Razorback Sucker Research and Monitoring in the Colorado River Inflow Area of Lake Mead and the Lower Grand Canyon, Arizona and Nevada

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Colorado River inflow (CRI)
Netting Catch Rates (CRI)
Larval Sampling (CRI)

“Active Light Sampling”
N=132

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado River Inflow</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.002</td>
<td>0.007</td>
<td>0.0014</td>
<td>0.000</td>
<td>0.042</td>
</tr>
<tr>
<td>Las Vegas Bay</td>
<td>0.39</td>
<td>0.43</td>
<td>0.342</td>
<td>0.093</td>
<td>0.282</td>
<td>0.1791</td>
<td>0.391</td>
<td>0.427</td>
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<tr>
<td>Echo Bay</td>
<td>0.43</td>
<td>0.024</td>
<td>0.021</td>
<td>0.269</td>
<td>1.482</td>
<td>0.2197</td>
<td>0.019</td>
<td>0.090</td>
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<tr>
<td>Virgin River/ Muddy River Inflow</td>
<td>0.001</td>
<td>0.116</td>
<td>0.107</td>
<td>0.011</td>
<td>0.013</td>
<td>0.0036</td>
<td>0.205</td>
<td>0.265</td>
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</tbody>
</table>
• 2014: 1 RZ aged (age-3)
• Total of 26 RZ aged at CRI

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Total #</th>
<th># NEW WILD</th>
<th># RECAP</th>
<th># NETS</th>
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<tbody>
<tr>
<td>2010</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>2011</td>
<td>15</td>
<td>7</td>
<td>8</td>
<td>187</td>
</tr>
<tr>
<td>2012</td>
<td>33</td>
<td>13</td>
<td>20</td>
<td>183</td>
</tr>
<tr>
<td>2013</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>2014</td>
<td>6</td>
<td>1</td>
<td>5</td>
<td>83*</td>
</tr>
<tr>
<td>TOTALS</td>
<td>61</td>
<td>25</td>
<td>36</td>
<td>553</td>
</tr>
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</table>
Movement of tagged fish from CRI into LGC.
Overview (LGC)

• For over 20 years, RBS thought to be extirpated from the Lower Grand Canyon (LGC)
• “…undertake an effort to examine the potential of habitat in the lower Grand Canyon for the species, and institute an augmentation program in collaboration with FWS, if appropriate.” (USFWS 2007 BiOP)
• Determined suitable habitat by science panel
• Razorbacks captured in Canyon by AZGFD
Objectives

• Determine RBS presence and habitat use in LGC
  – Larval and small-bodied fish community sampling within the LGC
    • Assess reproduction, spawning, and distribution
  – Sonic telemetry

• Explore linkages between Lake Mead and LGC
LGC Small-bodied Sampling

- 7 sampling trips per year
  - October, March-August 2014
  - Lava Falls to Pearce Ferry (RM 179-280)
- Sonic Telemetry
  - 9 RBS released near Lava Falls
  - SURs deployed every 5 miles
  - Active Listening
- Seining
- Generalized Random Tessellation Stratified (GRTS)
- Opportunistic Sampling
GRTS Sampling Design

• Well established and used by NPS
• Ensures spatially balanced, random sampling while reducing sampler bias
• 100 RM reach was divided into 800 m segments
• S-Draw selected 40, spatially balanced, segments with an additional 10 replacements
• Sampling can occur anywhere within the segment
• Repeated sampling in each of the 40 segments each trip
LGC Small-Bodied Sampling

- No Razorback Sucker
- 4-native species
- Native dominance ($P=0.0000$)

- Native abundance increase Jun.-Aug.
- Native fish present throughout
- Native dominance at nearly all segments
LGC Small-Bodied Sampling

- YOY suckers dominated early
- YOY Humpback Chub present May-Aug. (N=144)

- HC abundance increased throughout the summer
- Relatively even distribution by Aug.
Telemetry

• LGC
  – SURs installed every 5 RM (180-280)
  – 10-Razorback Suckers released April 2013 (Separation)
  – 9-Razorback Sucker implanted and released March 2014 (Lava Falls)

• CRI
  – Two, wild Razorback Suckers implanted 2014
Telemetry

- 25 fish, 22,100 contacts
  - 8 CRI released
  - 17 LGC released
- 3 fish from CRI to LGC
  - (2) Spencer (1) 5 miles below Lava
  - (1) LGC-CRI-LGC
- 1 wild fish from CRI to OA
- 2 fish from LCG to CRI
  - (1) LGC-CRI-LGC-CRI-LGC (Spencer)
  - (1) LGC-CRI (Iceberg)
- Additional movement upstream and downstream within the LGC
Conclusions and Considerations

• Razorback Sucker were found at the CRI for the 5\textsuperscript{th} year
  – Relatively young (<11 years)
• No Razorback Suckers captured during LGC small-bodied sampling in 2014
  – Age-0 juveniles in iceberg canyon
• Likely that movement occurring above Lava Falls
  – Most sonic activity from Spencer to Columbine
• GRTS sampling yielded similar species composition with higher native catch rates
• Razorback and other sucker habitat likely overlaps within the CRI and LGC with movement between the two
• Capture of other small sucker species lends hope for capturing small, wild Razorback Suckers in the future
What’s Next?

• Continued CRI sampling
• LGC: 7 trips in 2015
  – March-Sept
  – Continued telemetry
  – Continued small-bodied seining
  – Opportunistic adult sampling
• Explore linkages between Lake Mead and LGC
Thank You

Questions??