EVALUATION OF THE HOGBACK FISH WEIR—TRANSPORT AND ENTRAINMENT OF LARVAL FISH

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Colorado River Aquatic Biologists Meeting:
January 2016
Hogback Diversion Structure

670 m
Objectives

• Evaluate the entrainment of fish larvae.

• Evaluate entrainment of Neutrally Buoyant Particles (NBP)

• Evaluate NBP as surrogates for larval fishes
Two tests were completed in 2015:
• Razorback Sucker larvae (May)
• Colorado Pikeminnow larvae (June)

Methods
• Early larval life stages of Razorback Sucker and Colorado Pikeminnow reared from brood stock at SNARRC
  o Larvae marked with oxytetracycline after hatch
• Two densities of nylon NBP
  o red—neutrally buoyant [SG=1.005]
  o purple—positively buoyant [SG=0.97]
Methods

• Drift nets fitted with flow meters sets in return canal and irrigation canal.

• Two densities of nylon NBP (red–neutrally buoyant, purple–positively buoyant)

• Nylon NBP (red–neutrally buoyant, purple–positively buoyant)
• Larval Fishes (acclimated to river temperatures)
Methods

- Drift nets fitted with flow meters and placed at single location in thalweg of return canal and irrigation canal.
- Drift nets run continuously for duration of study and collected in 15 minute intervals.
- Contents preserved in 95% EtOH.
Analysis

- Densities of larval fishes and NBP were calculated as number collected in 15 minutes/volume of water sampled.

- Estimated totals diverted into canals was derived from density of NBP/fish in each sample and related to total discharge of canal.

- Transport velocity ($V_{50}$) was estimated based on the duration required for 50% of the NBP/fish to pass drift nets.
## 2015 Tests Parameters

<table>
<thead>
<tr>
<th>Date</th>
<th>5 May 2015 Razorback sucker</th>
<th>15 June 2015 Colorado Pikeminnow</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Juan River Discharge (cfs)</td>
<td>921</td>
<td>5,056</td>
</tr>
<tr>
<td>Return Canal (cfs)</td>
<td>65</td>
<td>78</td>
</tr>
<tr>
<td>Irrigation Canal (cfs)</td>
<td>128</td>
<td>158</td>
</tr>
<tr>
<td>Larvae (n=)</td>
<td>100,000</td>
<td>45,327</td>
</tr>
<tr>
<td>NBP, Red (specific gravity 1.005)</td>
<td>661,060</td>
<td>690,720</td>
</tr>
<tr>
<td>NBP, Purple (specific gravity 0.97)</td>
<td>410,331</td>
<td>417,497</td>
</tr>
</tbody>
</table>
Razorback Sucker Results

EVALUATION OF THE HOGBACK FISH WEIR—TRANSPORT AND ENTRAINMENT OF LARVAL FISH
Razorbac K Sucker Transport Rates

Return Canal

V_{50} RBS 74 min
V_{50} NBP red 77 min
V_{50} NBP purple 44 min
EVALUATION OF THE HOGBACK FISH WEIR—TRANSPORT AND ENTRAINMENT OF LARVAL FISH
Colorado Pikeminnow Results

EVALUATION OF THE HOGBACK FISH WEIR—TRANSPORT AND ENTRAINMENT OF LARVAL FISH
Colorado Pikeminnow Transport Rates

\[ V_{50} = 25 \text{ minutes} \]
Discussion

• Estimated total assumes homogeneity in canals.
  o 2016 sample design will evaluate densities across channel (width and depth)

• Earliest life stage of larvae used in 2015 study
  o 2016 stocking flexion mesolarvae

• Temporal drift patterns of native catostomid larvae
  o Diel drift behavior, abundance, and entrainment
  o Distribution of differing early life stages

• Modifications to the settling basin
  o Using lights to attract larvae away from weir wall
Study was approved by the San Juan River Basin Biology Committee (SJRBRIP)
Funded under a U.S. Bureau of Reclamation, Salt Lake City Project

Curation of material provide by Alexandra M. Snyder. Maribel Solis, Kendra B. Lecomte, and Larissa E. Garcia provided invaluable assistance with sorting samples in the laboratory

Additional assistance in the field was provided by Jenniifer L. Kennendy (ASIR), Christopher A. Cheek (Navajo Nation Dept. of Fish and Wildlife), Ernest Teller (USFWS), Marlin Saggboy (Shiprock Irrigation). Tracy Diver assisted with OTC marking of larvae (USFWS,SNARRC)

Ian Johnson provided data and operational assistance (Automated Consulting Engineering Services)