Frog Wars! Metapopulation Response of the Chiricahua Leopard Frog to Bullfrog Removal

Cecil R. Schwalbe
USGS/SBSC
Sonoran Desert Research Station

Philip C. Rosen
School of Natural Resources
University of Arizona

Dennis O. Suhre
School of Natural Resources
University of Arizona

Brent H. Sigafus
School of Natural Resources
University of Arizona

U.S. Department of the Interior
U.S. Geological Survey
Funding & Support

ARMI - Amphibian Research & Monitoring Init.
AWPF - Arizona Water Protection Fund
UA SNR
USFWS ES & Refuges
USFS
USGS
Acknowledgments

Bo Atkins, Kevin Baker, Shannon Baker, Sean Blumquist, Chris Beard, Val Catt, Denny Fenn, Sally Gall, David Hall, Mike Hill, Mary Hunnicutt, Lisa Labita, Walter Lane, Robin Llewellen, Boone McLaughlin, Verma Miera, Jimmy Oliver, Wayne Shifflett, Melissa Schultz, Aaron Stannard, Dale Turner, Charles Van Riper III, Eric Wallace, Cecily Westphal

Photo Credit: Erik Enderson, Phil Fernandez, Dale Turner
Global Amphibian Declines
Chiricahua Leopard Frog

Lowland Leopard Frog

“True Frogs”
or
Ranid frogs
(genus Rana now Lithobates)

Tarahumara Frog
Habitat Loss
Invasive Predators
Disease
American Bullfrog
20,000 eggs/clutch
Tadpoles:

800 lbs! (~40,000)
~1000 adult bullfrogs / ha !!
Bullfrog Population Removal
Drying, fencing, hand capture, shooting
Bullfrogs Present 2000
Bullfrogs Removed 1999-2000
Maintenance removal

Manual capture

Shooting

2-person canoe
Chiricahua Leopard Frog

Photo: Erik Enderson
Chiricahua Leopard Frog
Listed as Threatened, June 13, 2002
Last Altar Valley population pond drying
9 frogs, 13 tadpoles moved into captivity

Photo: Erik Enderson
Tanks w/ Chiricahua LF (2003, 2006, and 2007)

- **Perennial Tanks**
- **Ephemeral Tanks**
## Occupancy 2006

*Rana chiricahuensis* BANWR

<table>
<thead>
<tr>
<th>Psi</th>
<th>P</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11</td>
<td>0.77</td>
<td>Psi(\text{group})</td>
</tr>
</tbody>
</table>

\[ \text{Psi} = \text{PAO} = \text{Proportion of Area Occupied} \]

\[ P = \text{Detection Probability} \]
**Occupancy 2006**

*Rana chiricahuensis* **BANWR + CNF**

<table>
<thead>
<tr>
<th>Psi</th>
<th>P</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11</td>
<td>0.77</td>
<td>(\Psi\text{(group)} \times \text{p(survey)})</td>
</tr>
<tr>
<td>0.24</td>
<td>0.82</td>
<td>(\Psi\text{(water)} \times \text{p(time, water)})</td>
</tr>
</tbody>
</table>

\(\Psi\) = occupancy  
\(P\) = detection probability
After 26,000 gallons of water added
September 2007
Tanks w/ Chiricahua LF (2003, 2006, and 2007)

- **Perennial Tanks**
- **Ephemeral Tanks**
Pena Blanca Lake
Currently being drained
1000s of bullfrogs
Leopard frogs nearby – 2 spp.

Chiricahua Leopard Frog
Lowland Leopard Frog
Plans

Remove bullfrogs as lake dries
Occupy surveys w/i 5 miles of lake
Remove bullfrogs from ponds ≤ 3 mi of lake
Repeat occupy surveys

Work out bugs, repeat for other lakes