Razorback Sucker hybrids: hatch rates, larval survival and morphometrics

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Reproductive Isolation Mechanisms

- Mating behaviors: courtship
- Geographical Isolation
- Ecological isolation: breeding requirements
- Temporal isolation: breeding seasons

http://www.toonts.com/birds-of-paradise/
Historical Reproductive Isolation Mechanisms

- Ecological Isolation: Razorback spawning runs
- Temporal Isolation: different spawning seasons?

Glen Canyon 1873 http://www.wikiwand.com/en/Glen_Canyon#/Historic_period
Today’s Management Concerns
• Species fusion? Hybrid swarm
• Hybrid speciation? Hybrid is reproductively superior to parents
• Hybrid zones
• Hybrid viability
Today’s Management Concerns

• Species fusion? Hybrid swarm
• Hybrid speciation? Hybrid is reproductively superior to parents
• Hybrid zones
• Hybrid viability
Questions

• Do hybrids hatch as frequently as pure Razorback Suckers?
• Do hybrids differ from Razorback Sucker in larval survival?
• What do Razorback Flannelmouth sucker hybrids look like?
Methods
Parental Participation

- Females
  - 4 Razorback
  - 2 Flannelmouth
- Males
  - 7 Razorback
  - 2 Flannelmouth
Combinations

• Razorback: 9 unique parental pairs
• *Razormouth: 6 unique parental pairs
• Flannelmouth: 4 unique parental pairs
• **Flannelback: 6 unique parental pairs

*Razormouth Sucker:
Razorback female X Flannelmouth male

**Flannelback Sucker:
Flannelmouth female X Razorback male
Treatment success

**Combinations**
- Razorback: 9 unique parental pairings
- Razormouth: 6 unique parental pairings
- Flannelmouth: 4 unique parental pairings
- Flannelback: 6 unique parental pairings

**Fish Hatched per combination**
- 564
- 735
- 8
- 9
Questions

• Do hybrids hatch as frequently as pure Razorback Suckers?
• Do hybrids differ from Razorback Sucker in larval survival?
• What do Razorback Flannelmouth sucker hybrids look like?
No difference in hatch rates between Razorback or Hybrids

Razorback egg hatch rate: 5.87% [2.84, 9.84]
Questions

• Do hybrids hatch as frequently as pure Razorback Suckers?
• Do hybrids differ from Razorback Sucker in larval survival?
• What do Razorback Flannelmouth sucker hybrids look like?
No difference in larval survival to 37 days between cross
Questions

• Do hybrids hatch as frequently as pure Razorback Suckers?
• Do hybrids differ from Razorback Sucker in larval survival?
• What do Razorback Flannelmouth sucker hybrids look like?
Morphometrics

- 14 Flannelmouth Sucker- Colorado River, Diamond Creek to Lake Mead
- 15 Razorback Sucker- Rocky Mountain Research Station and Bubbling Ponds
- 13 Hybrids- from pilot study
Measurements
### Principal Components Analysis

#### Component Matrix

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<thead>
<tr>
<th>Component</th>
<th>Value</th>
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<tr>
<td>HDL.SD</td>
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<td>PDD.SD</td>
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<td>DR.SD</td>
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<td>BELLY.SD</td>
<td>.765</td>
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<td>HDD.SD</td>
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Discriminant Function Analysis

7 Ratios → 2 Functions

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## Classification Results$^a,c$

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Summary

• Hybrids and Razorbacks hatch and survive at similar rates

• Hybrids are an intermediate shape between Flannelmouth Sucker and Razorback Sucker, but look more like Razorback Sucker
Future work

• Re-spawn next spring
• Growth study
• Geometric morphometrics
• Meristics

Deformation grid

"Wireframe graph"

http://www.fruciano.it/research/geometric_morphometrics.shtml
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