Humpback Chub – range expansion in the lower Grand Canyon or better sampling?

David L. Rogowski
Arizona Game and Fish Department, Research Branch, 5000 West Carefree Highway, Phoenix, Arizona 85086
Humpback Chub – range expansion in the lower Grand Canyon or better sampling?

- What is their distribution?
- Is their recent occurrence in the lower/western Grand Canyon new?
Glen Canyon Dam

Lake Mead
Number of Humpback Chub captured within Colorado River by river mile (1980-2014)

- Little Colorado River confluence

![Graph showing number of HBC captured at specific river mile (log scale) from 1980 to October 2014.](image-url)
AGFD Methods

• Goal – representative sample of the fish community in the Co. River from Lees Ferry to Lake Mead

• Methods: random stratified sampling
  • 3 trips: 2 spring/summer, 1 in fall
    – Boat Electrofishing – near shore

Photos by George Andrejko, AGFD
Humpback Chub numbers
(AGFD electrofishing)

Number of Humpback Chub captured

Semi-standardized
Standardized electrofishing

Year
AGFD sample site distribution
(electrofishing)

Diamond Creek RM 225
Humpback Chub - distribution (AGFD-EF)
Humpback Chub distribution
(via AGFD electrofishing)
Average elevation of Lake Mead (ft)
Grand Canyon long term monitoring

• AGFD – Colorado River (since ~2000):
  – 2 spring/early summer: RM 0-281.4
  – Fall: Diamond Creek Down: RM 225-281.4

• USFWS (since ~2000)
  – Colorado River: “9 Aggregations” (Valdez & Ryell 1995)
  – Little Colorado River (hoop nets)
## "Humpback Chub aggregations?"

### Table 5.11. Location and numbers of humpback chub in nine aggregations in the Colorado River in Grand Canyon, 1990-93.

<table>
<thead>
<tr>
<th>Aggregations</th>
<th>Location (RM)</th>
<th>Number Captured</th>
<th>% of Total</th>
<th>Number Recaptured</th>
<th>Estimated Total</th>
<th>Primary Association</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>YOY  Juv  Adu  Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. 30-Mile</td>
<td>29.8 - 31.3</td>
<td>14  0  26  26</td>
<td>0.4</td>
<td>6</td>
<td>52</td>
<td>WS</td>
</tr>
<tr>
<td>2. LCR Inflow</td>
<td>57.0 - 65.4</td>
<td>1,630 1,293 1,524 4,647</td>
<td>78.2</td>
<td>280</td>
<td>3,482</td>
<td>WT/ED</td>
</tr>
<tr>
<td>3. Lava to Hance</td>
<td>65.7 - 76.3</td>
<td>778 226 15 1019</td>
<td>17.2</td>
<td>3</td>
<td>ne</td>
<td>-</td>
</tr>
<tr>
<td>4. Bright Angel Creek Inflow</td>
<td>83.8 - 92.2</td>
<td>13  2  9  24</td>
<td>0.4</td>
<td>1</td>
<td>ne</td>
<td>WT</td>
</tr>
<tr>
<td>5. Shinumo Creek Inflow</td>
<td>108.1 - 108.6</td>
<td>4  13  27  44</td>
<td>0.7</td>
<td>6</td>
<td>57</td>
<td>WT</td>
</tr>
<tr>
<td>6. Stephen Aisle</td>
<td>114.9 - 120.1</td>
<td>0  7  17  24</td>
<td>0.4</td>
<td>2</td>
<td>ne</td>
<td>DF/ED</td>
</tr>
<tr>
<td>7. Middle Granite Gorge</td>
<td>126.1 - 129.0</td>
<td>1  4  124 129</td>
<td>2.3</td>
<td>48</td>
<td>98</td>
<td>DF/ED</td>
</tr>
<tr>
<td>8. Havasu Creek Inflow</td>
<td>155.8 - 156.7</td>
<td>0  0  7  7</td>
<td>0.2</td>
<td>1</td>
<td>13</td>
<td>WT</td>
</tr>
<tr>
<td>9. Pumpkin Spring</td>
<td>212.5 - 213.2</td>
<td>0  0  6  6</td>
<td>0.2</td>
<td>2</td>
<td>5</td>
<td>WS</td>
</tr>
</tbody>
</table>

* includes recaptures
+ includes multiple recaptures, i.e., fish recaptured more than once.
\( M_p \) Mark-recapture estimate for adults using Chao estimator (See Chapter 6), ne= no estimate.
- WS = warm spring, WT = warm tributary, ED = eddy complex, DF = debris fan.
* Captured from a school of about 100 YOY in a spring plume, July 14, 1994, not included in totals for October 1990-November 1993.

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From: Valdez & Ryel 1995
USFWS “Aggregation” sampling locations

Year

Colorado River mile

2016
2014
2012
2010
2008
2006
2004
2002
2000
1998

0 50 100 150 200 250 300
USFWS “Aggregation” sampling: Humpback Chub capture locations
What is the distribution of Humpback Chub in the Grand Canyon?

- AGFD – representative sample of the River, but not effective (e.g. electrofishing)
- USFWS – effective sampling (hoop nets, trammels), but not representative
AGFD Methods

• Goal – representative sample of the fish community in the Co. River from Lees Ferry to Lake Mead

• Methods: random stratified sampling
  • 3 trips: 2 spring/summer, 1 in fall
    – Boat Electrofishing – near shore
    – Baited hoop nets (new in 2016)

Photos by George Andrejko, AGFD
2016 number of Humpback Chub/hoop net (285 hoop nets)

- 182 Humpback Chub

Diamond Creek

182 Humpback Chub
Humpback Chub CPUE via hoop nets 2016 (n=319)
Humpback Chub length frequency histograms

Spring/Summer sample
RM 225-281
n=42

Fall sample
RM 225-281
n=106
Humpback Chub Recaptures (hoop nets)

• Above RM 220: 21/37 recaptures (57%)
  – At Little Colorado River confluence ~80% recaptures

• Below RM 220: 3/146 recaptures (2%)
  – 3 were tagged recently and at RM 238-239 (2016)
Humpback Chub

• Occur throughout Colorado River?
  – Occurrence below RM 225 (Diamond Creek)
    • Not sure if this is new or not?
      – No longer a lake
      – More turbid, temperatures are warmer
      – Not adequately sampled

~ RM 264

Photo by George Andrejko, AGFD

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Next year

• Continue hoop nets
• Extend sampling below Pearce Ferry Rapid
  – 3 night hoop net trial
Acknowledgements

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