Bismarck Brown as a Marking Technique for Cyprinodon macularius desert pupfish

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**BACKGROUND**

- *Cyprinodon macularius* desert pupfish is listed as an endangered species. In 1993 US Fish and Wildlife recovery plan stated that desert pupfish “populations would be established in natural or quasi-natural Refugia...suitable for long-term maintenance of desert pupfish.” (Service, 1993).

Traditional population estimates are done every 1-2 years to monitor populations:
- Bill Williams River NWF
- Cibola NWF
- Imperial NWF

Anal fin clips have been used for marking.

Populations are determined from mark/recapture events.
Problem with Fin Clips

- is hard to see
- time consuming
- can’t be performed on individual less than 20mm
TYPES OF MARKS

- Elastomer tags
- Spray marking with fluorescent pigments
- Fin clip
What is Bismark Brown?

- It is used in histology for staining tissues
- It can be used with live cells
Deacon also found that "Bismarck Brown Y is applicable for use on *Cyprinodon nevadensis* and could be used in shortterm (2-3 day) mark and recapture studies" (Deacon, 1973). Given the success of Bismarck Brown with *Cyprinodon nevadensis* it is likely that *Cyprinodon macularius macularius* desert pupfish will show similar results.

HYPOTHESIS

- Desert pupfish can be stained using Bismarck Brown
- Stain will not cause mortality
- Stain will be visible for at least one day
## The Experiment

<table>
<thead>
<tr>
<th></th>
<th>Tank 1</th>
<th>Tank 2</th>
<th>Tank 3</th>
<th>Tank 4</th>
<th>Tank 5</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fish (N=)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bismark Brown Y Used (g)</td>
<td>0.5</td>
<td>0.25</td>
<td>0.5</td>
<td>0.25</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>water Used (L)</td>
<td>15L</td>
<td>10L</td>
<td>15L</td>
<td>10L</td>
<td>15L</td>
<td></td>
</tr>
<tr>
<td>Concentration: Bismark brown y (g) / water (L)</td>
<td>1:30,000</td>
<td>1:40,000</td>
<td>1:30,000</td>
<td>1:40,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>True Dye concentration with 50% active dye (g/L)</td>
<td>1:60,000</td>
<td>1:80,000</td>
<td>1:60,000</td>
<td>1:80,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Exposure time (H)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
RESULTS

MORTALITY

- No mortality occurred for fish in treatment tank
  - No statistical difference between treatment groups
- 2 mortalities were reported for the control tank
RESULTS
LENGTH (TL)

- No significant difference was show in length
  - No difference between individual with in the same treatment group.
- Desert pupfish were stained in a size range of 17mm-31mm
The stain was only visible for 1 day.
1:30,000 g/L for 2 hours is the best visual results.
FUTURE PLANS

- Use bismark brown at 1:30,000 g/L for 2 hours as the new marking technique in future population estimates.

- The first estimate will occur in Oct 2012 at three pupfish refuge facilities.