Rana onca Monitoring and Management

Jef Jaeger¹ & Ross Haley²

1. Public Lands Institute & School of Life Sciences, UNLV
2. Resource Management, Lake Mead National Recreation Area, NPS

CRTR Meeting, 25 January 2011
Background

Vegas Valley Leopard Frog
*Rana fisheri*

Strong genetic evidence that this frog was not
*R. onca* or *R. yavapaiensis*

*(manuscript in review)*

Drawings and Maps from Stebbins 2003
Background

ND2 Bayesian Inference Tree

R. yavapaiensis

Surprise Canyon
R. yavapaiensis

R. onca

Posterior probability support for major nodes shown

Hemmings et al. 2010
Background

Petitioned for listing under ESA in 2002

~1100 Frogs

Bradford, Jaeger, & Jennings 2004
Background

Voluntary CAS signed in 2005

- Monitor populations
- Establish additional populations in existing or created habitat
- Enhance or create habitat
- Manage populations and habitats to promote sustainability
- Investigate species biology and apply findings to management
Threats

“Two recent population extinctions occurred concomitantly with encroachment of emergent vegetation into pools.”
Bradford, Jaeger & Jennings 2004

“Observations suggest that adults prefer relatively open shorelines where dense vegetation does not dominate.”
Bradford, Jennings and Jaeger 2005

Habitat selection based on radio-telemetry indicates that these frogs prefer more vegetatively open areas.
Harris & Jaeger 2006, unpublished
Burro (and cattle) grazing has been essentially eliminated in the Northshore area in recent years.

Grazed area once favored by frogs at Blue Point Spring, August 2004

Same area, August 2010
Same area during rehab effort in Oct 2010

Photo: Mark Slaughter, BLM
Photo: Joe Barnes
Rehabbing fish-free pond at Blue Point Spring, Jan 2011
Vegetation Responses to Treatments
Jaeger, Graham, & Engel 2009, Unpublished

- *Eleocharis & Scirpus* dominated vegetation returned to pre-cut conditions < one-year
- *Cladium* (sawgrass) slower to re-establish < two-years
- Plant species richness and composition unresponsive*

*Example Data...All values ± 1 S.E.*
Threats

Introduced Predator and Competitors

“Unholy Trinity”

Convict cichlid photo: aquariumdomain.com
Some efforts at Blue Point Spring to create experimental fish-free breeding pools and channels…

Blue Point Spring, Jan 2011

Fish-free pond, March 2008, just after veg cutting and filling
Threats

Stochastic Events

Debris flows from storm in Black Canyon, October 2006

Willow Beach Oct. 14, 2006

Photo: NPS
In the early 2000s, more than half of all *R. onca* occurred at this site (Bradford, Jaeger & Jennings 2004)
Frogs Counted During Nocturnal VES at Bighorn Sheep Spring

![Bar chart showing frog counts over time with a storm event in October 2006 highlighted.]

- Storm Event, October 2006
Hossain, 2010. On the empirical relationship between large dams and the alteration in extreme precipitation

Natural Hazards Review
Headstarting, Translocations & Augmentations

Lake Mead 'Frog Lab', 2008
Also raceways at Willow Beach
National Fish Hatchery, and
Lake Mead State Fish Hatchery
# Headstarting, Translocations & Augmentations

<table>
<thead>
<tr>
<th>Year</th>
<th>Frogs Released</th>
<th>Tadpoles Released</th>
<th>Totals</th>
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<tr>
<td>2003</td>
<td>195</td>
<td>0</td>
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</tr>
<tr>
<td>2004</td>
<td>521</td>
<td>1784</td>
<td>2305</td>
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<tr>
<td>2005</td>
<td>261</td>
<td>963</td>
<td>1224</td>
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<tr>
<td>2006</td>
<td>230</td>
<td>1787</td>
<td>2017</td>
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<tr>
<td>2007</td>
<td>592</td>
<td>1365</td>
<td>1957</td>
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<tr>
<td>2008</td>
<td>389</td>
<td>528</td>
<td>917</td>
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<tr>
<td>2009</td>
<td>438</td>
<td>848</td>
<td>1286</td>
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<tr>
<td>2010</td>
<td>30</td>
<td>1236</td>
<td>1266</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Totals</strong></td>
<td><strong>8,511</strong></td>
<td><strong>11,167</strong></td>
</tr>
</tbody>
</table>

Translocated to 9 experimental sites or returned to augment Blue Point and Rogers springs.
Current Status
As of 2010

- ~ 6 Natural Sites
- 9 Experimental Sites…7 Extant

Critical need for more sites!

- Jaeger & Drost 2010, Unpublished
Perkins Pond – Latest experimental site

- 372 tadpoles released in May 2010
- 17 adults counted during Fall 2010 survey
VES results for adult & juvenile frogs by site

*Quail
*Tassi
*Red Rock
*Grapevine, AZ
*Grapevine, NV
*Pupfish
*Goldstrike
Salt Cedar
Dawns Cyn
Boy Scout
Black Cyn Sprs
Bighorn Sheep
Rogers
Blue Point

* Experimental Sites
VES results for adult & juvenile frogs

- Spring 04
- Fall 04
- Spring 05
- Fall 05
- Spring 06
- Fall 06
- Spring 07
- Fall 07
- Spring 08
- Fall 08
- Spring 09
- Fall 09
- Spring 10
- Fall 10

Legend:
- Experimental
- Natural Sites
Threats

Emergent Disease

Chytridiomycosis: potentially fatal disease caused by pathogenic fungus *Batrachochytrium dendrobatidis* (*Bd*)
Threats

Emergent Disease

- Lab studies: *Bd* grows and reproduces at temps from 4 – 25°C; most virulent at temps ≤ 23°C
- Pathogenicity and virulence significantly declines > 27°C
  
  E.g. Piotrowski et al. 2004

- Field studies: significant negative correlation between *Bd* and water temp
- At *R. yavapaiensis* sites with high *Bd* prevalence, infection rates were extremely low in water > 25°C
  
  Forrest and Schlaepfer, in review
Threats

Emergent Disease

- Thermal springs appear to provide important habitat where amphibians can persist despite the presence of *Bd*
  
  Forrest and Schlaepfer, in review

- *R. onca* now only occurs naturally in thermal springs, all with source temperatures > 30°C
Testing for *Bd*

- To date, 99 adult anurans from 9 natural and experimental *R. onca* sites have been tested for *Bd*
  
  (not all these samples were collected with precise water temps)

- Four *R. onca* from Blue Point have tested *Bd*+

- These *Bd*+ frogs were found downstream from the geothermal source, and 2 of these frogs were at the lowest specific water temps recorded (17.7°C)
‘Headstarted’ Frog at Perkins Pond
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Photo credits:
mostly Jef Jaeger