

2021 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). This permit was granted under the Safe Harbor Agreement for Pahrump poolfish at the 180-acre Springs Preserve (Enrolled Property) in Clark County, Nevada.

Executive Summary

In 2021, Pahrump poolfish fry were first observed in May and new cohorts continued to be observed into October. The number of Pahrump poolfish captured in fall 2021 is considerably lower than the estimate for fall 2020. Educational materials were published on social media, websites, and in an academic publication.

Population Surveys

There were no official surveys of Pahrump Poolfish in spring 2021.

Incidental captures of Pahrump poolfish occurred during a relict leopard frog (*Rana onca*) tadpole translocation conducted by Springs Preserve, Southern Nevada Water Authority (SNWA), and United States Fish and Wildlife Service (USFWS) on July 22, 2021. A total of 117 Pahrump poolfish were captured during the first tadpole trapping session. Of these, 62 (46 adults and 16 juveniles) were captured in the upstream pond. Another 55 (44 adults and 11 juveniles) were captured in the downstream pond. All were released without being marked or measured.

The Nevada Department of Wildlife (NDOW) conducted the annual fall survey with the assistance of Springs Preserve and SNWA staff:

- On September 21, 2021, a total of 41 Pahrump poolfish were captured and marked following previously established trapping protocols. Although 24 fish were captured in the downstream (NF-1a) pond, 92% (n = 22) of these fish were from a single trap set in the settling basin. Pahrump poolfish in the downstream pond can access the 500-gallon settling basin through drains on the pond bottom. Surprisingly, only 17 Pahrump poolfish were captured in the upstream (NF-1b) pond.
- On September 28, 2021, a total of 41 Pahrump poolfish were captured and marked during the first recapture session. For the downstream pond, 11 fish were captured, of which 9 were recaptures; whereas, in the upstream pond 30 fish were captured, of which only 8 were recaptures.
- A second recapture session was conducted on September 28, 2021. This was done because warmer mid-day temperatures might lead to more fish activity and thus foraging. For the downstream pond, 14 fish were captured, of which 10 were recaptures. Significantly more fish were captured/recaptured in the upstream pond during the second recapture session, with 54 fish captured, of which 30 were recaptures.

Fall population estimates and 95% Confidence intervals (CI) calculated by the Nevada Department of Wildlife (NDOW) for the two ponds are presented (**Tables 1–2**).

Table 1. Downstream Pond: Fall population size estimates and 95% Confidence Intervals (CI) of Pahrump poolfish captured in North Fork Pond 1a in 2018-2021 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

Table 2. Upstream Pond: Fall population size estimates and 95% Confidence Intervals (CI) of Pahrump poolfish captured in North Fork Pond 1b in 2018-2021 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

Mortalities

No dead Pahrump poolfish were observed in 2021. Moreover, no signs of disease were noted on any of the fish observed in the ponds. During a nocturnal frog survey on May 12, 2021, a black-crowned night heron (*Nycticorax nycticorax*) was observed flying to the ponds. Trail cameras secured to cottonwood trees also captured images of several visits from one or more great blue herons (*Ardea herodias*) (Fig. 1).



Fig. 1. Great blue heron (*Ardea herodias*) photographed by trail camera in upstream refugia pond at the Springs Preserve, Las Vegas, Clark County, Nevada, USA. Photo courtesy of Audrey Bennett.

Recruitment

Several cohorts of Pahrump poolfish fry were observed and documented from May 20 through October 5, 2021.

Environmental Conditions

Water quality measurements were recorded on an hourly basis by an In-Situ datalogger with probes for water temperature, pH, and conductivity (**Fig. 2, Table 3**).

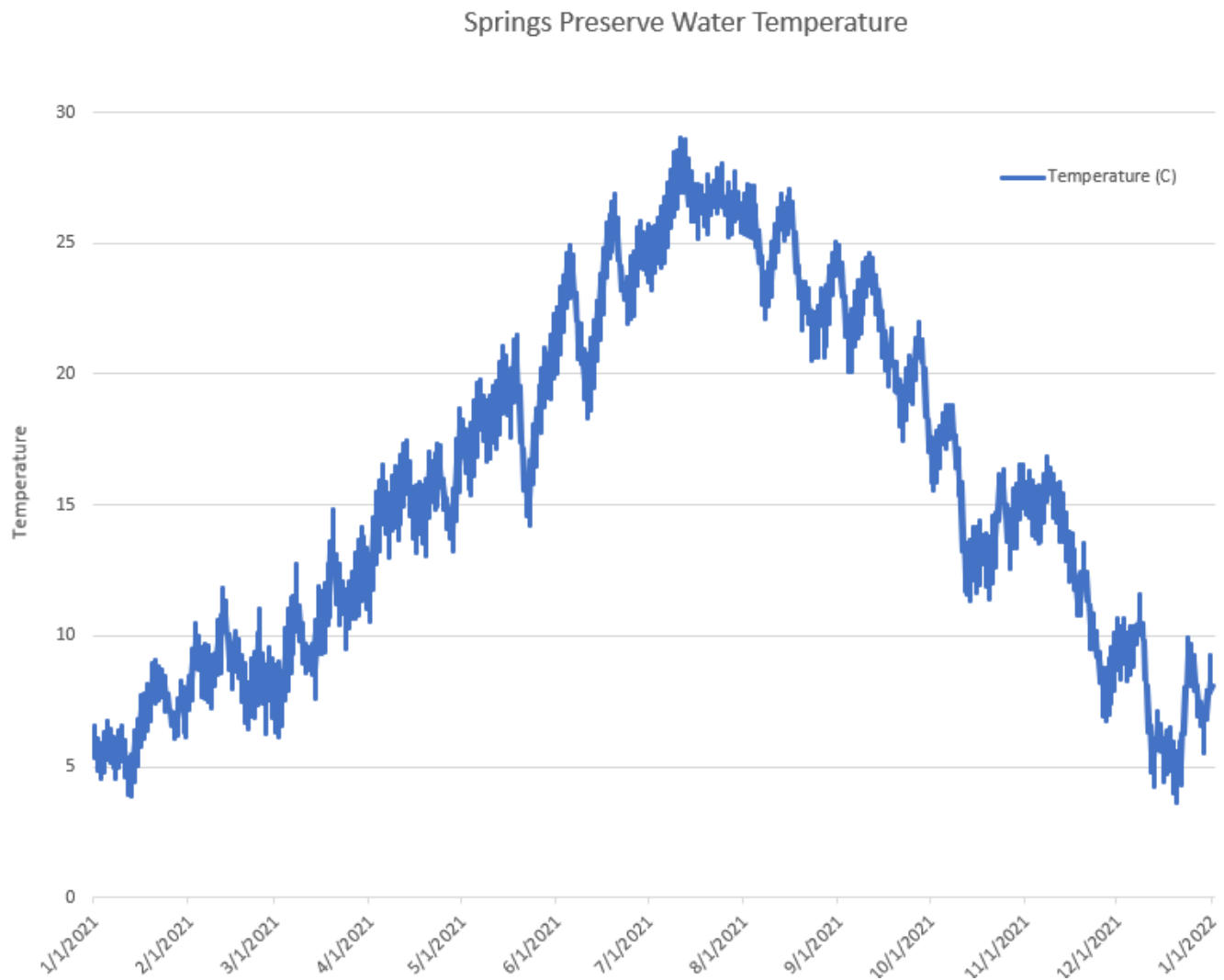


Fig. 2. 2021 Thermal profile (°C) for water in pond NF-1a at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Table 3. Average, maximum, and minimum temperatures in degrees centigrade (°C) in 2021 for downstream refugium pond (NF-1a) at the Springs Preserve, Las Vegas, Clark County, Nevada, USA.

Temperature	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	6.5	8.8	10.7	15.1	18.4	23.1	26.4	24.2	21.4	15.1	12.6	7.6
Maximum	9.0	11.8	14.8	18.7	22.3	26.9	29.0	27.2	24.9	18.8	16.9	11.6
Minimum	3.9	6.3	6.2	10.6	14.2	18.3	23.2	20.5	17.0	11.3	6.8	3.6

The pH of pond NF-1a averaged 9.0 in 2021, with maximum and minimum values of 9.7 and 8.4, respectively. The pH of pond water showed a daily cycle, tied directly to the photosynthetic cycle of submerged algae. Conductivity averaged 1,065, with maximum and minimum values of 1,216 and 841, respectively. Conductivity was fairly constant, with changes likely the combined result of evaporation, water changes, and seasonal changes in algal abundance, whether natural or removal during routine pond maintenance.

Education

Conservation messaging was shared during small group tours and as part of the Springboard series, a virtual field trip program. The Springboard program gives students in the Clark County School District the opportunity to remotely interact with on-site experts to learn more about Pahrump poolfish and the refugium on property.

[You Tube - Fish and Frogs in the Mojave](#)

Education efforts offered online through social media platforms included:

- Las Vegas PBS. July 16, 2021. STEAM Camp. [Vegas PBS STEAM Camp](#)
- You Tube, Facebook, Twitter. Endangered Species Day. [Pahrump Poolfish | Endangered Species Day](#)
- Facebook, Twitter, & Instagram. September 4, 2021. Pond predators for National Wildlife Day. [Twitter - Pond Predators](#)

In addition, an academic publication with an international audience was produced:

A fish out of water: Rewilding the Pahrump poolfish in Las Vegas, Nevada, USA. Saumure, R.A., Ambos, A., O’Toole, T., Harter, J., Guadalupe, K., Senger, B., Marshall, Z. 2021. Global Conservation Translocation Perspectives: 2021. Case studies from around the globe. International Union for the Conservation of Nature (IUCN) Species Survival Commission, Conservation Translocation Specialist Group, Gland, Switzerland. Pp. 41–45. [CTSG book v13 050221.pub \(iucn-ctsg.org\)](#)

Lastly, the Habitat Restoration section of the Springs Preserve website also contains educational information and a video with information on the Pahrump Poolfish, partners in the effort, surveys, and recovery efforts for the species. [Habitat Restoration](#)