Reproductive Success of Individual Razorback Suckers in Impounded Backwaters

Melody J. Saltzgiver
Thomas E. Dowling
Paul C. Marsh
Thomas F. Turner
Razorback sucker
(*Xyrauchen texanus*)

- Grows up to 1 meter long and 5kg
- Live 40+ years
- Iteroparous
- Highly fecund
  - ca. 200,000 eggs/large adult female
- 8% contribute annually
- 30% to 40% contribute in a generation
Lake Mohave
Conservation management plan

- Initiated in mid-1990’s
- Capture naturally produced larvae
  - Sample across regions throughout the spawning season to represent genetic diversity in the lake
Conservation management plan

➢ Reared in captivity
  • Hatcheries
  • Backwaters
Lake Mohave
Conservation management plan

• Release into the wild
  – PIT tag

• Monitoring
  – Native Fishes Work Group
  – Genetics
Impact on genetic diversity

- Genetic diversity decreases with population size
  - Can have negative effects on health of population (e.g., inbreeding depression)
How do we preserve the population using refuges?

- Develop isolated off-channel habitats
- Refuges for reproduction
- Interchange individuals with main river
Objective

To obtain information about reproductive success of individual razorback suckers kept in ephemeral backwaters

- How many adults contribute?
- What is the proportion of offspring from individual contributions?
- How many should we use in each pond?
- How often do we exchange them?
Methods

Stock adult razorback suckers in impoundments prior to spawning season.

- Equal sex ratios
- Fin clips

Gathered larvae throughout the spawning season, and juveniles during fall.

Genotype adults and offspring using microsatellites

- 14 Loci

Assign parentage using computer software MYKISS
Dandy Backwater Results

2010 - Stocked 99 females, 101 males

- 207 larvae collected (6 collections)
- 36 females and 31 males contributed (33% of adults)
- 40% of the larvae from unique female-male pairings
Dan10 Individual Parent Contributions to Larvae

- Frequency of Contribution
- Number of larvae

The graph shows the frequency of contributions for different numbers of larvae, with the highest contribution occurring when the number of larvae is 1.
Dandy Backwater Results

2010 - Stocked 99 F & 101 M

- 40 juveniles

- 17 females and 15 males contributed (16% of adults)

- 55% of the juveniles were unique female-male pairings
Dan10 Individual Contributions to Juveniles

Frequency of contribution

Number of Juveniles
Dan10 Individual Parent Contributions

Number of Offspring

Frequency of contribution

11/40 = .28
42/207 = .21
Dandy Backwater Results

2011 – Stocked 100 females, 100 males

- No larvae
- No Juveniles

2012 - Stocked 100 F & 100 M

- 4 juveniles
- 4 females and 4 males contributed (4% of adults)
- 100% of the juveniles were unique female-male pairings
Arizona Juvenile Backwater

2010 - Stocked 129 Females, 71 Males

2011 – Stocked 100 Females, 100 Males

2012 – Stocked 100 Females, 100 Males
<table>
<thead>
<tr>
<th>Year</th>
<th>Season</th>
<th># of Adults Stocked</th>
<th># of Offspring</th>
<th># of Parental Contributions</th>
<th>% of Unique Male Female Pairings</th>
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<tbody>
<tr>
<td>2010</td>
<td>spring</td>
<td>129 Females, 71 Males</td>
<td>210 larvae (4 collections)</td>
<td>66 Female, 39 males (53%)</td>
<td>75%</td>
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<tr>
<td>2011</td>
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<td>100 Females, 100 Males</td>
<td>305 larvae (6 collections)</td>
<td>68 Female, 69 males (69%)</td>
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<td>100 Females, 100 Males</td>
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<td>43 Female, 52 males (48%)</td>
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Arizona Juvenile Backwater

2012 - Stocked 100 Females, 100 Males

- 116 larvae collected (3 collections)
- 25 females and 35 males contributed to larvae (30% of adults)
- 63% of the larvae from unique female-male pairings

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AJ12 Individual Contributions to Larvae
Arizona Juvenile Backwater

2012 - Stocked 100 Females, 100 Males

- 246 juveniles captured
- 33 females and 39 males contributed to juveniles (36% of adults)
- 44% of the juveniles were unique female-male pairings
- One female produced 104 of the 246 juveniles.
AJ12 Individual Parent Contributions to Juveniles

Number of Juveniles

Frequency of Contribution
AJ12 Individual Parent Contributions

Frequency of Contribution vs. Number of Offspring

- Frequency of larvae contributions for 19/116 = 0.16
- Frequency of Juveniles contributions for 104/246 = 0.42
Conclusions

- Individual adult contributions variable but higher than expected. (8% annual; 40% generation)

- 33% Dandy 2010 larvae
- 16% Dandy 2010 juveniles
- 53% AJ 2010 larvae
- 69% AJ 2011 larvae
- 48% AJ 2011 juveniles
- 30% AJ 2012 larvae
- 36% AJ 2012 juveniles
Conclusions

- Equal contributions across sexes
- High fraction of progeny are produced by unique pairings
- Some individuals contributed many progeny
Future

- Continue backwater experiments
- Try to understand differences among ponds
- Expand to permanent backwaters
Acknowledgements

- MSCP
- Marsh & Associates
- Bureau of Reclamation
Questions?
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