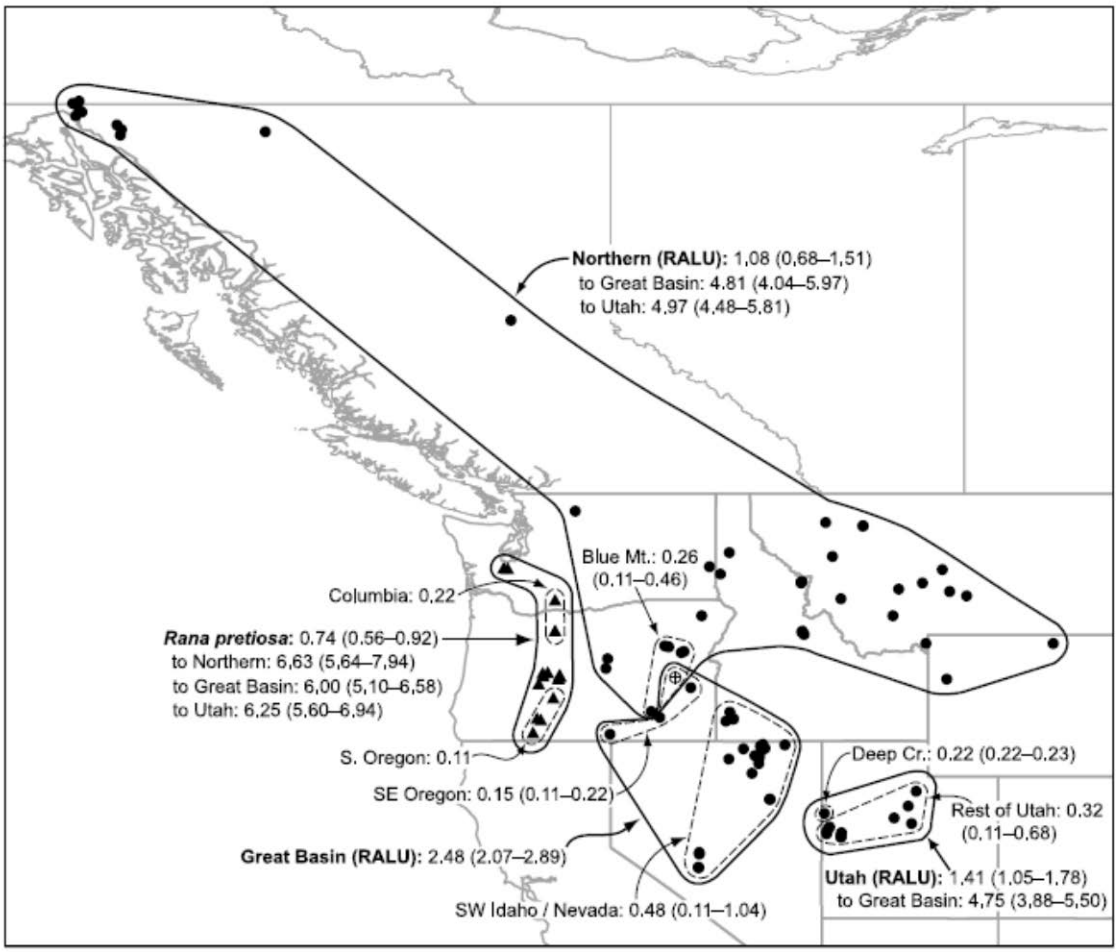

Fig. 3. Geographic distribution of major clades (solid black lines) and nested clades (dashed lines) identified in the phylogenetic analyses, with mean percent corrected sequence divergence (and ranges in parentheses) shown within and among clades. Clade names correspond to those used in Fig. 2 and Tables 1–3. Triangles = *R. pretiosa*; circles = *R. luteiventris*. The open circle with a cross is Kingsbury Gulch (site 59), where haplotypes from the northern clade and Great Basin clade were found.

Figure 1. Geographic distribution of Oregon spotted frogs (*Rana pretiosa*) and Columbia spotted frogs (*Rana luteiventris*; Funk *et al*. 2008, p. 202). Reprinted with permission. The Kingsbury Gulch site (open circle with a cross) has subsequently been identified as being part of the Northern Clade (Robertson and Funk 2012, p. 5).

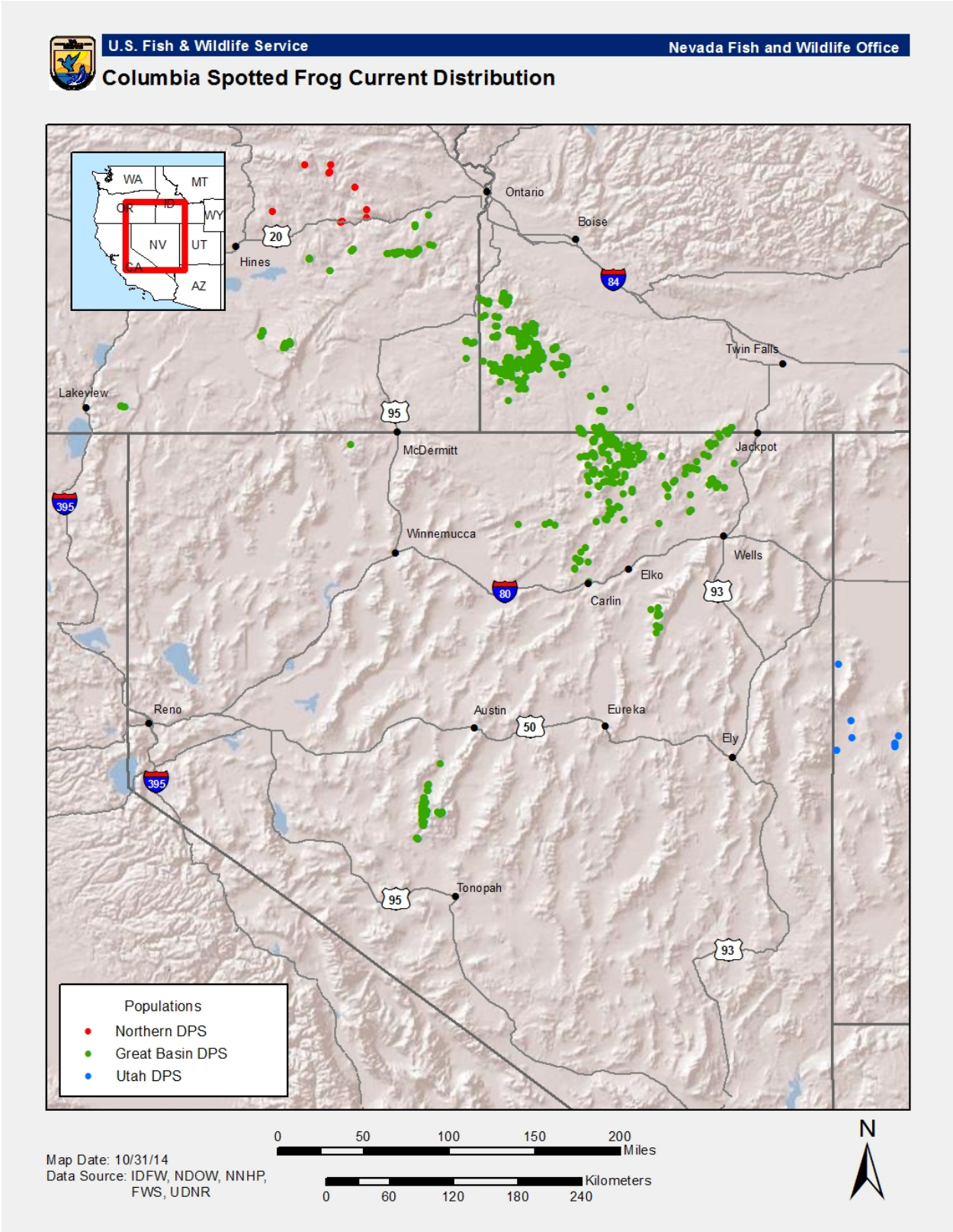

Figure 2. Current range of the Columbia spotted frog, Great Basin DPS, southern edge of the Northern DPS, and western edge of the Utah DPS.

Current Range/Distribution

Nevada

Columbia spotted frogs in Nevada are found at elevations between 1,700 and 2,650 meters (m) (5,600 and 8,700 feet (ft)). Columbia spotted frog populations in Nevada are geographically separated into three populations: Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains (Figure 12). The Nevada Wildlife Action Plan defines these areas as the Northern Basin and Range (Jarbidge-Independence Range) and Central Basin and Range (Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains populations) Ecoregions (Nevada Department of Wildlife (NDOW) 2012a, p. 84–85). The largest of Nevada's three population areas is the Jarbidge-Independence Range in Elko and Eureka Counties (this population also extends into southern Owyhee and Twin Falls Counties, Idaho; Figure 12). This population area is formed by the headwaters of streams in two major hydrographic basins. The South Fork Owyhee River, Owyhee River, Bruneau River, and Salmon Falls Creek drainages flow north into the Snake River basin while the Marys River, North Fork Humboldt River, Maggie Creek, and Rock Creek drain into the interior Humboldt River basin (NDOW 2003a, pp. S7–S16). Columbia spotted frogs occur in the Ruby Mountains in tributaries to the South Fork Humboldt River, Elko County (Figure 12; NDOW 2003a, pp. S7–S16). In the Toiyabe Mountains, Nye County, Columbia spotted frogs are found in six drainages within the Reese River watershed and Cloverdale Creek (Figure 12; NDOW 2003b, p. S8). The Toiyabe Mountains population is geographically isolated from the Ruby Mountains and Jarbidge-Independence Range populations by a large gap in suitable habitat and represents the southern-most extremity of the species' range. In 2013, Columbia spotted frogs were detected in the McDermitt Creek watershed west of the town of McDermitt, Humboldt County, Nevada (Figure 12). The current distribution includes 101 12-digit hydrologic units (HUCs; all references to HUCs in this document are at the 12-digit hydrologic unit level; USGS 2013, pp. 1-63) in northern and central Nevada (Figure 12).

Idaho

Both the Great Basin DPS and Northern DPS of Columbia spotted frogs are found in Idaho (Figure 1). Populations in southwestern Idaho are considered part of the Great Basin DPS. The current distribution of Columbia spotted frogs in southwestern Idaho includes 42 HUCs within tributaries of Salmon Falls Creek and the Owyhee and Bruneau Rivers in Twin Falls and Owyhee Counties and occur at elevations between 1,353–2,124 m (4,439–6,968 ft) (Figure 12; Munger *et al*. 1996, pp. 5, 66–69; La Fayette 2011, p. 12; Lohr 2012, p. 5). The Idaho Comprehensive Wildlife Conservation Strategy defines this area as the Columbia Plateau Ecoregion (Owyhee Uplands and Northwestern Basin and Range Ecosections; Idaho Department of Fish and Game (IDFG) 2005, pp. 1–13).

Oregon

Both the Great Basin DPS and Northern DPS of Columbia spotted frogs are found in Oregon (Figures 1 and 2; Robertson and Funk 2012, p. 19–20). Populations east of Highway 395 and

south of Highway 20 including the Owyhee and Steens Mountains in Lake, Harney, and Malheur Counties are part of the Great Basin DPS (Figure 2; Munger *et al*. 1998a, pp. 3–4; Smyth 2004, pp. 3–7; Funk *et al*. 2008, p. 202; Pearl *et al*. 2010, pp. 5–8; Robertson and Funk 2012, pp. 10–12, 19–20). The current range of the Great Basin DPS of Columbia spotted frogs in southeastern Oregon are found in 22 HUCs and occur at elevations between 1,097–2,247 m (3,599–7,372 ft). Isolated populations in southeastern Oregon occur in tributaries of the Donner und Blitzen (including Malheur Lake), Owyhee, and South Fork Malheur Rivers and a disjunct population in Parsnip Creek near Lakeview, Oregon. The Oregon Conservation Strategy defines this area as the Northern Basin and Range Ecoregion (Oregon Department of Fish and Wildlife (ODFW) 2006, pp. 204–221).

Population Estimates/Status

Six long-term datasets (Dry Creek, Oregon; Sam Noble Springs, Idaho; Tennessee Gulch, Pole Creek, Green Mountain Creek, and Toiyabe Mountains, Nevada) were used to assess population trends of Columbia spotted frogs across the range of the Great Basin DPS (Figure 3; Pilliod *et al*. 2015b, pp. 1–50). In addition, two populations with long-term datasets from the Northern DPS (Little Rock Creek, Montana; Skyhigh Basin, Idaho) were used to compare areas which are believed to be relatively stable (Northern DPS) to areas which are thought to be declining (Great Basin DPS). Both recruitment (the number of adults added to the population) and adult survival (annual survival of adults) metrics were used to analyze the effects of year and drought-related weather covariates on population growth rates over a 9 to 16 year timeframe (Pilliod *et al*. 2015b, pp. 6–12). Results from Pilliod *et al*. (2015b, pp. 12–15) are discussed below.

Population growth rates from all eight populations (2 Northern DPS and 6 Great Basin DPS) indicate that four populations had positive growth rates (Skyhigh Basin, Dry Creek, Green Mountain Creek, and Toiyabe Mountains), and four populations were declining (Little Rock Creek, Sam Noble Springs, Tennessee Gulch, and Pole Creek). No evidence was found to indicate that the Great Basin DPS populations were declining as compared to the Northern DPS. Population growth rates were variable across years and by site. Several populations showed both positive and negative population growth rates depending on the year. Adult survival was relatively high (between 53 and 81 percent) at most sites (with the exception of Dry Creek) and, therefore, positive population growth rates were reliant on recruitment. Adult recruitment was more variable than adult survival (between 7–67 percent) with a general pattern of lower adult survival from low to high elevation sites, and alternatively, higher recruitment from low to high elevation sites. Weather-related covariates were also variable across sites and had different effects on both adult survival and recruitment. For example spring and summer precipitation positively influenced recruitment at Green Mountain and Skyhigh Basin while summer precipitation had a negative relationship on recruitment at Toiyabe Mountains. This complex interaction is a result of differences in latitude and elevation of the sites, different weather patterns across this rather large area, and different habitat types at each site. Pilliod *et al*. (2015b, pp. 15–17) conclude that the asynchronous demographic rates of Columbia spotted frog populations found at these eight sites reduces the likelihood of all the populations declining at once, which increases the probability of persistence.

Nevada

Declines of Columbia spotted frog populations in Nevada have been recorded since 1962 when it was observed that in many Elko County localities where Columbia spotted frogs were once numerous, the species was nearly extirpated (Turner 1962, pp. 326–327). Extensive loss of habitat (particularly along mainstem rivers) had occurred from conversion of wetland habitats to irrigated pasture and from spring and stream dewatering by mining and irrigation practices. In addition, there were extensive impacts on riparian habitats due to historical intensive livestock grazing practices (Gruell and Swanson 2012, pp. 57–66). Researchers in Nevada have documented the loss of historically occupied sites, reduced numbers of individuals within local populations, and declines in the reproduction of local populations (Turner 1962, pp. 326–327; Hovingh 1990, p. 6; Reaser 1997a, pp. 30–33; Wente *et al*. 2005, p. 99).

Prior to 2003, lack of standardized and extensive monitoring prevented dependable determinations of frog population numbers or trends across Nevada. However, long-term standardized monitoring protocols have been implemented for both the Toiyabe Mountains and Northeastern populations (NDOW 2004b, pp. 1–25; 2009, pp. 1–21). Results from these efforts are provided below.

Within the Ruby Mountains, Jarbidge, and Mountain City Ranger Districts on the HTNF and the BLM Elko District in northeastern Nevada, there are approximately 212 HUCs. Of the 212 HUCs, 178 HUCs are associated with perennial water; the remaining 34 HUCs have little water and are not expected to have any frog habitat. From 2000 to present, the USFS and NDOW have conducted presence-absence surveys within 117 HUCs with perennial water. Upon completion of a HUC survey, the HUC is identified as either occupied (frogs detected), absent (no frogs detected and insufficient habitat), or unknown (no frogs detected, but more surveys needed). Of the 117 HUCs surveyed since 2000, Columbia spotted frogs have been detected in 71 (61 percent) (NDOW 2014, p. 16).

In 2004, the HTNF initiated an intensive mark-recapture survey at two sites, Green Mountain Creek, Ruby Mountains Ranger District; and Tennessee Gulch, Mountain City Ranger District (and added a third site in 2005, Pole Creek, Jarbidge Ranger District), as part of an effort to determine population estimates, mortality, juvenile-to-adult recruitment, movement, and habitat preference (Figure 3). A summary of findings is discussed below (Van Horne 2013, pp. 1–17). Between 2004 and 2013, a total of 2,217 discrete adult frogs (total number marked plus total number of recaptures from previous years) were captured from all three sites. Between 2006 and 2013, the average number of adult frogs captured (mean = 43) at the Green Mountain Creek site was relatively stable and remained approximately double the numbers captured in 2004 and 2005; however, juvenile numbers have shown a more variable trend (Van Horne 2013, pp. 4–7). Population growth has been positive at this site due to consistently high adult survival and high recruitment in some years (Pilliod *et al*. 2015b, p. 35). Adult numbers captured at Tennessee Gulch in 2013 was 120. Between 2005 and 2009 adult numbers were similar (mean = 161); however, between 2010 and 2012, the mean number of adults captured declined to 76. In addition, females outnumbered males in the population by 2 to 1, and juvenile numbers remained low for 6 years in a row before rebounding in 2013 (Van Horne 2013, pp. 8–11). Adult survival

has been very high; however, due to poor recruitment, population growth has been slightly negative at this site (Pilliod *et al*. 2015b, p. 35). The number of adult frogs captured at the Pole Creek site between 2005 and 2007 averaged 175 individuals; however, beginning in 2008 and continuing through 2013, the number of adults captured has declined sharply with only 7 adults captured in 2013. Additionally, juvenile numbers remained low with a total of 11 captured between 2006 and 2013. Due to variable adult survival and poor recruitment, population growth has been negative at this site and is at risk of extirpation (Pilliod *et al*. 2015b, p. 35). This decline at the Pole Creek site is believed to be due to the declining amount of available habitat, which is due to reduced beaver (*Castor canadensis*) activity (Van Horne 2013, pp. 12–15).

To document population dynamics within the Toiyabe Mountains population, a large mark-recapture study using PIT tags was initiated in 2004 and has continued annually (Figure 3). During this period, 6,435 frogs have been PIT tagged. Results from the 2013 monitoring are discussed below (NDOW 2013b, unpublished data). In 2013, total discrete adult frog captures (total number marked plus total number of recaptures from previous years) decreased by 1,000 individuals (n = 1,597) compared to 2012 (n = 2,594); however, this number is the second highest since monitoring began. Total recaptures in 2013 (n = 784) were similar to 2012 (n = 763). The average number of juveniles captured between 2004 and 2009 was 387; however, between 2010 and 2013 the average increased substantially to 1,235. This is the single largest known population in the Great Basin and has shown positive growth every year with adult survival and consistent recruitment contributing equally to population growth (Pilliod *et al*. 2015b, p. 35). The average egg mass counts from 2004 to 2009 were 45; however, since 2010, egg mass counts have been 3 to 9 times higher. Population estimates are made using the Jolly-Seber method and have ranged from a low of 582 adults in 2005 to a high of 3,549 adults in 2012 (NDOW 2013b, unpublished data). Additionally, estimates of the adult population were made by USGS between 2004 and 2010 using the program MARK (Adams *et al*. 2013, pp. 1–12). Population estimates were generally lower using this method but showed similar trends.

Idaho

Prior to their listing as a Candidate species in 1993, Columbia spotted frogs were found at seven locations in southwestern Idaho (Munger *et al*. 1996, p. 3). Since 1993, several more locations in southwestern Idaho have been documented (Figure 3). Extensive surveys (presence/not detected) began in 1995 and intensive surveys (mark-recapture and egg mass counts) at four sites began in 1997. In 2000, a monitoring protocol was established for extensive surveys of Columbia spotted frogs at 51 Element Occurrences (EO) in southwestern Idaho (Engle 2000a, p. 29). According to the protocol, a subset of EOs is surveyed every year on a 3-year rotation (approximately 15 EOs/year). From 2001 to 2006, Columbia spotted frogs occupied from 45 to 85 percent of surveyed EOs. In 2007, the monitoring protocol shifted from presence/not detected surveys to occupancy estimation and modeling, and survey units were based on catchment basins (HUCs broken into smaller survey units) (Moser 2007, pp. 9–10). From 2007 to 2011, 58 to 85 percent of the catchment basins surveyed were occupied by Columbia spotted frogs. Additionally, 39 different catchment basins located on private lands in southwestern Idaho were surveyed from 2009 to 2012 (LaFayette 2009–2012, entire documents), and Columbia spotted frogs were detected in 32 (82 percent) (LaFayette 2009, pp. 6–17; 2010, p. 7; 2011, p. 13; 2012, p. 4).

Four sentinel sites, located in different catchment basins, have been intensively surveyed annually since 1997 (Lohr 2012, pp. 2–17). These sites are Sam Noble Springs, Circle Pond, Cottonwood Creek, and Stoneman Creek. Sam Noble Springs is a complex of nine man-made ponds excavated in wet meadows or at springheads managed by Idaho Department of Lands (Lohr 2012, p. 6). Six of the oldest ponds are surrounded by a 104-acre grazing exclosure fence that was erected in 2003. Two of the other three ponds are partially fenced. Circle Pond is an impoundment that was originally created for livestock water and is fed by three springs (Munger 2003, p. 3). In 1997, a grazing exclosure fence was erected around the springs and pond. Cottonwood Creek is a slow-flowing, perennial stream with areas of pooled water. Stoneman Creek is a perennial stream that had an active beaver population prior to 1992 and again from 2001 to 2011.

Complete egg mass counts have been conducted at the four sentinel sites from 2000 to 2012. The number of egg masses at Stoneman Creek increased substantially with the reintroduction of beaver in 2001, which improved breeding habitat.

Mark-recapture surveys were conducted at Circle Pond and Stoneman Creek from 1997 to 2006, at Cottonwood Creek from 2000 to 2006, and at Sam Noble Springs from 1997 to 2012. Because of small sample sizes, population estimates were difficult to construct at Circle Pond, Cottonwood Creek, and Stoneman Creek and total captures were reported instead (Moser and Patton 2006, pp. 8-17). In contrast, at Sam Noble Springs, mark-recapture results were pooled for the six older ponds in the grazing exclosure leading to sample sizes large enough to use Program MARK. The resulting estimates ranged from a high of 137 adult frogs in 2000 to 66 adult frogs in 2003. Population growth has been negative at Sam Noble Springs; however, it has been fairly stable since 2003 with consistent adult survival and variable recruitment (Pilliod *et al*. 2015b, p. 35).

Oregon

In southeastern Oregon, presence-absence surveys conducted in 1997 reconfirmed a population of Columbia spotted frogs in the Dry Creek drainage in Malheur County which had been previously documented in 1939 (Figure 3; Munger *et al*. 1998a, pp. 3–4, 12). Dry Creek was historically a tributary to the Owyhee River; however, it now flows into Owyhee Reservoir. Dry Creek is characterized by steep canyons, scour pools, and meandering stream reaches with boulders, cobbles, and sandy substrate (Meyer 2013, p. 2). Detailed population sampling using PIT tags has occurred in Dry Creek since 2001 (Meyer 2013, pp. 1–30). During this period, 3,218 frogs were PIT tagged. Total discrete adult frog captures were substantially lower in 2013 (n = 29), 2012 (n = 56) and 2011 (n = 38) compared to 2010 (n = 197) and 2009 (n = 164) (Meyer 2013, p. 14). Subadult frog counts were also fewer in 2013 (n = 127), 2012 (n = 158) and 2011 (n = 121) compared to 2010 (n = 1,086) and 2009 (n = 628) (Meyer 2013, p. 14). Based on Lincoln-Petersen estimates, the total population size (N) has generally increased since 2001 (N = 74), with large increases detected in 2008 (N = 493), 2009 (N = 890), and 2010 (N = 1,632); however, in 2011 (N = 305), 2012 (N = 266), and 2013 (N = 230), a substantial decrease in the population occurred (Meyer 2013, pp. 12– 14). Two large spring (March and May) flow

events in 2011 coupled with recent drought conditions (2012–2013) are presumed to have caused this reduction in the population. Over the 13-year study period, only 301 individuals have been recaptured, indicating that annual survival rates of adults are low (Meyer 2013, p. 27). Despite this low adult survival, population growth has been increasing at this site due to very high recruitment levels (Pilliod *et al*. 2015b, pp. 14, 35).

Presence-absence monitoring has occurred in the Steens Mountain area, Harney County, in which small isolated populations of Columbia spotted frogs have been located (Smyth 2004, pp. 3–7). Between 2000 and 2003, the USGS compared regional distributions of amphibians with occurrence patterns suggested in historical (prior to 1999 in this study) data (Wente *et al*. 2005, pp. 95–99). Visual encounter surveys were used to determine presence-absence of Columbia spotted frogs on public lands in eastern Oregon and northern Nevada. Based on occupancy models, the USGS estimated that Columbia spotted frogs occupied 53 percent of the 30 historical sites in the area surveyed (Wente *et al*. 2005, p. 99). Between 2000 and 2003, 6 of 16 sites proximal to historical sites were occupied (Wente *et al*. 2005, p. 99). Additionally, 187 sites in southeastern Oregon were randomly selected for presence-absence surveys of which only 3 sites were occupied; however, variability in occupancy between the 3 years was problematic due to drought, variable historical records, and inherent biases in detecting declines using revisitation studies (Wente *et al*. 2005, pp. 99–106). More recently, USGS crews sampled 42 historical (prior to 2000 in this study) locations in southeastern Oregon (both Northern and Great Basin DPS) and found Columbia spotted frogs at nearly 60 percent of the target sites or in nearby habitat (Pearl *et al*. 2010, pp. 2–9). The authors caution interpretation of the results because the survey was conducted in one year (2009), sites were only visited once, many of the historical records contained just a few adult frogs, and many of the historical records contained poor location data (Pearl *et al*. 2010, pp. 7–8). Malheur National Wildlife Refuge biologists have also found more Columbia spotted frogs throughout the refuge than was previously thought (F. Healy, 2015, pers.comm.)

In summary, monitoring efforts of varying intensities are being implemented throughout the range of the Columbia spotted frog in Idaho, Nevada, and Oregon. Extensive surveys and monitoring since 1993 have revealed that Columbia spotted frog populations are much more widespread than what was previously known (and at the time of Candidacy). While some sites and HUCs are no longer occupied, Columbia spotted frogs are well distributed as compared to the known historical distribution throughout southwestern Idaho and northeastern Nevada with isolated and disjunct populations in southeastern Oregon and central Nevada (Figure 3). Population estimates are available for six intensively surveyed sites across three states—population growth at three sites are positive and three sites are declining (Pilliod *et al.* 2015b, pp. 15, 35). Population genetic analyses have been conducted in Oregon and Idaho and have revealed genetic signals indicative of small isolated populations (Robertson and Funk 2011, pp. 5–9, 13; Robertson and Funk 2012, pp. 5–12).

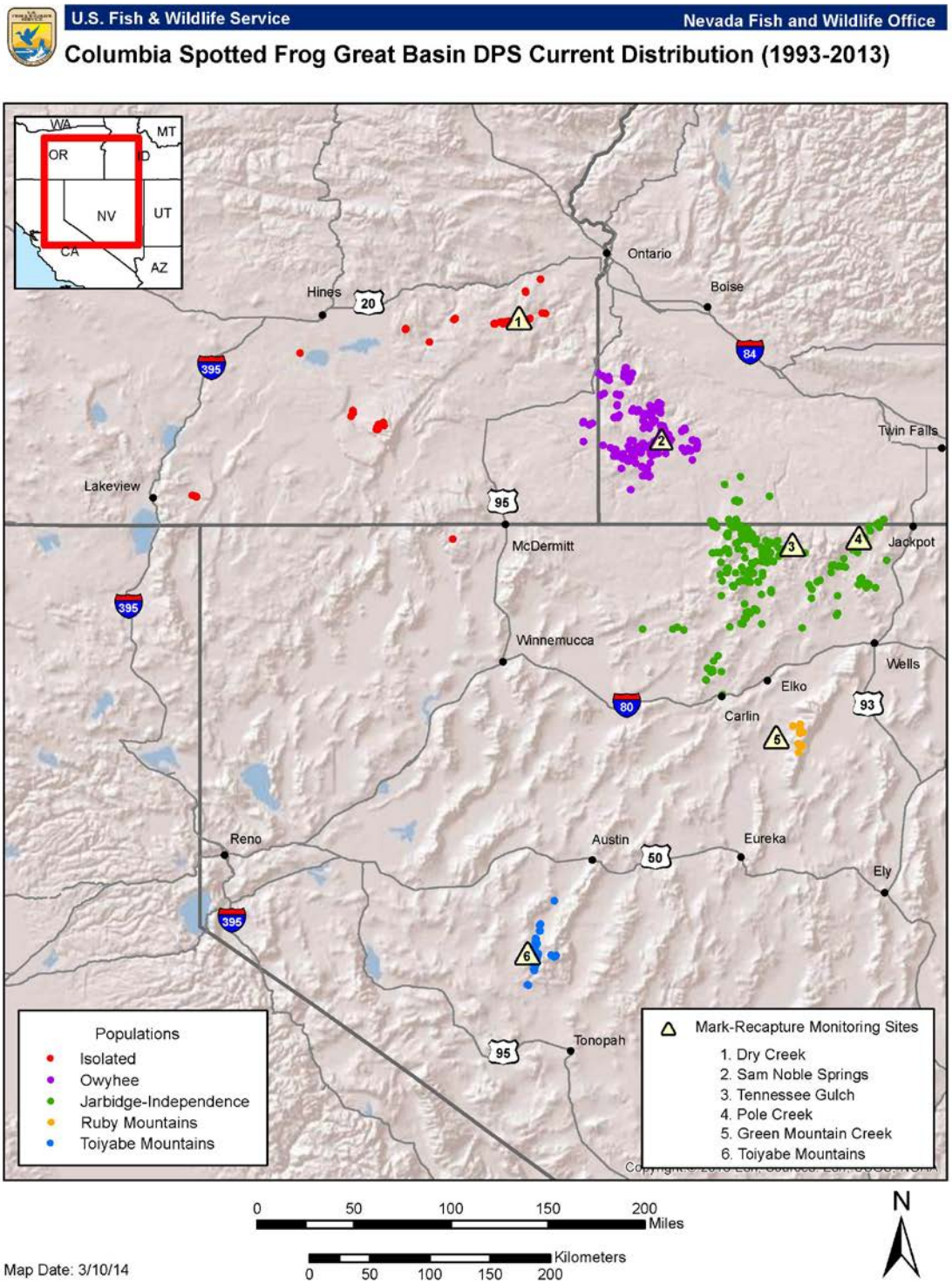

Figure 3. Current distribution of Columbia spotted frog populations within the Great Basin DPS. Currently occupied sites are those located from 1993 (year of Candidacy) to 2013. Also noted are locations of the mark-recapture monitoring sites.

DISTINCT POPULATION SEGMENT (DPS)

Under the Endangered Species Act (ESA), we must consider for listing any species, subspecies, or, for vertebrates, DPSs of these taxa, if information is sufficient to indicate that such action may be warranted. To implement the measures prescribed by the ESA and its Congressional guidance, we, along with the National Oceanic and Atmospheric Administration (NOAA) Fisheries, developed policy to clarify our interpretation of the phrase "distinct population segment of any species of vertebrate fish or wildlife" for the purposes of listing, delisting, and reclassifying species under the ESA (61 FR 4722; February 7, 1996). The policy allowed us to interpret the requirement of the ESA to "…determine whether any species is an endangered species or a threatened species" (section 4(a)(1)) in a clear and consistent fashion for the term "distinct population segment." Under our DPS policy, we consider three elements in a decision regarding the status of a possible DPS as endangered or threatened under the ESA. These are applied similarly for addition to the lists of endangered and threatened wildlife and plants, for reclassification, and for removal. The elements are: (1) the population segment's discreteness from the remainder of the species to which it belongs; (2) the population segment's significance to the species to which it belongs; and (3) the population segment's conservation status in relation to the ESA standards for listing (*i.e.*, when treated as if it were a species, is the population segment endangered or threatened?). Our policy further recognizes it may be appropriate to assign different classifications to different DPSs of the same vertebrate taxon.

Discreteness

The DPS policy standard for discreteness allows an entity given DPS status under the ESA to be adequately defined and described in some way that distinguishes it from other representatives of its species. A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which significant differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist.

We have found evidence that the Great Basin population of the Columbia spotted frog (*Rana luteiventris*) is discrete because it meets the criterion for marked separation. Columbia spotted frogs in Nevada, southwestern Idaho, and most populations in the southeastern Oregon portion of the Great Basin are geographically separate and are genetically divergent from the remainder of the species (Figures 1 and 2; Funk *et al*. 2008, p. 204).

For management purposes, populations within the Great Basin have been divided into four subpopulations. The largest of Nevada's three subpopulation areas is the Jarbidge-Independence Range in Elko and Eureka Counties as well as southern Owyhee and Twin Falls Counties, Idaho (Figure 2). This subpopulation area is formed by the headwaters of streams in two major hydrographic basins. The South Fork Owyhee River, Owyhee River, Bruneau River, and Salmon Falls Creek drainages flow north into the Snake River basin while the Marys River, North Fork

Humboldt River, and Maggie Creek drain into the interior Humboldt River basin. A smaller subpopulation of Columbia spotted frogs is located in the Ruby Mountains about 80 kilometers (km) (50 miles (mi)) south of the Jarbidge-Independence Range subpopulation. However, these two subpopulations are isolated by lack of suitable habitat and hydrologic connectivity. The Toiyabe Mountains subpopulation is isolated nearly 320 km (200 mi) southeast of the Ruby Mountains and Jarbidge-Independence Range subpopulations and represents the southern-most extremity of its range (Figures 1 and 2). The Owyhee subpopulation of Columbia spotted frogs appears to be widely distributed throughout southwestern Idaho (Owyhee and Twin Falls Counties) and southeastern Oregon (Malheur County). Scattered populations also occur in northern Nevada (Humboldt County) and southeastern Oregon (Lake, Malheur, and Harney Counties), but these populations are generally small, with a few exceptions, and appear to be isolated from each other and from other subpopulations in southwestern Idaho and northeastern Nevada by either natural or human-induced habitat disruptions (Figure 2; Robertson and Funk 2011, pp. 5–9; Robertson and Funk 2012, p. 6).

All four Great Basin subpopulations are geographically isolated and separate from the main continuous Northern population of Columbia spotted frogs in the central mountains of Idaho by the Snake River Plain and adjacent lowlands in eastern Oregon. The Owyhee subpopulation in southwestern Idaho is approximately 125 km (75 mi) from the Northern population in central Idaho. Occupied habitat in the Northern population is characterized mostly by conifer forests and high elevation lake environments while habitat for the Great Basin population is characterized by sagebrush steppe and their associated stream and pond environments. However, these two habitat types converge in east-central Oregon in the vicinity of State Highway 20. In this area, Columbia spotted frogs from the Northern and Great Basin populations are in close proximity to each other (Figures 1 and 2; Robertson and Funk 2012, pp. 6, 20). Genetic information discussed below indicates that populations north of State Highway 20 belong to the Northern DPS while populations south of State Highway 20 belong to the Great Basin DPS (Figure 2; Robertson and Funk 2012, pp. 6, 20). Furthermore, the Great Basin population is both hydrologically and geographically separated from isolated populations in Utah. The subpopulation in the Ruby Mountains (Lahontan Basin) is approximately 145 km (90 mi) from the West Desert population (Utah DPS; Bonneville Basin) near Ibapah, Utah (Figures 1 and 2). As detailed below, geographic isolation of the Great Basin population is supported by genetic analyses.

Three earlier genetic studies were conducted on Columbia spotted frogs, which have improved our knowledge of the distribution and genetic structure of the species (Green *et al*. 1996, pp. 374–390; Green *et al*. 1997, pp. 1–8; Bos and Sites 2001, pp. 1499–1513). Unfortunately, these studies did not include populations in southwestern Idaho and eastern Oregon. Because the distribution of subpopulations within the Great Basin DPS was unresolved, the United States Geological Survey (USGS) initiated a genetic evaluation of the Great Basin DPS (USGS 2006, pp. 1–3). Objectives of the study included: 1) determine the distribution of distinct subpopulations within the Great Basin DPS; 2) determine whether Columbia spotted frog populations from southeastern Oregon and southern Idaho are part of the Great Basin DPS; 3) determine whether Columbia spotted frog populations from northeastern Oregon are part of the Great Basin DPS or instead, part of the large, contiguous portion of the species' range in the northern Rocky Mountains; and 4) examine population genetic structure and status in the Great

Basin DPS of Columbia spotted frog. Results from this study are presented below (Funk *et al*. 2008, pp. 198–210).

The strongest genetic evidence that Columbia spotted frog populations in the Great Basin are genetically discrete from other Columbia spotted frogs comes from Funk *et al*. (2008, pp. 198–210) who examined mitochondrial DNA (mtDNA) sequence variation throughout the extant range of Columbia spotted frogs. These data indicate three distinct major clades (a clade is a group of taxa sharing a closer common ancestry with one another than with members of any other clade): Northern, Great Basin, and Utah (Figure 1; Funk *et al*. 2008, pp. 201–202). The three clades are nearly as divergent from each other as they are from Oregon spotted frog, a closely related but separate species (Funk *et al*. 2008, p. 202). Additionally, within each major clade, well-defined nested clades are also evident. The Great Basin clade has two well-defined nested clades in southwestern Idaho-Nevada and southeastern Oregon (Figure 1; Funk *et al*. 2008, p. 202). These two nested clades are also the most divergent among the nested clades indicating the effects of small isolated populations in southeastern Oregon (Funk *et al*. 2008, p. 205). The authors also found one location in east-central Oregon where there is an overlap between the Northern and Great Basin clades (Figure 1; Funk *et al*. 2008, p. 204). However, a more recent study using microsatellite markers found that this site (Kingsbury Gulch) belongs in the Northern clade (Robertson and Funk 2012, p. 5). Both the Great Basin DPS and the Northern DPS of Columbia spotted frogs are found in Oregon and are located in close proximity of each other along State Highway 20. Based on genetic information, populations east of Highway 395 and south of State Highway 20 including the Owyhee and Steens Mountains in Lake, Harney, and Malheur Counties are part of the Great Basin DPS (Figure 2; Robertson and Funk 2012, pp. 10–12, 19–20). This area of southeastern Oregon has been identified as a natural zone of hybridization for other species, such as butterflies and birds (Remington 1968, pp. 321–428).

Summary of Discreteness

Considering all the evidence presented above regarding geographic separation and genetic divergence, the Service finds that Columbia spotted frogs in the Great Basin meet the discreteness criterion for marked separation described in our DPS policy.

Significance

Under our DPS policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to, evidence of the persistence of the discrete population segment in an ecological setting that is unique for the taxon; evidence that loss of the population segment would result in a significant gap in the range of the taxon; evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; and evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

We have found evidence that three of these significance factors (unique ecological setting, loss

would result in a significant gap of the species range, and marked differences in genetic characteristics) are met by the Great Basin population of the Columbia spotted frog. The extinction of the Nevada, southwestern Idaho, and southeastern Oregon portion of the range of the Columbia spotted frog would likely result in the loss of a significant genetic entity and the curtailment of the range of the species (Hampe and Petit 2005, pp. 462–463). The trailing edge of a species range often has small isolated populations which have low levels of within population genetic diversity due to the effects of isolation; however, genetic diversity between populations is typically high due to little or no genetic exchange between populations (Hampe and Petit 2005, p. 462). Particularly, the work of Funk *et al*. (2008, pp. 198–210) indicates that Columbia spotted frogs in the Great Basin differ genetically from Columbia spotted frogs sampled in other portions of the range to a significant degree. The ecological setting in which populations of Columbia spotted frogs exist within the Great Basin are markedly different from other parts of its range due to the xeric nature of the Great Basin and the species' reliance on more lotic habitats as compared to populations in the Northern DPS which relies on pond and lake habitat (Arkle and Pilliod 2015, p. 15). Additionally, loss of Columbia spotted frogs in central Nevada would result in a significant gap in the range of the species because it would eliminate the southern extent of the species' range (Figures 1 and 2).

Summary of Significance

Considering all the evidence presented above regarding unique ecological setting, that the loss of theses populations would result in a significant gap in the species range, and marked differences in genetic characteristics, the Service finds that Columbia spotted frogs in the Great Basin meet the significance criterion through unique ecological setting, loss would result in a significant gap, and marked genetic characteristics as described in our DPS policy.

Summary of DPS Analysis for the Great Basin Population of Columbia Spotted Frog

We evaluated the Great Basin population of Columbia spotted frogs, addressing the two elements that our policy requires us to consider in deciding whether a vertebrate population may be recognized as a DPS and considered for listing under the ESA. We conclude that the Great Basin population is discrete, as per our policy, because it is markedly separate based on its geographic separation and genetic divergence from the isolated populations in Utah and the main continuous populations in central and northern Idaho, northeastern Oregon, eastern Washington, western Montana, northwestern Wyoming, southeast Alaska, and British Columbia and Alberta, Canada (Figure 1). We conclude that the Great Basin population of the Columbia spotted frog is significant because the loss would result in a significant gap in the species range and there are marked differences in genetic characteristics (the loss of the species from this unique ecological setting would result in a significant reduction in the species' range and would constitute loss of a genetically divergent portion of the species). Because the population segment meets the discreteness and significance criteria of our DPS policy, the Great Basin population of the Columbia spotted frog constitutes a DPS, which qualifies for consideration for listing under the Act.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Columbia spotted frogs in the Great Basin have been impacted primarily by the effects of past habitat destruction and/or modification, which caused increased habitat fragmentation and isolation. Heavy use by livestock has been shown to be detrimental to Columbia spotted frog habitat. While livestock grazing occurs throughout the Great Basin, there is uncertainty regarding livestock grazing effects from a lack of monitoring data (Veblen *et al*. 2011, pp. 24–28, 39). Development of springs for livestock and agricultural purposes has occurred throughout the Great Basin; however, the status of Columbia spotted frog habitat as it relates to spring development is unknown. Mining has been shown to have local impacts to populations but has a relatively low influence on a rangewide basis. Beaver management can influence Columbia spotted frogs if trapping occurs in areas which are occupied by Columbia spotted frogs. Beaver harvest is monitored by the states at the county level; therefore, the impact from trapping is difficult to evaluate. Modification and destruction of Columbia spotted frog habitat from historical and current anthropogenic disturbances have contributed to the current fragmented and isolated nature (and subsequent genetic character) of Columbia spotted frog populations in the Great Basin. However, current conservation efforts and management have been implemented and as a result the impacts of past and current on the species' habitat currently does not rise to the level of a threat under the Act and we do not expect it do so in the near future. See Species Status Assessment and conservation information below for additional information (Service 2015, pp. 33–39).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

We found no information indicating that overutilization has led to the loss of populations or a significant reduction in numbers of individuals for this species. Therefore, we conclude based on the best scientific and commercial information available that overutilization for commercial, recreational, scientific, or educational purposes does not currently pose a threat to the Great Basin DPS of the Columbia spotted frog, nor is it likely to become a threat in the future.

C. Disease or predation.

Nonnative fish (*i.e.*, salmonids or bass) and amphibian (bullfrog) predators occur within the range of Columbia spotted frogs. These predators can eliminate or reduce populations or restrict movement of individuals, thus, increasing fragmentation and inhibiting metapopulation dynamics; therefore, predation by nonnative fish and amphibians is negatively impacting Columbia spotted frogs in the Great Basin. However, we have determined that the level of impact does not rise to the level of a threat under the Act now or into the near future. This is based on the localized nature of the stressor, relative stability of populations of the species across its range, and conservation efforts being implemented for the species.

Nonnative fish and amphibians can also be vectors for parasites and pathogens (*e.g.*, chytrid fungus), which may increase susceptibility of individuals or populations to disease outbreaks or deformities leading to increased mortality rates. However, population-level effects of both pathogens and parasites have yet to be documented within the Great Basin; therefore, we conclude that disease is not negatively affecting Columbia spotted frogs in the Great Basin now or into the near future. See Species Status Assessment for additional information (Service 2015, pp. 39–43).

D. The inadequacy of existing regulatory mechanisms.

Since we did not find that any of the potential threats rise to the level of warranting listing, we do find any of the existing regulatory mechanisms to be inadequate. See Species Status Assessment for discussion of potential threats (Service 2015, pp. 33–50).

E. Other natural or manmade factors affecting its continued existence.

In the Species Status Assessment, we evaluated numerous stressors potentially impacting the species including: the effects of climate change, drought, wildfire, UV-b radiation, pesticides, and the combination of multiple stressors (see Species Status Assessment (Service 2015, pp. 43–49). Although these potential stressors may be acting on the species, their magnitude and intensity are either localized, not well understood, or managed to the point to where they do not rise to the level of a threat under the Act. See conservation measures below for additional information.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Conservation Measures Implemented

In Nevada, 10-year conservation agreements (each known as a Conservation Agreement and Strategy, or CAS) were signed in September 2003 for the Toiyabe Mountains and Northeast populations (NDOW 2003a, pp. 1–43; 2003b, pp. 1–55). Federal, State, and local agencies signed the CAS's and all signatories have participated in conservation of Columbia spotted frogs. The purpose of the CAS's is to coordinate monitoring and expedite implementation of conservation measures to address stressors to the species through collaborative efforts among numerous agencies to ensure long-term survival of Columbia spotted frogs in Nevada. At the end of 2012, 15 percent of the identified tasks listed in the Northeast Nevada CAS had been completed and an additional 80 percent of the tasks had been initiated at some level (NDOW 2012b, p. 4). At the end of 2012, 29 percent of the identified tasks listed in the Toiyabe Mountains CAS had been completed and an additional 64 percent of the tasks had been initiated at some level (NDOW 2012c, unpublished data). It should be noted that most tasks in the CAS's are ongoing throughout the life of the agreement. Due to the success of the CAS's in managing and conserving Columbia spotted frogs in Nevada, a revised 10-year agreement (2015–2024) was signed in February 2015.

In 2003, adequate habitat was identified as a limiting factor in the CAS for the Toiyabe Mountains population, and in 2004, a habitat enhancement project was completed which included the construction or augmentation of 22 ponds in Indian Valley Creek (NDOW 2004a, pp. 4–6). An additional 14 ponds were constructed near Indian Valley Creek in 2009 along with plug and pond restoration techniques within Indian Valley Creek to arrest headcutting within the meadows. All ponds created in 2004 and 2009 have documented occupancy and 77 percent have documented breeding activity (either egg masses or tadpoles observed). The plug and pond stream restoration stabilized the headcuts and changed 500 meters (0.31 mi) of ephemeral stream habitat into perennial habitat with documented occupancy and breeding activity (Humboldt-Toiyabe National Forest, unpublished data).

In Idaho, a Candidate Conservation Agreement with Assurances (CCAA) was completed in 2006 for the Columbia spotted frog population at Sam Noble Springs (Service 2006, pp. 1–45). The purpose of the CCAA is to implement conservation measures at Sam Noble Springs on 640 acres of state land to improve breeding, foraging, dispersal, hibernating habitat, and migration corridors for Columbia spotted frogs while allowing continued livestock use of the property. These conservation measures include: (1) erecting a grazing exclosure fence around a 104-acre portion of occupied Columbia spotted frog habitat, (2) reducing the number of AUMs by 43 percent outside of the grazing exclosure, (3) constructing additional ponds for breeding habitat outside of the grazing exclosure, and (4) improving the quality of habitat inside the grazing exclosure by refurbishing ponds, as needed. In addition, a draft Conservation Strategy has been written which provides information regarding conservation issues, management actions, and priorities intended to provide a framework for voluntary participation in collaborative conservation efforts in Idaho (IDFG 2010, pp. 1–11).

On other private lands within Owyhee County, Idaho, 41 ponds were constructed or enhanced on private land in 2010 and 2011, to increase breeding habitat and connectivity between existing populations (Service 2010, pp. 4–5; 2011a, pp. 1–14; 2011b, pp. 1–12). Since construction, breeding and/or Columbia spotted frog presence has been documented at 37 percent of the ponds with limited surveys.

Boise State University has conducted several research projects in Idaho related to Columbia spotted frogs including the reintroduction of beaver for Columbia spotted frog habitat restoration (Munger and Lingo 2003, pp. 1–6). Removal of beaver in 1992 and the subsequent deterioration of the associated beaver dam on Stoneman Creek in southwestern Idaho is believed to be directly related to the decline of a spotted frog population there (Lingo and Munger 2003, pp. 3–6; Munger and Oelrich 2006, pp. 5–8). Intensive surveying of Stoneman Creek documented only one adult Columbia spotted frog in 2000 (Engle 2000a, p. 4). Since beaver reintroduction in 2001, annual egg mass numbers have increased substantially (0 egg masses in 2000 to 167 in 2010; Lohr and Haak 2010, p. 13). In a study looking at long-term trends of Columbia spotted frogs across its entire range using egg mass data, sites with restoration specifically for Columbia spotted frogs had higher growth rates compared to sites without restoration indicating effective management options for conserving Columbia spotted frogs (Hossack *et al*. 2013a, pp. 1415, 1418).

The Malheur National Wildlife Refuge (MNWR) recently completed a Comprehensive Conservation Plan which includes numerous activities aimed at improving aquatic health on the refuge (Service 2013, pp. 1–773). The Comprehensive Conservation Plan defines 14 goals for the MNWR, six of which will directly benefit Columbia spotted frogs. These six goals include (Goal 1) enhance aquatic health and habitat conditions essential to the conservation of the flora and fauna that depend on Malheur Lake and associated waterbodies; (Goal 2) protect, maintain, and rehabilitate riverine and riparian habitats to conditions essential for the conservation of native fish and wildlife species; (Goal 3) protect, maintain, and rehabilitate riparian habitats to conditions essential for the conservation of wildlife species; (Goal 4) enhance, protect, and/or maintain primary habitats essential to the conservation of a diversity of aquatic and terrestrial wildlife species; (Goal 5) enhance and maintain rare and unique habitats; and (Goal 13) gather scientific information (surveys, research, and assessments) to support adaptive management decisions (Service 2013, pp. 2-24–2-42; 2-61–2-65). Implementation of Goal 13 has already resulted in an increase in known occupied habitat on the MNWR (F. Healy 2015 pers. comm.).

To minimize the effects of livestock grazing on Columbia spotted frog habitat, many grazing allotment closures and grazing exclosure projects have been implemented throughout the frog's range including on Cloverdale Creek and Indian Valley Creek (Toiyabe Mountains population), Dry Creek in southeastern Oregon, and Circle Pond, Sam Noble Springs, and Stoneman Creek (Owyhee population), as well as study sites in northeastern Oregon (Northern DPS; Bull 2005, pp. 2, 35–36). Additionally, conservation grazing practices, particularly the timing and duration of grazing, have led to improved riparian and stream habitat conditions in several northern Nevada streams which have occupied Columbia spotted frog habitat (Booth *et al*. 2012, pp. 515–518; Dalldorf *et al*. 2013, pp. 38–41; Kozlowski *et al*. 2013, pp. 37–60). Effectiveness monitoring of these projects is vital in determining the impacts of grazing on Columbia spotted frogs in these areas and the validity of these management actions in protecting and enhancing Columbia spotted frog habitat. Active monitoring, research, and habitat improvement projects are occurring or are planned throughout the range of the Great Basin DPS of Columbia spotted frogs, which are increasing our knowledge of life history characteristics, population fluctuations, effectiveness of habitat improvement projects, genetics, and stressors to the species (Hossack *et al*. 2013a, pp. 1415, 1418; Arkle and Pilliod 2015, pp. 1–19; Pilliod and Scherer 2015, pp. 1–22; Pilliod *et al*. 2015a, pp. 1–20; Pilliod *et al*. 2015b, pp. 1–19).

State Protections

Columbia spotted frogs are classified as a protected amphibian by the State of Nevada under Nevada Administrative Code (NAC) 503.075(2)(a). Per NAC 503.090(1) there is no open season on those species of amphibian classified as protected. Per NAC 503.093 a person shall not hunt or take any wildlife which is classified as protected, or possess any part thereof, without first obtaining the appropriate license, permit or written authorization from the NDOW. NAC 503.094 authorizes issuance of permits for the take and possession of any species of wildlife for strictly scientific or educational purposes (NAC 2012, pp. 14–16).

All native amphibians are considered protected nongame species in Idaho (Idaho Administration

Procedures Act (IDAPA) 2012, p. 7–8). No open seasons are set for protected nongame species and collection of these species is subject to IDFG issuance of a scientific collection permit except that up to four native amphibians and reptiles of a given species can be captured alive, held in captivity, killed, or possessed at any one time by holders of a valid Idaho hunting license (IDAPA 2012b, p. 4).

Columbia spotted frogs are on the nongame protected wildlife list for the State of Oregon which makes it unlawful for any person to hunt, trap, pursue, kill, take, catch, angle for, or have in possession, either dead or alive, whole or in part (Oregon Administrative Rules 2012, pp. 8–9). Moreover, they are listed as "critical" on Oregon's sensitive species list which is used as an early warning system and encourages voluntary actions to improve the status of species on the list (ODFW 2008, pp. 1, 11). Critical species are defined as species that are imperiled with extirpation from a specific geographic area of the state because of small population sizes, habitat loss or degradation, and/or immediate threats. Critical species may decline to a point of qualifying for threatened or endangered status if conservation actions are not taken (ODFW 2008, p. 2). All three States include Columbia spotted frogs in their State Wildlife Action Plans as a species of conservation concern or of conservation priority which highlights threats and conservation needs of the species (IDFG 2005, p. 71; NDOW 2012a, p. 76; ODFW 2006, p. 337).

Promising management options are available to maintain or improve Columbia spotted frog resiliency throughout the Great Basin. Improved grazing management (*e.g.*, reduced stocking rates, reduced utilization levels, rest rotation practices), particularly within riparian habitats, can lead to improved riparian and stream habitat conditions (Booth *et al*. 2012, pp. 515–518; Dalldorf *et al*. 2013, pp. 38–41; Kozlowski *et al*. 2013, pp. 37–60). Creating ponded habitat has also improved numerous occupied sites throughout the Great Basin as well as other parts of the species range (Hossack *et al*. 2013a, pp. 1415–1418; Pilliod and Scherer 2015, pp. 20–21). Beaver are important in the creation of small pools with slow-moving water that function as habitat for frog reproduction and create wet meadows that provide foraging habitat and protective vegetation cover (Naiman *et al*. 1988, pp. 754–761; Amish 2006, p. 9; Cunningham *et al*. 2007, pp. 2520–2523; Stevens *et al*. 2007, pp. 6–11; Gibson and Olden 2014, pp. 399–405; Pollack *et al*. 2014, pp. 279–289). There is a growing body of evidence linking the positive habitat influence of beaver to the presence of Columbia spotted frogs in the Great Basin DPS (Amish 2006, pp. 29–35; Arkle and Pilliod 2015, pp. 16–17; Pilliod *et al*. 2015a, pp. 17–19). Beaver management by the states will be important in the long-term survival of Columbia spotted frogs. See Species Status Assessment for additional information (Service 2015, pp. 50–53).

SUMMARY OF THREATS

Columbia spotted frogs in the Great Basin have been impacted primarily by the effects of past habitat destruction and modification, which caused increased habitat fragmentation and isolation. Heavy use by livestock has been shown to be detrimental to Columbia spotted frog habitat. While livestock grazing occurs throughout the Great Basin, there is uncertainty regarding livestock grazing effects from a lack of monitoring data (Veblen *et al*. 2011, pp. 24–28, 39). Development of springs for livestock and agricultural purposes has occurred throughout the

Great Basin; however, the status of Columbia spotted frog habitat as it relates to spring development is unknown. Mining has been shown to have local impacts to populations but has a relatively low influence on a rangewide basis. Beaver management can influence Columbia spotted frogs if trapping occurs in areas which are occupied by Columbia spotted frogs. Beaver harvest is monitored by the states at the county level; therefore, the impact from trapping is difficult to evaluate. Modification and destruction of Columbia spotted frog habitat from historical and current anthropogenic disturbances have contributed to the current fragmented and isolated nature (and subsequent genetic character) of Columbia spotted frog populations in the Great Basin.

Nonnative fish and amphibian predators and pathogens occur within the range of Columbia spotted frogs. Nonnative fish and amphibian predators can eliminate or reduce populations or restrict movement of individuals, thus, increasing fragmentation and inhibiting metapopulation dynamics; therefore, predation by nonnative fish and amphibians is negatively impacting Columbia spotted frogs in the Great Basin. Nonnative fish and amphibian predators can also be vectors for parasites and pathogens (*e.g.*, chytrid fungus), which may increase susceptibility of individuals or populations to disease outbreaks or deformities leading to increased mortality rates. However, population-level effects of both pathogens and parasites have yet to be documented within the Great Basin; therefore, we conclude that disease is not negatively affecting Columbia spotted frogs in the Great Basin at this time or in the near future.

Climate change has and is expected to continue to affect Great Basin ecosystems; however, predictions are difficult to make and the impacts to Columbia spotted frog populations are not well documented (Fleishman *et al*. 2004, pp. 248–251; Botkin *et al*. 2007, pp. 227–234; Field *et al*. 2007, pp. 627–630). Many negative consequences of a changing climate are associated with amphibian species, and predictions indicate that impacts from climate change may be the greatest challenge to conserving amphibians in the future (Corn 2005, pp. 59–64). The current state of small fragmented populations of Columbia spotted frogs in the Great Basin DPS indicates populations are more vulnerable to extirpation due to loss of habitat from predicted climate related impacts (Corn 2005, pp. 59–64; Wilcox *et al*. 2006, pp. 857–862; Pilliod *et al*. 2015a, p. 19). Protecting or improving Columbia spotted frogs and their habitat so that they can adapt to expected changes in climate may be the most important conservation action (Chambers *et al*. 2004b, pp. 266–268; Seavy *et al*. 2009, pp. 331–333). Overall, we found that climate change research forecasts a drying pattern and a subsequent reduction in suitable habitat with additional isolation of populations; however, there is uncertainty about how these changes will play out at the population level and the future timeframe under which this will happen. While research has shown that current weather patterns are not influencing Columbia spotted frogs similarly across the Great Basin DPS, this pattern could change if these climate influences become more synchronous, or the frequency, duration, and severity of extreme events such as drought increases across the Great Basin (Pilliod *et al*. 2015b , p. 17). However, based on the variability and uncertainty of the exact effects of climate change within the range of the Columbia spotted frog Great Basin DPS, we have determined that the effects of climate change will not impact the species now or in the near future.

RATIONALE FOR NOT WARRANTED FINDING

The following summary is based on information contained in our files, particularly the Species Status Assessment for the Great Basin DPS of the Columbia spotted frog (available at: *http://ecos.fws.gov/species*). Columbia spotted frogs are highly aquatic frogs endemic to the Great Basin, northern Rocky Mountains, British Columbia, and southeast Alaska. Columbia spotted frogs in southeastern Oregon, southwestern Idaho, and northeastern and central Nevada make up the Great Basin Distinct Population Segment. Columbia spotted frogs are closely associated with clear, slow-moving streams or ponded surface waters with permanent hydroperiods and relatively cool constant water temperatures. In addition to permanently wet habitat, streams with beaver ponds, deep maximum depth, abundant shoreline vegetation, and non-salmonid native fish species have the greatest probability of being occupied by Columbia spotted frogs within the Great Basin.

Monitoring efforts are being implemented throughout the range of the Columbia spotted frog in Idaho, Nevada, and Oregon. Extensive surveys and monitoring since 1993 have revealed that Columbia spotted frog populations are much more widespread than what was previously known (and at the time of Candidacy). While some sites and watersheds are no longer occupied, Columbia spotted frogs are well distributed as compared to the known historical distribution throughout southwestern Idaho and northeastern Nevada with isolated and disjunct populations in southeastern Oregon and central Nevada.

Columbia spotted frogs in the Great Basin have been impacted primarily by the effects of past habitat destruction and modification, which caused increased habitat fragmentation and isolation. Heavy use by livestock has been shown to be detrimental to Columbia spotted frog habitat. While livestock grazing occurs throughout the Great Basin, there is uncertainty regarding livestock grazing effects from a lack of monitoring data. Development of springs for livestock and agricultural purposes has occurred throughout the Great Basin; however, the status of Columbia spotted frog habitat as it relates to spring development is unknown. Mining has been shown to have local impacts to populations but has a relatively low influence on a rangewide basis. Beaver management can influence Columbia spotted frogs if trapping occurs in areas which are occupied by Columbia spotted frogs. Beaver harvest is monitored by the states at the county level; therefore, the impact from trapping is difficult to evaluate.

Nonnative fish and amphibian predators and pathogens occur within the range of Columbia spotted frogs. Nonnative fish and amphibian predators can eliminate or reduce populations or restrict movement of individuals, thus, increasing fragmentation and inhibiting metapopulation dynamics; therefore, predation by nonnative fish and amphibians is negatively impacting Columbia spotted frogs in the Great Basin. Nonnative fish and amphibian predators can also be vectors for parasites and pathogens (*e.g.*, chytrid fungus), which may increase susceptibility of individuals or populations to disease outbreaks or deformities leading to increased mortality rates. However, population-level effects of both pathogens and parasites have yet to be documented within the Great Basin.

Climate change has and is expected to continue to affect Great Basin ecosystems; however, predictions are difficult to make and the impacts to Columbia spotted frog populations are not well documented. The current state of small fragmented populations of Columbia spotted frogs in the Great Basin DPS indicates populations are more vulnerable to extirpation due to loss of habitat from predicted climate related impacts. Protecting or improving Columbia spotted frogs and their habitat so that they can adapt to expected changes in climate may be the most important conservation action. Overall, we found that climate change research forecasts a drying pattern and a subsequent reduction in suitable habitat with additional isolation of populations; however, there is uncertainty about how these changes will play out at the population level and the future timeframe under which this will happen.

Conservation efforts are occurring in many areas across the range of the Columbia spotted frog. A 10-year Conservation Agreement and Strategy had been implemented in Nevada since 2003. Due to the success of the Conservation Agreement and Strategy in managing and conserving Columbia spotted frogs in Nevada, a revised 10-year agreement (2015–2024) was signed in February 2015. In 2006, a Candidate Conservation Agreement with Assurances was developed for a population in Idaho. An increase in monitoring has improved our knowledge of the distribution of the species as well as improved knowledge of demography in several populations. Ongoing management aimed to maintain or improve Columbia spotted frog habitat is occurring in many locations within the Great Basin. Improved grazing management (for example, reduced stocking rates, reduced utilization levels, rest rotation practices) in some locations has contributed to improved stream and riparian habitat in some areas. Creating ponded habitat has also improved numerous occupied sites throughout the Great Basin as well as other parts of the species range. Beaver are important in the creation of small pools with slow-moving water that function as habitat for frog reproduction and create wet meadows that provide foraging habitat and protective vegetation cover. Beaver management by the states will be important in the long-term survival of Columbia spotted frogs. All three states include Columbia spotted frog on their list of protected species.

Overall, the best available scientific and commercial information does not indicate that any of the stressors identified above (livestock grazing, spring development, mining, beaver harvest, nonnative fish and amphibian predators and pathogens, and climate change) are having population-level impacts on the Great Basin DPS of the Columbia spotted frog. In addition, Columbia spotted frog populations are much more widespread than what was previously known (and at the time of Candidacy).

As required by the Act, we considered the five factors in assessing whether the Great Basin DPS of the Columbia spotted frog is endangered or threatened throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the Great Basin DPS of the Columbia spotted frog. We reviewed the information available in our files, other available published and unpublished information, and we consulted with recognized Columbia spotted frog experts and other Federal, State, and tribal agencies. Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the threats are not of sufficient imminence, intensity, or magnitude to indicate that the Great Basin DPS of the Columbia spotted frog is in

danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout all of its range. This is based on the relatively stable population and distribution of the species and the fact that conservation management is occurring throughout the species range for both impacts to habitat and the species. In considering any significant portion of the range of this species, we evaluated whether the stressors facing the Great Basin DPS of the Columbia spotted frog might be geographically concentrated in any one portion of its range and whether these stressors manifest as threats to the species such that it would be presently in danger of extinction throughout all of the species' range. Because the distribution of the species is relatively stable across its range and stressors are similar throughout the species range, we found no concentration of stressors that suggests that Great Basin DPS of the Columbia spotted frog may be in danger of extinction in a portion of its range. We also found no portion of its range where the stressors are significantly concentrated or substantially greater than in any other portion of its range. Therefore, we find that listing the Great Basin DPS of the Columbia spotted frog as a threatened or endangered species or maintaining the species as a candidate is not warranted throughout all or a significant portion of its range at this time and we are removing it from candidate status.

For species that are being removed from candidate status:
_No__Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES: N/A

EMERGENCY LISTING REVIEW: Is Emergency Listing Warranted?

Emergency listing is not warranted at this time because activities that are likely to extirpate Columbia spotted frogs in the Great Basin DPS in the next 12 months have not been identified.

DESCRIPTION OF MONITORING AND CONSERVATION EFFORTS

Conservation efforts are occurring in many areas across the range of the Columbia spotted frog. A 10-year Conservation Agreement and Strategy had been implemented in Nevada since 2003. Due to the success of the CAS in managing and conserving Columbia spotted frogs in Nevada, a revised 10-year agreement (2015–2024) was signed in February 2015. In 2006, a Candidate Conservation Agreement with Assurances was developed for a population in Idaho. An increase in monitoring has improved our knowledge of the distribution of the species as well as improved knowledge of demography in several populations. Ongoing management aimed to maintain or improve Columbia spotted frog habitat is occurring in many locations within the Great Basin. Improved grazing management (*e.g.*, reduced stocking rates, reduced utilization levels, rest rotation practices) in some locations has contributed to improved stream and riparian habitat in some areas. Creating ponded habitat has also improved numerous occupied sites throughout the Great Basin as well as other parts of the species range (Hossack *et al*. 2013a, pp. 1415–1418;

Pilliod and Scherer 2015, pp. 20–21). Beaver are important in the creation of small pools with slow-moving water that function as habitat for frog reproduction and create wet meadows that provide foraging habitat and protective vegetation cover (Naiman *et al*. 1988, pp. 754–761; Cunningham *et al*. 2007, pp. 2520–2523; Pollack *et al*. 2014, pp. 279–289). Beaver management by the states will be important in the long-term survival of Columbia spotted frogs. All three states include Columbia spotted frog on their list of protected species.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Nevada, Idaho, and Oregon

Indicate which State(s) did not provide any information or comments: N/A

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: Alexandra Pitts 6.26.15
Regional Director, Fish and Wildlife Service — Date

Concur: SEP 23 2015
Director, Fish and Wildlife Service — Date
Gary Frazer

Do not concur: _____ _____
Director, Fish and Wildlife Service — Date

Director's Remarks: _____

U.S. Fish and Wildlife Service Species Assessment
For Columbia Spotted Frog, Great Basin Distinct Population Segment (DPS) (*Rana luteiventris*)

Date of annual review: May 2015.
Conducted by: Chad Mellison, Reno Fish and Wildlife Office, Region 8.