2025 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. The agreement and permit expire in 2032 but can be renewed for an additional 15 years.

Executive Summary

From July 2021 to July 2023, the estimated population increased from 98 to 804 Pahrump poolfish in the North Fork refugium ponds, a 720% increase. In 2025, the population was estimated to be 650 fish. Despite a 19% decrease since 2023, the population remains 563% higher than the lowest estimate of 98 fish in 2021. In addition, the number of adult females (fish > 45 mm) increased by 18.5% in 2025 compared to 2024.

Methods

In 2025, we repeated the 2024 trapping methodology, deploying six fine mesh and five regular mesh traps in the Upstream Pond and five fine mesh traps and six regular mesh traps in the Downstream Pond. Thus, a total of 22 traps (11 fine mesh and 11 regular mesh minnow traps) were deployed in the ponds in 2025. As in prior years, a single regular mesh trap was deployed in the pond's settling basin.

Population Estimate

The Nevada Department of Wildlife (NDOW) conducted the July-August 2025 surveys with the assistance of the Southern Nevada Water Authority (SNWA), USFWS, and Springs Preserve colleagues:

- On July 30, 2025, we captured and marked a total of 559 adult Pahrump poolfish in the two interconnected ponds following previously established trapping protocols. We captured an additional 26 immature fish (< 30 mm) in the two ponds: 23 in the Upstream Pond and 3 in the Downstream Pond.

- On August 6, 2025, we captured a total of 553 adult Pahrump poolfish in the two interconnected ponds during the recapture session. We captured an additional 57 immature fish in the two ponds: 40 in the Upstream Pond and 17 in the Downstream Pond.

We present survey results, population estimates, and 95% Confidence intervals (CI) for years 2018–2025 for the two ponds below (**Fig. 1., Tables 1–3**). We estimated that the adult population for the refugium ponds was 650 fish, a 19% decrease from a high of 803 fish in July 2023. Nevertheless, the population remains 563% higher than the lowest estimate (i.e., 98 fish total) in July 2021.

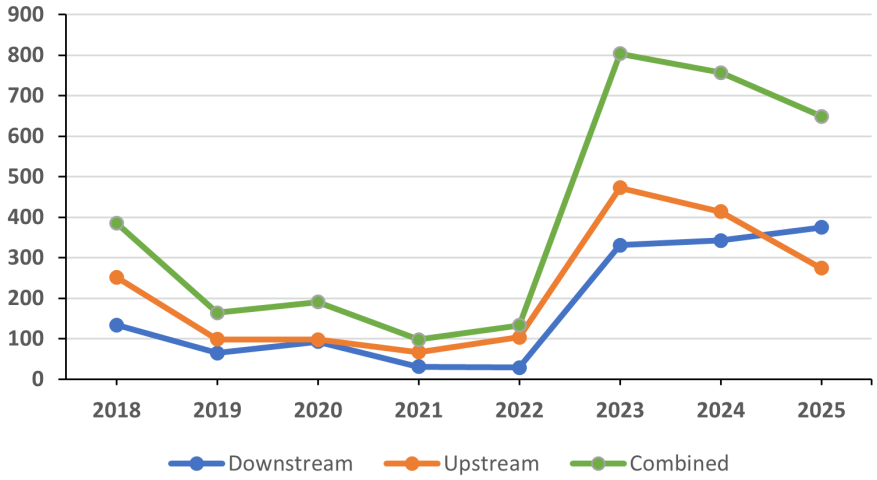

Fig. 1. Population estimates for annual Pahrump poolfish surveys conducted in the Upstream and Downstream refugium ponds at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Figure 1 captures the slow decline in fish numbers from introduction in 2018 through 2021, the beginnings of population stabilization and recovery following only a couple months of stonewort removal in spring 2022, and the dramatic explosion in fish numbers following the near-complete removal of stonewort in 2022. What the figure does not convey well is some peculiarities of recent survey data.

Table 1. Recent mark-recapture survey results of adult Pahrump poolfish captured in North Fork Ponds in 2023–2025 at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Pahrump Poolfish – Both Ponds	2023	2024	2025
Capture Session – Total Marked	566	566	559
Recapture Session – Total Captured	450	629	553
Recapture Session – Total Marked Previously	317	474	476
Recapture Session – Total Unmarked	133	155	77
Recapture Session – % Marked	58.0%	67.3%	86.1%
Population Estimate*	804	757	650

*Modified Chapman estimator (Dettloff 2023)

For instance, the number of fish captured in the initial marking sessions in 2023–2025 is remarkably stable, being identical in 2023–2024 and differing by only seven fish in 2025 (**Table 1**). Differences arose during the recapture sessions, with an annual increase in the percentage of marked fish that are recaptured, increasing by 28% over the three years. Possible explanations may include one or more of the following:

1. In 2024 and 2025, 50% of the traps were fine mesh traps. Fine mesh traps may reduce or prevent some fish from consuming bait from the outside of the trap. This may have forced more fish to enter the traps.

2. In prior years, bait was discarded from the traps on land rather than in the ponds. As this could attract more predators to the ponds, bait was discarded in the ponds in 2024 and 2025. This could be considered a form of pre-baiting for the recapture session, habituating the fish to eating the dog and cat kibble without consequences. This could result in a higher recapture rate the following week.

3. In 2025, a few of the fish captured were noticeably underweight (Ambos, pers. comm.), something that was not noted in previous years. There may be some competitive interactions for food resources between the Pahrump poolfish and relict leopard frog tadpoles. If food resources are indeed limited, fish may have been more inclined to enter the traps to access the bait.

Table 2. Downstream Pond: Population estimates and 95% Confidence Intervals (CI) of adult Pahrump poolfish captured in North Fork Pond 1a in 2018–2025 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
2024	2	362	314–419
2025	2	375	369–382

Table 3. Upstream Pond: Population estimates and 95% Confidence Intervals (CI) of adult Pahrump poolfish captured in North Fork Pond 1b in 2018–2025 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
2024	2	395	352–443
2025	2	275	269–281

We also measured all adult and immature fish captured in both ponds on July 24, 2024 and July 30, 2025 to create size-frequency histograms for the Springs Preserve population (**Fig. 2**). Although size-frequency histograms have been compiled based on small samples of fish from much larger populations, our data include all fish captured rather than a small subsample.

Given similar sample sizes, these data help visualize any changes in the population size structure between years. For instance, the number of immature fish (i.e., 16–30 mm) remained constant between the two years. Although the number of fish in the 31–35 mm size class decreased by 44%, there was a concomitant increase in the 41–45 mm size class of 31%. Since it has previously been established that all Pahrump poolfish > 45 mm are females (Goodchild 2016; Lackmann et al. 2021), the Springs Preserve population was comprised of at least 119 and 141 adult females in 2024 and 2025, respectively (**Fig. 2**). For 2025, this represents an encouraging 18.5% increase in the adult female population. Taken together, these data suggest that adult survivorship of both sexes is increasing.

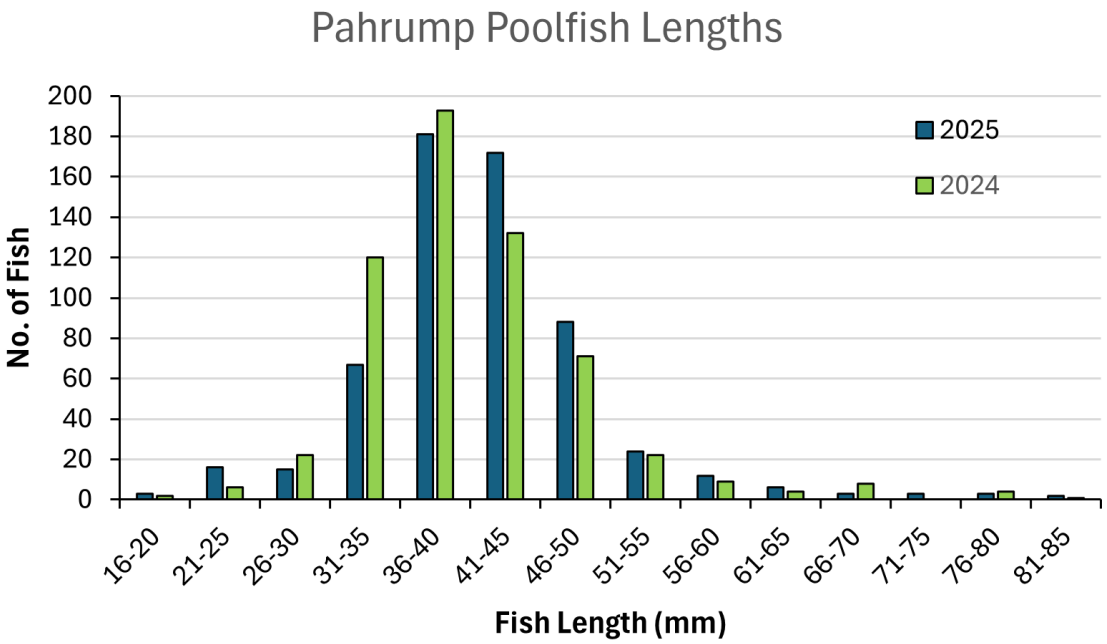

Fig. 2. Pahrump poolfish size-frequency histogram of total length for adult and immature fish captured in July 2024 (n = 594) and July 2025 (n = 595) in the combined Upstream and Downstream ponds at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Operation and Maintenance

We continue to remove stonewort as part of weekly pond maintenance, primarily during the macroalga's active growing season. We conducted fall pond maintenance on October 15 (Upstream Pond) and October 29 (Downstream Pond). These dates followed the summer period of active Pahrump poolfish reproduction but occurred before the annual period of winter dormancy. We removed a substantial amount of bottom detritus, as well as encroaching root masses from riparian vegetation. As the removal of bottom detritus can release hydrogen sulfide, we do not clean both ponds on the same day.

Education

We share information about the Pahrump poolfish on the Springs Preserve website. Discussions of the project, our annual reports, and scientific publications are now available to the public on this webpage. Guests visiting the ponds can also read interpretive panels about the history of the Pahrump poolfish and 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 a podcast featuring Dr. Raymond Saumure:

- Jenga in the Wild – SNWA Water Smarts Podcast - February 13, 2025

In addition, two articles were published in the Pipeline, a Las Vegas Valley Water District newsletter:

- Rare species surviving and thriving - Pipeline Employee News – March 6, 2025 (**Appendix I**)
- Conservation efforts ensure poolfish survival – Pipeline Employee News – September 22, 2025 (**Appendix II**)

Mortalities

We observed four dead Pahrump poolfish in 2025. On February 18, we found a single partially decayed fish in the east skimmer basket. On July 15, we found another dead fish in the west skimmer basket with flared operculum but no obvious signs of injury, disease, or decay. As far as can be ascertained, both of these fish likely died of natural causes. On July 31, we found two mummified fish in a Gee minnow trap. Unfortunately, these fish were not removed from a trap in 2024 and we only discovered these mortalities in 2025. Procedures have been put into place to ensure such an unfortunate error does not happen again. We previously reported all four mortalities to USFWS.

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. This project was supported by Springs Preserve team members Katrina Smith, Karina Carter-Bárcenas, Grace Friedmann, Briana Miller, and Alexandra Schock. Fieldwork was also supported by SNWA team members Aaron Ambos, Audrey Bennett, and Cindy Soriano. We thank SNWA Hydrologist Tyler Andreas for continuing to perform maintenance of the In-Situ water quality probe. We extend a special thank you to the late Abigail Phillips for promoting the Pahrump poolfish through numerous innovative educational activities at the Springs Preserve.

Literature Cited

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Goodchild, S.C. 2016. Life history and interspecific co-persistence of native imperiled fishes in a single species and multi-species *ex situ* refuges. Ph.D. Dissertation, North Dakota State University, Fargo, North Dakota. 94 p.

Lackmann, A.R., S. Kettelhut, B.L. Paulson, C.M. Anderson, S.C. Goodchild, K.D. Guadalupe, and C.A. Stockwell. 2021. Thin-sectioned otoliths reveal sexual dimorphism and a 10-year lifespan in the endangered Pahrump poolfish. North American Journal of Fisheries Management 41:1631–1639.

Appendix I

A team of researchers has recreated habitat at the Springs Preserve to help protect the endangered Pahrump Poolfish and Relict Leopard Frog. Find out which species is cannibalistic, and which was nearly wiped out on the Water Smarts Podcast, "JENGA IN THE WILD: Rewilding endangered species supports historic ecosystem."

When Las Vegas Valley artesian springs ran dry decades ago, several species disappeared from the landscape. Rewilding projects at the Springs Preserve have helped rebuild the native habitat and protect endangered species like the Pahrump Poolfish, Relict Leopard Frog and Desert Tortoise. Tune in and learn about the challenges of repopulating these fascinating species who call Springs Preserve home.

Visitors to the Springs Preserve can catch a glimpse of the Pahrump poolfish and relict leopard frogs by taking the trails to Cottonwood Grove.

Appendix II

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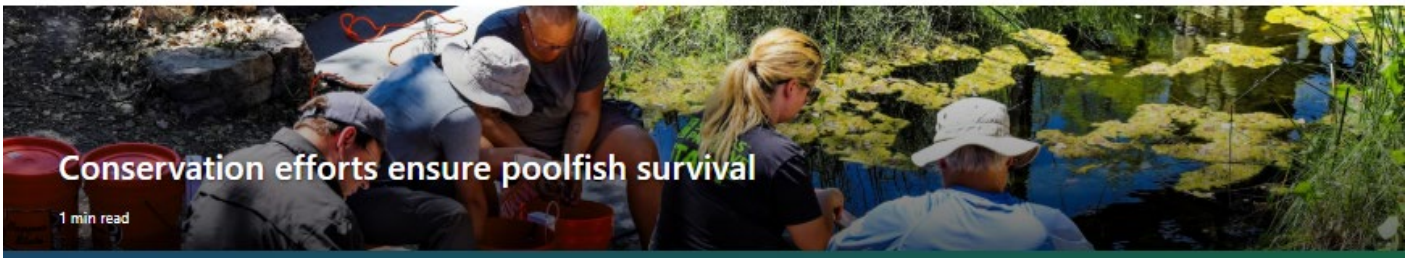
Pipeline Employee News

Employee News Home | Pipeline archive | Audio | Video



Conservation efforts ensure poolfish survival

1 min read

The endangered Pahrump poolfish continue to enjoy a safe haven at the Springs Preserve ponds, as experts track their progress in the latest annual survey conducted by the U.S. Fish & Wildlife Service, SNWA and Springs Preserve staff.

While annual populations fluctuate, the overall Poolfish population has grown by as much as 720 percent since biologists began the removal of a macroalgae called Stonewort, which stopped dragonfly larvae from hunting the baby fish at the surface of the water. Thanks to these efforts and more, the poolfish continue to flourish.

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.