

**2023 Annual Summary of Activities**  
**Pahrump Poolfish Safe Harbor Agreement**

**By**

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The following report is an annual summary of activities under Enhancement of Survival Permit # TE17874C-0 issued to the Las Vegas Valley Water District (LVVWD) by the U.S. Fish and Wildlife Service (USFWS). This permit was granted in 2017 under the Safe Harbor Agreement for Pahrump poolfish at the 180-acre Springs Preserve (Enrolled Property) in Clark County, Nevada.

**Executive Summary**

The estimated Pahrump poolfish population size increased from 133 in July 2022 to 804 in July 2023. This represents a 504% increase in the population size of Pahrump poolfish in the Springs Preserve refugium ponds.

**Population Surveys**

The Nevada Department of Wildlife (NDOW) conducted the July–August 2023 survey with the assistance of the Southern Nevada Water Authority (SNWA), USFWS, and Springs Preserve colleagues:

- On July 25, 2023, a total of 566 Pahrump poolfish were captured and marked in the two ponds following previously established trapping protocols. Of these fish, 350 were captured and marked in the Upstream Pond (Pond NF-1b) and 216 in the Downstream Pond (Pond NF-1a).
- On Aug 1, 2023, a total of 450 Pahrump poolfish were captured in the two ponds during the recapture session. For the Upstream Pond, 269 fish were captured, of which 199 were recaptures; whereas, in the Downstream Pond 181 fish were captured, of which 118 were recaptures.

Population estimates and 95% Confidence intervals (CI) for years 2018–2023 calculated by the Nevada Department of Wildlife for the two ponds are presented below (**Tables 1–2**).

**Table 1. Downstream Pond:** Population size estimates and 95% Confidence Intervals (CI) of Pahrump poolfish captured in North Fork Pond 1a in 2018–2023 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Year	No. Surveys	Population Size Estimate	95% CI
2018	3	134	63–310
2019	2	65	46–96
2020	3	93	41–232
2021	3	31	21–50
2022	2	29	18–50
2023	2	331	277–397

The estimated population sizes of Pahrump poolfish in July 2023 were the highest since the population was established in 2018. Moreover, the Downstream Pond had a 1,041% increase over the 2022 survey estimate; whereas, the Upstream Pond had a 355% increase over the 2022 survey estimate.

**Table 2. Upstream Pond:** Population size estimates and 95% Confidence Intervals (CI) of Pahrump poolfish captured in North Fork Pond 1b in 2018–2023 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Year	No. Surveys	Population Size Estimate	95% CI
2018	2	252	215–295
2019	2	99	74–136
2020	2	98	72–137
2021	3	67	49–94
2022	2	104	77–142
2023	2	473	412–544

### Operation and Maintenance

In laboratory studies, Horn et al. (1994) found that damselfly and dragonfly nymphs consumed 81% and 76% respectively of razorback sucker (*Xyrauchen texanus*) larvae in just seven days. They suggested that extensive growth of aquatic vegetation might exacerbate predation rates by allowing odonate nymphs to actively prey upon fish throughout the water column, rather than just the fish larvae that happen to rest on the bottom or swim within reach of the bottom-dwelling odonates. Observations at the Springs Preserve suggest that different life stages of Pahrump poolfish are stratified in the water column, with the most vulnerable fry at the water surface. Consequently, in spring 2022, a concerted effort was made to remove dense mats of stonewort (*Chara* sp.) growing within the two ponds. By July 2022, the estimated number of Pahrump poolfish appeared unchanged in the Downstream Pond but was 64% higher in the Upstream Pond. Since then, new stonewort growth has been removed as part of regular pond maintenance in an attempt to increase recruitment by limiting odonate nymph access to most of the water column.

### Environmental Conditions

Water quality measurements were recorded hourly by a submerged datalogger with probes for water temperature, pH, and conductivity (**Table 3–5**). Although the probe is designed to go nine months without calibration, maintenance of the probe is now being carried out by SNWA Hydrologists every two weeks.

The average water temperatures in the pond remain remarkably consistent from year-to-year, within 0.7°C (**Table 3**). Similarly, maximum water temperatures have not exceeded 29°C (84°F) and stayed within a 2.1°C range. Once again, the minimum water temperature recorded was below 5°C (41°F) suggesting the species is adapted, or has adapted, to colder temperatures than those historically recorded at Manse Spring.

**Table 3. Downstream Pond:** Average, minimum, and maximum hourly temperatures in degrees centigrade (°C) for refugium pond (NF-1a) for 2020–2023 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Year	Average	Minimum	Maximum
2020	16.0	3.9	26.9
2021	15.9	3.6	29.0
2022	15.8	2.7	28.2
2023	15.3	3.4	28.2

Although the pH in the ponds appeared to be increasing from 2020–2022 (**Table 4**) more frequent calibration of the datalogger probe by Hydrologists revealed this was not the case. The 2023 pH data are comparable to those of 2020. Although the maximum pH is considerably lower, this may be related to changes in the pond algal community structure and/or possibly the buffering effect of more rain.

**Table 4. Downstream Pond:** Average, minimum, and maximum hourly pH for refugium pond (NF-1a) for 2020–2023 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Year	Average	Minimum	Maximum
2020	8.6	8.0	9.4
2021	9.0	8.4	9.7
2022	9.34	8.7	9.9
2023	8.2	7.8	8.5

As with pH, the average and minimum conductivity values are somewhat lower in 2023 (**Table 5**), which is attributed to regular calibration.

**Table 5. Downstream Pond:** Average, minimum, and maximum hourly conductivity in microsiemens per meter (µS/m) for the refugium pond (NF-1a) for 2020–2023 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Year	Average	Minimum	Maximum
2020	1,092	997	1,211
2021	1,065	841	1,216
2022	1,109	1,004	1,182
2023	983	771	1,341

## Education

Information about the Pahrump poolfish is shared on the Springs Preserve [website](#). Guests visiting the ponds can read interpretive panels about the history of the Pahrump poolfish and some of the threats the species faces. Natural history and conservation messaging for the Pahrump poolfish were shared during program offerings. Other public education outreach efforts from Springs Preserve were offered online through social media platforms, and included:

- [World Wildlife Day - Facebook - March 3, 2023 - English](#)
- [World Wildlife Day - Facebook - March 3, 2023 - Spanish](#)
- [World Wildlife Day - X / Twitter - March 3, 2023](#)
- [World Wildlife Day - Instagram - March 3, 2023](#)
- [World Wildlife Day - LinkedIn - March 3, 2023](#)
- [World Wildlife Day - YouTube - March 3, 2023](#)

In addition, an article was published about the population size increase in the Pipeline, a Las Vegas Valley Water District newsletter:

- Heroic Comeback for endangered poolfish – Pipeline Employee News – October 12, 2023 (**Appendix I**)

The Springs Preserve was awarded an Outside Agency Grant by Clark County to create new bilingual interpretive panels for the future South Fork refugium pond system. These panels were completed and installed in 2023 (**Appendix II**).

### Mortalities

No dead Pahrump poolfish were observed in 2023. Moreover, no signs of disease were noted on any of the fish trapped and/or observed in the ponds.

### Acknowledgments

The conservation of the federally endangered Pahrump poolfish at the Springs Preserve would not be possible without our agency partners, with special thanks to James Harter at the USFWS and Kevin Guadalupe at NDOW. As always, this project is supported by team members Katrina Smith and Thomas O’Toole at the Springs Preserve, as well as Aaron Ambos, Audrey Bennett, Jean-Axel Urbietta Aguilar, and Cindy Nguyen at SNWA. Jena Antonchuk is thanked for taking the lead on designing, creating, and editing the new bilingual interpretive panels. SNWA Hydrologists Grant Kornrumpf and Jim Prieur graciously took over the maintenance of the In-Situ water quality probe. Thanks also to Julie Schoolmeester for her expertise in compiling, editing, and shepherding the various successful grant applications to fund upcoming expansions of this rewilding project.

### Literature Cited

Horn, M.J., P.C. Marsh, G. Mueller, and T. Burke. 1994. Predation by odonate nymphs on larval razorback suckers (*Xyrauchen texanus*) under laboratory conditions. *Southwestern Naturalist* 39:371–374.

## Appendix I

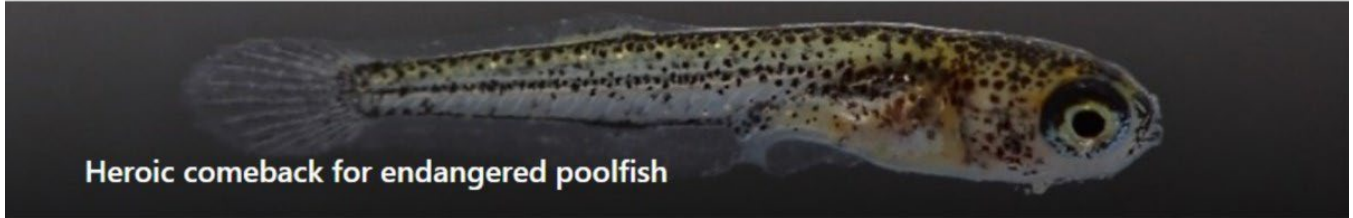


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## Heroic comeback for endangered poolfish

As part of a restoration effort in 2018, the Nevada Department of Wildlife released 290 federally endangered Pahrump poolfish in the Springs Preserve ponds at [Cottonwood Grove](#). While the poolfish were expected to flourish in their new habitat, their numbers dwindled to a mere 98.

Then something remarkable happened. SNWA Environmental Biologist Dr. Raymond Saumure recommended a single change in pond maintenance, and fish numbers began to skyrocket! That change involved removing from the ponds a macroalgae that dragonfly and damselfly larvae climb up on to feed on baby poolfish, threatening their existence. By removing the macroalgae, called stonewort, the insect larvae had reduced feeding grounds, and the poolfish population exploded.

Today, at a healthy 657, the poolfish are well adapted to their home at Cottonwood Grove—where you can learn more about the history of these threatened species through a variety of interpretive exhibits.

The [Springs Preserve](#), in partnership with the [Southern Nevada Water Authority](#), works to protect native and endangered species and educate our community about our desert ecosystem.

### Pahrump poolfish habitat at Cottonwood Grove



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## Appendix II

# WHERE IT STARTED, WHERE IT'S GOING

## Continuing Commitment to Restoration

The small pond before you replicates the South Fork of the historic Las Vegas Creek channel that ran dry prior to 1962. Biologists re-created this pond as habitat for the Pahrump poolfish (*Empetrichthys latos*).

Restoration work and maintenance of these ponds are a never-ending labor of love for the biologists at the Springs Preserve. Biologists continually monitor the health of this ecosystem, track Pahrump poolfish population size and analyze water quality.

### DONDE EMPEZÓ, A DONDE VA

Compromiso Continuo con la Restauración

El pequeño estanque que tiene ante usted es una réplica del canal histórico South Fork de Las Vegas Creek, que se secó antes de 1962. Los biólogos recrearon este estanque como hábitat adicional para el pez piscina de Pahrump (*Empetrichthys latos*).

El trabajo de restauración y mantenimiento de estos estanques es un trabajo de amor sin fin para los biólogos de Springs Preserve. Los biólogos monitorean continuamente la salud de este ecosistema y el crecimiento de la población del pez piscina de Pahrump. Además, analizan datos de la calidad del agua.



Springs Preserve biologists use modern technology to test water quality in the re-created ponds. Los biólogos de Springs Preserve utilizan tecnología moderna para evaluar la calidad del agua en los estanques recreados.



The Pahrump poolfish is only about 2 1/3 inches (6 cm) long. This species is native to Manse Spring in Nevada and thrives in warm spring waters. El pez piscina de Pahrump mide solo 2 1/3 pulgadas (6 cm) de largo. Esta especie es originaria de Manse Spring en Nevada y prospera en aguas cálidas de manantial.

# DESIGN AND CONSTRUCTION

## Re-Creating a Riparian Habitat

A lot of work goes into the construction of re-created habitats. In addition to digging, plumbing, planting and monitoring, our biologists and engineers invest years of research and planning.

Strict regional, state and federal regulations protect endangered species and how they are relocated.

The ponds created for the federally endangered Pahrump poolfish (*Empetrichthys latos*) are designed

to foster healthy population growth. The ponds incorporate native plant life, aeration and circulation systems, and native rocks and soil. The design and materials used to re-create these ponds are beneficial to every organism living within the ponds.

### DISEÑO Y CONSTRUCCIÓN

#### Recreando un Hábitat Ribereño

Se dedica mucho trabajo a la construcción de hábitats recreados. Además de excavación, plomería, plantación y monitoreo, nuestros biólogos e ingenieros invierten años de investigación y planificación.

Las estrictas regulaciones regionales, estatales y federales protegen a las especies en peligro de extinción y cómo se reubican.

Los estanques creados para el pez piscina de Pahrump (*Empetrichthys latos*) en peligro de extinción fueron diseñados para fomentar el crecimiento saludable de la población.

Los estanques incorporan vida vegetal nativa, sistemas de aireación y circulación, y rocas y suelo nativos. El diseño y los materiales utilizados para recrear estos estanques son beneficiosos para todos los organismos que viven ahí.



The pond in front of you was carefully created using man-made and natural materials. This image shows the pond in its early stages.  
El estanque frente a usted fue cuidadosamente creado utilizando materiales naturales y hechos por el hombre. Esta imagen muestra el estanque en su primera etapa.

# A NEW HOME

## Restoring and Protecting Biodiversity

The South Fork Ponds are part of the Springs Preserve's re-created wetland habitat. Biologists manage these man-made ponds to support the federally endangered Pahrump poolfish (*Empetrichthys latos*). They introduced the poolfish, a species native to Nevada, to ponds at the Springs Preserve to help reduce its chances of becoming extinct.

Threats to the Pahrump poolfish include invasive species that are not part of the ecosystem's natural food web, including pet tropical fish or goldfish, crayfish, and some pet freshwater turtle species, like the red-eared slider.

### UN NUEVO HOGAR

#### Restaurando y Protegiendo la Biodiversidad

Los estanques de South Fork son parte del hábitat de humedales recreados de Springs Preserve. Los biólogos manejan este estanque artificial para apoyar al pez piscina de Pahrump (*Empetrichthys latos*), en peligro de extinción. Introdujeron el pez piscina, una especie nativa de Nevada, en los estanques de Springs Preserve para ayudar a reducir sus posibilidades de extinción.

Las amenazas para el pez piscina de Pahrump incluyen especies invasoras que no forman parte de la red alimentaria natural del ecosistema, incluidos los peces tropicales o peces dorados, los cangrejos de río y algunas especies de tortugas de agua dulce, como la tortuga de orejas rojas.

## POND FOOD WEB

### CADENA ALIMENTICIA

Tertiary Consumer  
Consumidor Terciario



Secondary Consumer  
Consumidor Secundario



Primary Consumer  
Consumidor Primario



Primary Producer  
Productor Primario



Decomposer  
Descomponedores



# DON'T DITCH A FISH

## or a turtle or frog or crayfish

Releasing animals—including aquarium species—into ponds and streams is illegal.

When pets are released in the wild, they rarely survive. Many suffer before they die because they are unable to find food or shelter. Those pets that do survive in the wild, often become invasive species that can destroy native wildlife and entire ecosystems.

### NO DEJES UN PEZ

o una tortuga o una rana o un cangrejo de río

La liberación de animales vivos, incluidas las especies de acuarios, en estanques y arroyos es ilegal.

Cuando las mascotas son liberadas en la naturaleza, rara vez sobreviven. Muchos sufren antes de morir porque no pueden encontrar comida ni refugio. Esas mascotas que sobreviven en la naturaleza, a menudo se convierten en especies invasoras que pueden destruir la vida silvestre nativa y ecosistemas completos.

Releasing your former pet fish, frog, turtle, crayfish—any pet—into the wild is against the law. It's also cruel, destructive and can cost communities hundreds of thousands of dollars in relocation and clean-up costs.

For more information, please visit [dontletitloose.com](http://dontletitloose.com)

Liberar a su antigua mascota, pez, rana, tortuga, cangrejo de río, o cualquier otra mascota en la naturaleza es ilegal, cruel, destructivo y puede costarles a las comunidades cientos de miles de dólares para solucionarlo.

Para más información, visite [dontletitloose.com](http://dontletitloose.com)

