ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** AAABH01150
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CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Rana onca* Frost et al.
COMMON NAME: Relict Leopard Frog
SYNONYMS: *Lithobates onca*; *Rana pipiens onca*; *Rana pipiens* (complex)
FAMILY: Anura: Ranidae

AUTHOR/PLACE OF PUBLICATION: Cope, 1875 – *in* Yarrow, *in* Wheeler's Rep. Surv. W. 100th Mer., Vol.5, Zool., p. 528. *Lithobates onca*, Frost, D.R., et al., 2006. The Amphibian Tree of Life. *Bulletin of the American Museum of Natural History* no. 297: 1-370. [15 Mar 2006]

TYPE LOCALITY: Within the Virgin River drainage, probably collected in the vicinity of St. George, Washington County, Utah by Henry Crècy Yarrow in 1872.

TYPE SPECIMEN: Henry Crècy Yarrow, 1872. Single adult female collected.

TAXONOMIC UNIQUENESS: In North America, *onca* is 1 of 21+ species in the genus *Rana*. Validity of *onca* as a species is controversial. There are taxonomic questions as to whether populations in the Virgin River are *onca* or something else. Jaeger et al. (2001) examined variation in mtDNA and morphology, and concluded that certain leopard frog populations in the Virgin River/Black Canyon (Colorado River) region represent a species (*Rana onca*) distinct from *R. yavapaiensis* (NatureServe 2002). Pfeiler and Markow (2008) reported evidence consistent with a close or identical relationship with *R. yavapaiensis*.

Frost et al. (2006) recognized *Lithobates* (Anura: Raniae) for all species of North American "*Rana*" not placed in *Rana sensu stricto*. Although Crother (2008) accepted this change, others expressed a reluctance to accept this taxonomy (Hillis 2007, Wiens et al. 2009). Hillis and Wilcox (2005) provided a phylogenetic taxonomy that retained the species now under *Lithobates* within *Rana*. The nomenclature of North American ranids continued to be debated (Dubois 2007, Pauly et al. 2009, Frost et al. 2009) without resolution. Fouquette and Dubois (2014) suggested *Lithobates* be considered a subgenus of *Rana*, and Yuan et al (2016) suggested returning *Lithobates* to *Rana*. Crother (2017) suggested the best course of action was to hold this taxonomic change in abeyance and retained the use of *Lithobates*, as does Frost (2021). Holycross et al. (2022a, 2022b) and Arizona Game and Fish Department (2022) follow Yuan et al. (2016), using *Rana*, so HDMS uses *Rana* for the genus. U.S. Fish and Wildlife Service is still using *Lithobates* as the genus in the Environmental Conservation Online System and the 12-month finding that listing is not warranted (USDI, FWS 2016).

DESCRIPTION: A medium-sized leopard frog with body lengths of 4.45 to 8.90 cm (1.75 to 3.5 in). Dorsal coloration is brown, gray, or greenish, with greenish brown "leopard" spots

(USDI, FWS 2009). The underside is whitish, with dark mottling on the throat and yellow or yellow-orange in the groin and on the underside of the hind limbs (USDI, FWS 2009). A glandular fold runs down each side of the back, becoming indistinct half to three-quarters of the way towards the rear of the animal (USDI, FWS 2009). The upper jaw has a light stripe, and the eardrum may have a light center (USDI, FWS 2009). The male has swollen thumbs (USDI, FWS 2009).

AIDS TO IDENTIFICATION: The Relict Leopard Frog is very similar (in appearance) and closely related to the Lowland Leopard Frog (*Rana yavapaiensis*). It is distinguished from similar species of the *Rana pipiens* complex by its short, indistinct, dorsolateral folds that extend ½ to ¾ down the dorsum, generally shortened legs, an incomplete supralabial stripe, upper surfaces of the thighs usually spotted and not barred, and males having enlarged tympana, paired vocal sacs, and no vestigial oviducts (AmphibiaWeb 2009).

ILLUSTRATIONS:
Drawing (Behler and King 1979:376)
Drawing (Smith 1978:69)

TOTAL RANGE: Virgin River Drainage in SE Nevada and NW Arizona. Previously believed to be extinct; rediscovered in the early 1990s, and, as of 2001, known from small populations in several springs in Arizona and Nevada (NatureServe 2002). Populations in Utah appear to have been extinct since the 1950's. Relict Leopard Frogs are currently considered to occupy eight sites in two general areas, three in the Northshore Springs Complex (along the base of the Muddy Mountains near the Overton Arm of Lake Mead and five in Black Canyon below Hoover Dam along Lake Mohave (USDI, FWS 2016). Reintroduction efforts are underway in parts of Utah and Nevada (UDWR 2015).

RANGE WITHIN ARIZONA: Extreme NW corner of the state in the Virgin River drainage near Littlefield, Mohave County. Historically this species occurred along the Colorado River and included at least Black Canyon below Hoover Dam. It most likely occurred in what is now Lake Mead and extended into the lower Grand Canyon. They were reestablished at 3 sites near Lake Mead but drought and flooding destroyed one population in 2006 (Rorabaugh 2023)

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: A nocturnal frog that is inactive in cold temperatures. Like other leopard frogs, when frightened this species will flee into the water or to the security of an overgrown grassy bank (Behler and King 1979). Similar to other leopard frog species, Relict Leopard Frogs can live at least four years in the wild (Relict Leopard Frog Conservation Team (RLFCT) 2016).

REPRODUCTION: For all leopard frog species in the Southwest, rates of reproduction are highly variable based on rainfall and other environmental influences (USDI, FWS 2005). Field studies indicate that Relict Leopard Frogs have an extended breeding period focusing on spring and fall, with most egg masses recorded from January through April (RLFCT 2016). A typical egg mass

is 40–60 mm in diameter and contains hundreds of eggs (RLFCT 2005). Field and laboratory observations indicate hatching occurs in approximately one week (RLFCT 2005).

FOOD HABITS: No studies specific to the food habits of the Relict Leopard Frog have been conducted, however the food preferences of adult Relict Leopard Frogs are likely similar to other leopard frog species (USDI, FWS 2016). Adults probably are mainly invertivorous. Larvae are primarily herbivorous and probably eat algae, organic debris, plant tissue, and minute organisms in water (USDI, FWS 2005).

HABITAT: Adult frogs inhabit permanent streams, springs, and spring-fed wetlands below approximately 600 m (1,968 ft) without dense vegetation (Murphy 2018). Adults may prefer relatively open shorelines where dense vegetation does not dominate. Breeding habitat includes pools or slow moving side areas of streams, with or without emergent vegetation." They typically are found in or near water, or among *Scirpus*. Relict Leopard Frogs are most often found in 1-7 cm of water, with most choosing depths of 1-4 cm (USDI, FWS 2005).

ELEVATION: 680 – 1,900 ft (207-580 m) in Arizona (AZGFD, unpublished data accessed 2003).

PLANT COMMUNITY: Little is known about the specific plant community selected by the Relict Leopard Frog, however Harris (2006) determined that some population extinctions of *Rana onca* have occurred concomitantly with the encroachment of native emergent vegetation into pools historically utilized by frogs. Radio-telemetry and multiple analysis of variance studies confirmed that adult *Rana onca* select for areas with less vegetative cover in general (Harris 2006).

POPULATION TRENDS: The total population in the late 1990s was estimated at 1,100 metamorphosed individuals. It is considered one of the rarest frogs in North America (Rorabaugh 2023). As of 2001, there were roughly a half dozen known extant occurrences in Nevada and Arizona (Jaeger et al. 2001). Populations of Relict Leopard Frogs are improving due to conservation actions and current efforts to reestablish and increase naturally occurring and reintroduced populations, largely as a result of management response following the species gaining candidate status in 2002 (USDI, FWS 2016). Ongoing habitat management, establishment of new sites, and restoration activities are making substantial progress, and the range wide populations of the species are considered stable or growing by the U.S. Fish and Wildlife Service (USDI, FWS 2016).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None, as *Lithobates* (USDI, FWS 2016)
[C* as *Lithobates* (USDI FWS 2010-2015)]
[C* (USDI, FWS 2004-2009)]
[C (USDI, FWS 2002)]
[None (USDI, FWS 1994, 1996)]

[C3A (USDI, FWS 1985, 1989, 1991)]
[C2 (USDI, FWS 1982)]

STATE LIST STATUS: 1 (AZGFD, AWCS 2022)
[1A (AGFD SWAP 2012)]
[WSC-Extinct, AGFD, WSCA 1996 in prep]
[Extinct (AGFD, TNW 1988)

OTHER STATUS: Bureau of Land Management Sensitive as *Lithobates* (USDI, BLM AZ 2017)
Not Forest Service Sensitive (USDA FS Region 3, 2007, 2013)
[Forest Service Sensitive (USDA, FS Region 3, 1999)]
EN (IUCN, IUCN SSC Amphibian Specialist Group 2022)

MANAGEMENT FACTORS: Threats include elimination or dramatic alteration of aquatic habitat due to dams, agriculture, marsh draining, and water development and the spread of predator and nonnative bullfrogs, crayfish, and predaceous fishes. Nonnative predators such as Louisiana red swamp crayfish (*Procambarus clarki*), American bullfrogs (*Rana catesbeiana*), and nonnative fish are associated with extirpation of relict leopard frogs (USDI, FWS 2016). Water diversions and groundwater development associated with livestock grazing and urban development have caused altered habitats due to diversion of water from streams and pools usually utilized by frogs (RLFCT 2016). Bradford (2004) suggests there is some evidence that grazing systems in Nevada and Arizona could potentially benefit habitat for Relict Leopard Frog by limiting vegetation encroachment. Small population size presents a critical threat to most Relict Leopard Frog populations as they occur in small, isolated desert spring sites (RLFCT 2016).

PROTECTIVE MEASURES TAKEN: A petition to list the Relict Leopard Frog as endangered was filed by the Center for Biological Diversity and the Southern Utah Wilderness Alliance in May of 2002, and the species was granted candidate status by the U.S. Fish and Wildlife Service in June of 2002 (USDI, FWS 2002). In addition, a multi-agency working group developed a conservation agreement to maintain viable populations of this frog in the wild in 2005 (USDI, FWS 2005). The Conservation Agreement and Strategy was updated by the Relict Leopard Frog Conservation Team in 2016 (RLFCT 2016). The Relict Leopard Frog Conservation Team implemented several conservation efforts which resulted in an overall reduction of most threats, and it was determined by the U.S. Fish and Wildlife Service that the species does not need ESA protection in 2016 (USDI, FWS 2016). The state of Utah is currently petitioning for sensitive species designation to facilitate management during the early phases of repatriation and recovery of this species in Utah, where the species is currently considered extirpated (UDWR 2020). An Arizona fishing license is required to take any amphibian.

SUGGESTED PROJECTS: Distribution, population and life history studies are needed. Surveys for existing and potential populations should be done at night, and at least twice weekly during expected periods of breeding (fall and late winter) (Jennings et al. 1995). Studies on

"accurately identifying important habitat features for protection, developing captive rearing programs, assessing potential sites for reintroduction, and reintroduction of Relict Leopard Frogs to the wild" are also called for in the Conservation Agreement (RLFCT 2016). Additional monitoring data is also needed to develop a baseline assessment of current species status and population trends as conservation efforts continue (USDI, FWS 2016).

LAND MANAGEMENT/OWNERSHIP: BLM – Arizona Strip Field Office; NPS – Lake Mead National Recreation Area, Grand Canyon National Park.

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ADDITIONAL INFORMATION:

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