

2019 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. 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 The winter of 2018-2019 was relatively cold with minimum water temperatures of 0.5°C in the Springs Preserve refugia. Pahrump poolfish were first observed active in April 2019. Fry were first noted in May 2019 and new fry continued to be observed into October 2019. The combined spring mark-recapture estimate for both ponds was 173 Pahrump poolfish, revealing a 55% decrease in population size from October 2018. The combined fall 2019 estimate for both ponds was 164 Pahrump poolfish. Thus, the Pahrump poolfish population size has stabilized following the fall 2018 mortality event.

Environmental Conditions

The winter of 2018-2019 was relatively cold with minimum water temperatures of 0.5 and 1.6 °C recorded on January 4, 2019 in the upstream and downstream ponds, respectively. Partial ice cover was also noted on January 2, 2019. Peak summer temperatures of 26.7 and 27.5 °C were recorded on July 28, 2019 in the upstream and downstream pond, respectively. Temperature data were provided by NDOW and were recorded on HOBOTemp dataloggers. Summer water temperature were likely attenuated by: (1) the shade created by the Fremont cottonwood tree canopy; (2) extensive aeration from waterfalls and mechanical aeration system (i.e., bubblers).

On September 18, 2019, a new In-Situ water quality datalogger was deployed to record hourly measurement for water temperature, pH, and conductivity. The probe records water quality data from the downstream pond (NF-1a) on an hourly basis and transmits it via the NOAA GOES geostationary satellite server system.

Recruitment

Pahrump poolfish were first observed active on April 25, 2019. They reproduced on numerous occasions in 2019. Fry were observed from 14 May through 3 October 2019. Given the considerable amount of recruitment observed, it was surprising that relatively few small fish were captured in the small-mesh Gee minnow traps in fall 2019. Two hypotheses are proposed: (1) the loss of 55% of the adult population greatly reduced the number of fry in the system, many of which no doubt fall prey to natural causes (e.g., dragonfly larvae); and (2) the presence of somewhere between 100-1,100 Relict leopard frog (*Rana onca*) tadpoles decreased survivorship of Pahrump poolfish fry to either niche overlap or resource competition (e.g., algae, detritus). There were no tadpoles in the ponds in 2018. It remains to be seen whether these and/or other factors resulted in reduced growth or survivorship of Pahrump poolfish. Further research is required.

Mortalities

Three dead Pahrump poolfish were recovered in 2019. The two adults were recovered in a skimmer basket on March 20, 2019 following a particular cold winter. The third fish was a 20 mm juvenile observed on November 7, 2019 in a skimmer basket. No signs of disease were noted on any of these fish.

Population Surveys

Following the mortalities documented in fall 2018, a spring mark-recapture session was scheduled to quantify the impact of mortalities on population size.

13 June 2019

Assisted NDOW with 1st mark-recapture session. Captured and tail clipped 121 Pahrump poolfish; 25 from downstream (NF-1a) pond and 96 from upstream (NF-1b) pond.

18 June 2019

Pahrump Poolfish recapture session conducted by NDOW. A total of 136 Pahrump poolfish were captured; 36 in the downstream pond and 100 in the upstream pond. Of these, 21 and 74 were recaptures in the downstream and upstream ponds, respectively.

The spring population estimates and 95% Confidence intervals (CI) calculated by NDOW for the two ponds were:

- Downstream Pond (NF-1a): 43 Pahrump poolfish with 95% CI of 28-69.
- Upstream Pond (NF-1b): 130 Pahrump poolfish with 95% CI of 103-163.

The combined spring mark-recapture estimate for both ponds was 173 Pahrump poolfish. Thus, the mark-recapture estimates produced by NDOW revealed that the spring 2019 Pahrump poolfish population had decreased by approximately 213 fish, a 55% decrease in population size from October 2018.

Given the mortalities documented in fall 2018, the fall 2019 mark-recapture surveys were conducted a month earlier (i.e., September rather than October). This was done to avoid the confounding effects of stress from: (1) capture & handling; and (2) a drastic decrease in water temperature. This scheduling change appeared to successfully mitigate for the 2018 stressors, as only a single dead juvenile fish was observed approximately two months after the mark-recapture session. There were no signs of the flavobacterium / fungal infections documented in fall 2018.

12 September 2019

Assisted NDOW with 1st mark-recapture session. Captured and tail clipped 129 Pahrump poolfish; 43 from downstream (NF-1a) pond and 86 from upstream (NF-1b) pond.

19 September 2019

Pahrump Poolfish recapture session conducted by NDOW. A total of 100 Pahrump poolfish were captured; 47 in the downstream pond and 53 in the upstream pond. Of these, 31 and 46 were recaptures in the downstream and upstream ponds, respectively.

The population estimates and 95% Confidence intervals (CI) calculated by NDOW for the two ponds were:

- Downstream Pond (NF-1a): 65 Pahrump poolfish with 95% CI of 46-96.
- Upstream Pond (NF-1b): 99 Pahrump poolfish with 95% CI of 74-136.

The combined fall estimate for both ponds was 164 Pahrump poolfish. Thus, the mark-recapture estimates produced by NDOW revealed that the fall 2019 Pahrump poolfish population had decreased by approximately 9 fish since spring 2019, a number well within the 95% CI. Thus, based on 2019 mark-recapture estimates, the population size has stabilized following the fall 2018 mortality event.