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Science and Resources Management
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Monitoring of the Gambusia gaigei Refugium - January, 1986

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On 31 January 1986 Gambusia at the G. gaigei refugium and Spring 4 sites in Big Bend National Park were monitored. The general distribution of Gambusia was noted and water temperatures taken to correlate with distribution patterns. Twenty-eight presumed G. gaigei and 20 presumed G. affinis were collected from four sites for laboratory analysis. Seven live presumed gaigei and seven live presumed affinis were used in an electrophoretic analysis of the populations. No specimens were taken from the refugium pond.

An unusually warm winter did not separate the refugium pond into two distinctly separate temperature regimes as it did in January last year. Water at the inlet was 21⁰C, 17⁰C at the outlet and 16⁰C on the far west end. Gambusia gaigei appeared to be fairly evenly distributed over the pond, with no concentrations noted.

At the Spring 4 site I commenced sampling from the far end of the pond near the outlet. Collecting site #1 (at the outlet) registered 21⁰C. Seven live fish were taken at site 1 with 3 preserved and four live ones taken back to the lab.

About half-way back toward the spring, I went off the dike and down to the stream meandering through the thick Carrizo growth below the Spring 4 pond. Here at site #2 18 specimens presumed to be G. affinis were captured in water 14⁰C. Back up the dike to site #3 from Spring 4 pond nearer the spring. Twenty-one specimens from the site were secured, three taken to the lab alive. Water temperature here was 22⁰C.

Site #4 was along the nature trail well below Spring 4. Eight specimens obtained here were preserved and four taken alive to the lab. Water temperature along the nature trail was 11⁰C.

The problem last reported with beaver activity producing high water near Spring 4 has been alleviated. Mike Fleming showed me a beaver dam just south of the nature trail that is periodically breached by park personnel. Breaching of the dam seems to cause beavers in the area to abandon their activity near Spring 4, and return to the lower area to repair the dam.

All live Gambusia taken to the lab were individually quick-frozen in liquid nitrogen and marked according to site collected. Several weeks after being placed in liquid nitrogen specimens were removed, the entire body of each fish homogenized separately, the homogenate centrifuged, and the supernatant recovered. Minute amounts of the supernatant of each specimen were absorbed into a wick and placed in horizontal slots of a Poulik gel. The gels were run for 9 hours at 240 volts.

Electrophoretic tests for six enzymes were conducted. Only LDH (lactate dehydrogenase) proved to be of diagnostic use. The photo of the LDH gel plate (Fig. 1) shows that fish presumed to be G. gaigei from sites 1 and 3, both sites from the Spring 4 pool, have a distinct band about halfway up the anodal plate. Fish from sites 2 and 4, the areas below Spring 4 from which presumed G. affinis were taken, all lack this band.

Morphological analysis of preserved specimens verified that all fish from sites 1 and 3 were gaigei and all fish from sites 2 and 4 were affinis.

The Spring 4 area nearest the spring (site 3) had a much greater population density than did site 1. The numbers of G. gaigei in the Spring 4 pool appeared to be much greater than that in the refugium pool also. Many pregnant females were noted in Spring 4, while very few were observed in the refugium.