**Field Trip Report**
**Nevada Department of Wildlife**

Date: 7, 22 July 2004
Location: Shoshone Ponds
Purpose: Determine size of populations of Pahrump poolfish (*Empetrichthys latos latos*) and Relict dace (*Relictus solitarius*)
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## METHODS

The four ponds which contain native fish were trapped with standard, unbaited minnow traps on July 7 and 22, 2004, to estimate the population size of the fish species present. Pahrump poolfish, *Empetrichthys latos latos,* are found in the north, middle, and stock ponds. Relict dace, *Relictus solitarius*, occupy the south pond. When the traps were pulled, the fish were tallied, marked, and then released back into the pond. Fish were marked with an oblique clip of the caudal fin using surgical scissors. Only fish greater than 30 millimeters (mm) were marked, so population estimates are for fish 30 mm and greater in size. Population estimates were made using the Peterson estimator (M*C/R), except for the relict dace population which required the use of Chapman's modification of the Peterson estimator [(M+1)(C+1)/(R+1)] because only one fish was recaptured (Ricker 1975). Approximate 95% confidence intervals were calculated using a table appropriate to the Poisson distribution, after the method described in Ricker (1975). Table 1 lists the number of traps used and set time at each location.

**TABLE 1.** Trapping data for the population estimates at Shoshone Ponds.

| Location | Species | Mark Traps | Mark Set Hours | Recap. Traps | Recap Hours |
|---|---|---|---|---|---|
| North Shoshone | *E. l. latos* | 5 (4 + 1 mesh) | $\Sigma$=22.3 | 5 | $\Sigma$=19.0 |
| Middle Shoshone | *E. l. latos* | 5 (4 + 1 mesh) | $\Sigma$=19.7 | 5 | $\Sigma$=18.3 |
| South Shoshone | *Relictus solitarius* | 5 (4 + 1 mesh) | $\Sigma$=15.8 | 5 | $\Sigma$=18.3 |
| Stock Pond | *E. l. latos* | 23 (21 + 2 mesh traps) | $\Sigma$=129.5 | 28 | $\Sigma$=127.4 |

On 7 July, traps lined with 1/8" mesh were set so that a wider range of fish sizes could be captured for length-frequency analysis (Table 2, Figures 1-3). Two of these traps were set in the stock pond and one was set in each of the others. Fish in these traps were measured before being clipped.

Water temperature (°C), dissolved oxygen (mg/L, % saturation), conductivity (µS), and salinity (ppt) were measured in each pond using a YSI 85 Dissolved Oxygen probe (Table 4).

## RESULTS

In the ponds which contained poolfish, the population estimates were as follows: the north pond-496 (423-582, p=0.95), the middle pond-1104 (955-1273, p=0.95), and the stock pond-1642 (1630-1805, p=0.95) (Table 3). The population estimate for relict dace was 132 (40-240, p=0.95) (Table 3). Table 3 also shows the catch-per-unit-effort or fish-per-trap-hour for each trapping session.

**TABLE 2**. Summarized length data for fish populations at Shoshone Ponds, July 2004.

| Location | Length Data(mm) | | | |
|---|---|---|---|---|
| | Mean | SD | Range | n |
| North Shoshone | 36.56 | 7.36 | 24-52 | 41 |
| Middle Shoshone | 39.16 | 6.78 | 28-62 | 91 |
| South Shoshone | NA | NA | NA | NA |
| Stock Pond | 43.59 | 10.12 | 28-68 | 123 |

**TABLE 3**. Mark-recapture data for the sampling period.

| Location | Species | M | C | R | CPUE M 7-7-04 | CPUE C 7-22-04 | Estimate (95% confidence interval) |
|---|---|---|---|---|---|---|---|
| North Shoshone | *E. l. latos* | 321 | 232 | 150 | 14.4 | 12.2 | 496 (423-582) |
| Middle Shoshone | *E. l. latos* | 512 | 388 | 180 | 26.0 | 21.2 | 1104 (955-1273) |
| South Shoshone | *Relictus solitarius* | 43 | 5 | 1 | 2.7 | 0.3 | 132 (40-240) |
| Stock Pond | *E. l. latos* | 660 | 1072 | 431 | 5.1 | 8.4 | 1642 (1630-1805) |

M = number of fish initially marked, C = Number of fish examined for marks, R = Number of fish bearing marks. CPUE = Catch Per Unit Effort (fish per trap hour)

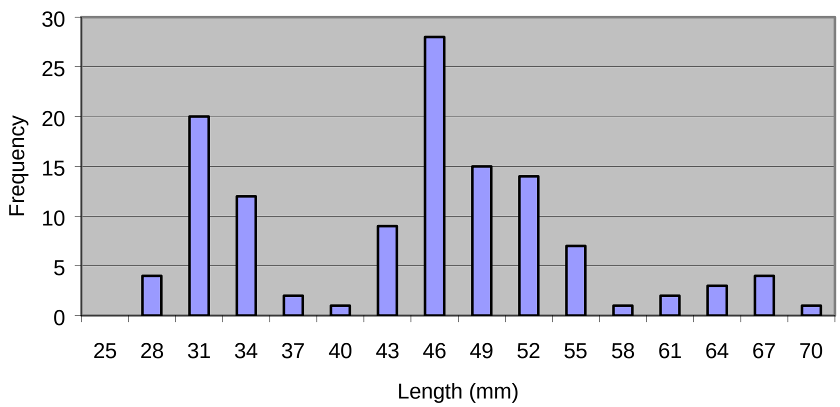


**Figure 1** Length-frequency histogram for poolfish captured in the stock pond.

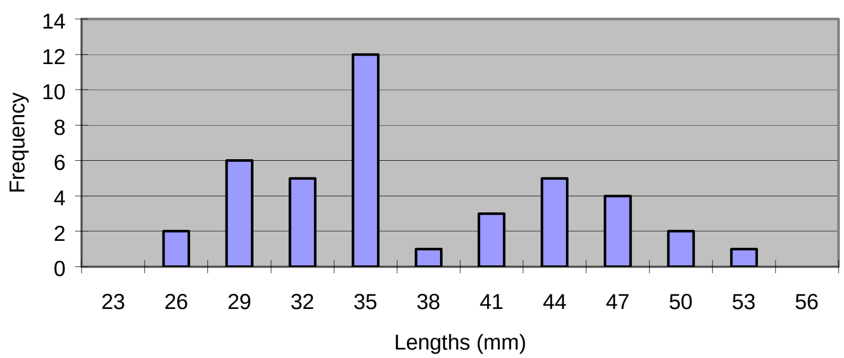


**Figure 2** Length-frequency histogram for poolfish in the north pond.

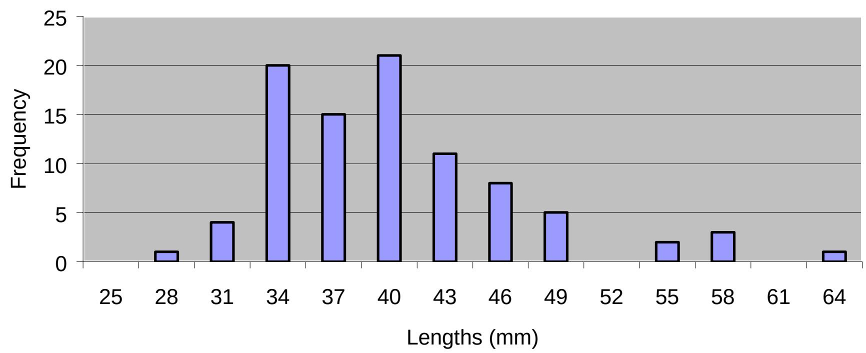


**Figure 3** Length-frequency histogram for poolfish in the middle pond.

| **TABLE 4**. Selected physical parameters at sampling locations on 22 July 2004. | | | | | |
|---|---|---|---|---|---|
| **Pond** | **TEMP** (C) | **% SAT** | **mg/L** | **µS** | **ppt** |
| South | 23.2 | 31.4 | 2.70 | 89.1 | 0.0 |
| Middle | 22.8 | 58.1 | 4.92 | 97.0 | 0.1 |
| North | 26.0 | 79.7 | 6.50 | 90.0 | 0.0 |
| Stock inflow | 21.0 | 89.5 | 7.96 | 30.0 | 0.0 |
| Stock outflow | 23.9 | 107.0 | 9.04 | 122.1 | 0.1 |

**DISCUSSION**

Pahrump poolfish population numbers have rebounded from the low levels seen in 2003, and have returned to more normal levels (Table 5, Figure 4). Length-frequency histograms of these populations show a range of sizes which also indicate that the populations are doing well (Figures 1-3, Table 2). It is still uncertain what caused the drastic reduction a year ago, but the BLM and NDOW are discussing ways to improve the habitat at Shoshone Ponds. At a field trip in July, BLM and NDOW discussed several options that would hopefully improve the habitat at Shoshone Ponds, including increasing the enclosed area and digging a ditch outside of the fence uphill from the ponds to prevent cattle waste from washing into the ponds during rain events.

The good news did not extend to the relict dace population, however. This population, which reached its highest level in 2003, has dropped 84% (Figure 5). Looking at the water quality data (Table 4), the dissolved oxygen levels were lower than the levels in the middle and north ponds just meters away. The conductivity was also different in the south pond which may indicate that the water source or conveyance is slightly different for this pond than the middle and north ponds. It is not certain whether the ponds are functioning independently of each other or if they are connected to some degree. The south pond may also be at a different point in a nutrient cycle. This reduction may be a delayed response to what caused the poolfish numbers to decline in 2003. Hopefully, a rebound similar to that which the poolfish populations experienced this year will be seen in the dace population next year.

A population of *E. l. latos* was first found in the outflow of the artesian well approximately 40 meters north of the north pond during the September and October surveys of 1999. The water from the well maintains stream-like qualities for approximately 50 meters before flowing into a marsh. This year, fish were observed in the flowing water but not in the marsh. It is not known how these fish arrived at this location. The pond immediately north of the artesian well did not contain fish and did not contain water in 2004, but has contained water in the past.

Northern leopard frogs, *Rana pipiens*, were observed at all four sampling locations in 2004. Metamorphs were observed in the stock pond and adults were seen at all ponds.

| **TABLE 5**. Summary of population estimates (Peterson) for Shoshone Ponds fishes, 1989,1997-2003 (95% Confidence Intervals, Poisson distribution). | | | | |
|---|---|---|---|---|
| Year | North Shoshone Pond | Middle Shoshone Pond | South Shoshone Pond | Shoshone Stock Pond |
| 1989 | 450 (381-531) | 1 captured | 502 (264-1129) | 2451 (2146-2798) |
| 1997 | 303 (197-496) | 1714 (1294-2330) | 400 (195-1000) | 1600 (1373-1866) |
| 1998 | 266 (173-435) | 1538 (1170-2021) | 482 (313-790) | 1203 (959-1506) |
| 1999 | 269 (225-321) | 1382 (1132-1687) | 568 (288-1137) | 3989 (2710-6155) |
| 2000 | 310 (245-391) | 467 (333-679) | 435 (276-731) | 3511 (3194-3860) |
| 2001 | 235 (200-277) | 743 (512-1127) | 407 (214-915) | 3028 (2608-3516) |
| 2002 | 283 (210-388) | 1294 (1005-1662) | 307 (178-576) | 6572 (5786-14444) |
| 2003 | 89 (71-113) | 115 (89-148) | 840 (255-1527) | 718 (596-864) |
| 2004 | 496 (423-582) | 1104 (955-1273) | 132 (40-240) | 1642 (1630-1805) |

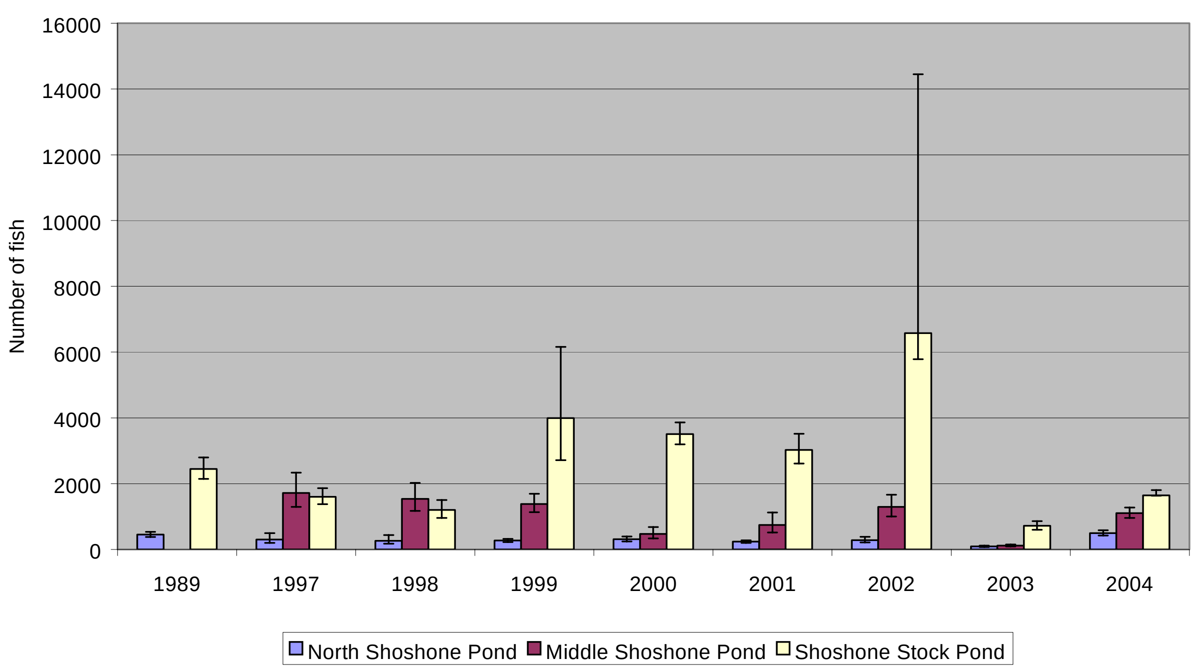


**Figure 4** Pahrump poolfish population estimates at Shoshone Ponds.

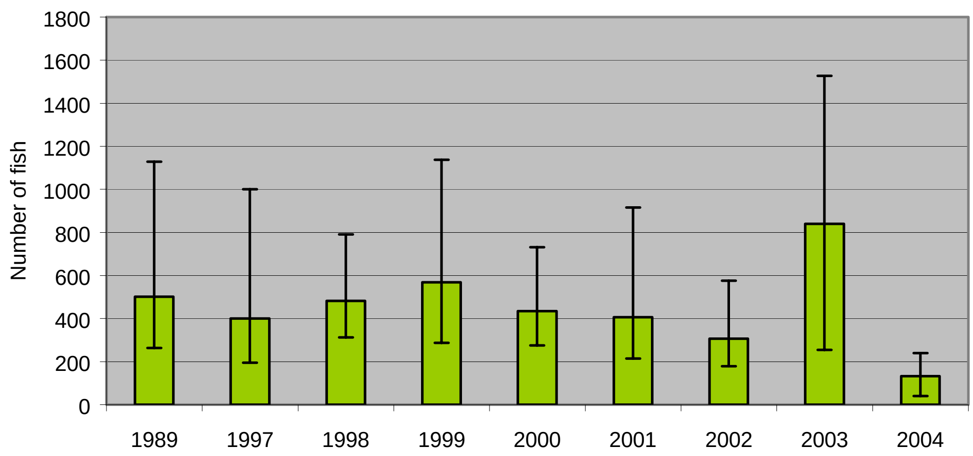


**Figure 5** Relict dace population estimates in the south pond at Shoshone Ponds.

## LITERATURE CITED

Ricker WE. 1975. Computation and interpretation of biological statistics of fish populations. Bull Fish Res Board Can. 191: 382 p.