Humpback Chub Translocations to Shinumo and Havasu Creeks, Grand Canyon National Park

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Many Cooperators!

- Funded by Reclamation and NPS
- Thank you to NPS River and Helicopter crews!
- Many, many volunteers helped too!

*Thanks to Amy Martin, Brian Healy, Melissa Trammell, Jeff Sorensen, Jan Balsom, and Allyson Mathis for beautiful photos*
Why Translocate Humpback Chub?

- USFWS 1994 Biological Opinion – Establish a 2nd “spawning aggregation” of Humpback Chub

- Conservation Measures in USFWS 2008 & 2011 Biological Opinions – tributary Humpback Chub translocations

- NPS Comprehensive Fisheries Management Plan 2013
Valdez et al. 2000 – Developed plan for establishing second population of humpback chub in Grand Canyon, identifying the top 3 tributaries for translocation

1. Havasu Creek
2. Shinumo Creek
3. Bright Angel Creek, excluded due to “large number of predators…”
Translocation Sites

- Glen Canyon Dam & Lake Powell - 15 miles upstream
- Hoover Dam & Lake Mead

- HBC collected from LCR as YOY
- Treated & PIT tagged at SNARRC or AGFD BP
- Translocated within 11 months of collection

HBC illustration by Joe Tomelleri
Translocation Goals

- Experimental
- Establish second spawning population in Grand Canyon
  -and/or—
- Provide rearing habitat for juvenile Humpback Chub - Augmentation of Colorado River aggregations
<table>
<thead>
<tr>
<th>Tributary</th>
<th>Hatchery Tagging Date</th>
<th>Average Length (mm)</th>
<th>Average Weight (g)</th>
<th>Release Date</th>
<th>Number Translocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shinumo Creek</td>
<td>May 18, 2009</td>
<td>127.9</td>
<td>18.7</td>
<td>June 15, 2009</td>
<td>302</td>
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<tr>
<td>Shinumo Creek</td>
<td>June 10, 2010</td>
<td>121.1</td>
<td>15.3</td>
<td>June 23, 2010</td>
<td>300</td>
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<tr>
<td>Shinumo Creek</td>
<td>May 5, 2011</td>
<td>88.9</td>
<td>5.4</td>
<td>June 21, 2011</td>
<td>300</td>
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<tr>
<td>Shinumo Creek</td>
<td>June 10, 2013</td>
<td>123.3</td>
<td>14.8</td>
<td>June 15, 2013</td>
<td>200</td>
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</tbody>
</table>

* Alternative translocation site due to Galahad Fire (fish originally destined for Shinumo Creek).

Shinumo Creek
Total = 1102
<table>
<thead>
<tr>
<th>Tributary</th>
<th>Hatchery Tagging Date</th>
<th>Average Length (mm)</th>
<th>Average Weight (g)</th>
<th>Release Date</th>
<th>Number Translocated</th>
</tr>
</thead>
<tbody>
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<td>Havasu Creek</td>
<td>May 5, 2011</td>
<td>86.1</td>
<td>4.8</td>
<td>June 28, 2011</td>
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<td>Havasu Creek</td>
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<td>May 13, 2012</td>
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<td>Havasu Creek</td>
<td>May 9, 2013</td>
<td>123.1</td>
<td>14.9</td>
<td>May 14, 2013</td>
<td>300</td>
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<tr>
<td>Havasu Creek</td>
<td>May 9, 2014</td>
<td>123</td>
<td>16.4</td>
<td>May 14, 2014</td>
<td>300</td>
</tr>
<tr>
<td>Havasu Creek*</td>
<td>May 9, 2014</td>
<td>124</td>
<td>16.4</td>
<td>June 5, 2013</td>
<td>209</td>
</tr>
</tbody>
</table>

* Alternative translocation site due to Galahad Fire (fish originally destined for Shinumo Creek).

Havasu Creek

Total= 1350
Monitoring Methods
Questions about Translocations

1. Will chub remain & survive?
2. Will chub augment mainstem?
3. How will chub fare in the tributaries?
4. Will chub reproduce?
1. Will chub remain & survive?

- Apparent survival has varied over time
- 2011 - low Rainbow Trout densities
- 2013 - soft release into new areas

50.4% as of January 2013

Antenna efficiency: ??
1. Will chub remain & survive?

*Cross-hatched population estimates indicate estimates based on preliminary, modeled capture probability data derived from previous sampling events.*

- Minimum of 200 HBC to be maintained in Shinumo Creek if acting as a “grow out” stream (NPS CFMP 2013)
1. Will chub remain & survive?

- Apparent survival does not vary over time in Havasu Creek as it does in Shinumo Creek.
- Apparent survival does vary by HBC total length and translocation group.
1. Will chub remain & survive?

- These abundance estimates include both translocated and non-translocated Humpback Chub.
- Minimum of 200 HBC to be maintained in Havasu Creek if reproduction occurs (USFWS 2010, NPS CFMP 2013)
2. Will Translocations Augment Colorado River Humpback Chub Aggregations?

- NPS 2010-2014: 149 unique translocated chub caught in the mainstem Colorado River, many in multiple years (214 total captures)

- 3 HBC translocated to Shinumo Creek have been detected in antenna array in the Little Colorado River

- GCMRC/FWS presenting much more later today!
3. How will chub fare in the tributaries?

Hatchery relative weight vs. one summer in Shinumo Creek
3. How will chub fare in the tributaries?

**Shinumo Creek Translocated HBC vs. Little Colorado R.**

**Age-1+ Growth**

Theoretical LCR juvenile growth curve: Robinson & Childs 2001
3. How will chub fare in the tributaries?

**Havasu Creek Translocated HBC vs. Little Colorado River Age-1+ Growth**

*Theoretical LCR juvenile growth curve: Robinson & Childs 2001*
4. Will chub reproduce in tributaries?

**Havasu Creek**
- Ripe males and females have been captured
- **GCMRC/ U of A ultrasound image study suggests multiple females contained developed eggs**

**Shinumo Creek**
- No ripe fish
- Worn fins and spawning coloration detected
4. Will chub reproduce in tributaries?

Untagged juvenile humpback chub from Havasu Creek in May 2013 & October 2014
Tributary Translocation Summary

1. Will chub remain & survive? Yes, some
   ➢ Maintaining 200 minimum per the CFMP (NPS 2013) and USFWS 2010 Genetics Management Plan

2. Will chub augment mainstem aggregations? Yes

3. How will chub fare in the tributaries? Growth as high or higher than the LCR

4. Will chub reproduce? Yes, in Havasu Creek
2014 Flooding & Fire in Shinumo Creek

- Galahad Fire- started by lightning in May and then managed; burned approximately 6500 acres and 10% of the watershed

- Late July- flood severely damaged the antenna array
  - USFWS staff reported the Colorado River had turned dark with ash and smelled like a campfire downstream of Shinumo Creek; recreational boaters said the source was Shinumo Creek
  - NPS River District personnel observed charcoal pieces in the creek

- August 20-22- an larger flood was reported by commercial boatmen, with impacts noted even in the mainstem Colorado River
2014 Flooding & Fire in Shinumo Creek

- September – NPS monitoring revealed severe flood disturbance & widespread deposition of charred wood
  - water level appeared to have risen at least 12-15 feet above baseflow
  - riparian vegetation was reduced by approximately 80-90%
  - at least one archeology site was damaged (Bass Camp)
  - macroinvertebrate densities and taxa richness significantly reduced
  - sediment deposition eliminated most pool habitat, including former HBC translocation sites
  - fish community reduced by 99%
Upper Shinumo Trips

- **September 29-October 3: Merlin & Modred Reconnaissance**
  - concluded that the heavy localized rainfall on top of burned areas and flooding caused the likely extirpation of all HBC and BHS from the watershed
  - RBT present in Merlin Abyss, providing a source for recolonization as habitat recovers

- **October 29-November 3: Merlin & Modred Nonnative Removal**
  - 869 RBT captured and preserved for beneficial use
  - 139 SPD (population estimate= 293-859)
  - RBT captured above a barrier falls in upper Merlin; are found all the way up to the spring source (several miles)
    - High habitat complexity and remote area with extremely difficult access make electrofishing removal unlikely
Potential Shinumo Creek Actions—pending planning & compliance

- Explore options and compliance for trout removal in upper watershed
- Monitor recovery of watershed
- Translocate Humpback Chub
  - were successfully maintaining 200 translocated HBC in creek
  - good growth
  - evidence of mainstem augmentation
    → successful “grow out”
- Reintroduce Bluehead Sucker
Pre- and Post- Flood/Galahad Fire photo-matching
Galahad Fire
Sept 2009 and Sept 2014
Low Trail first stream crossing: Reach 1/2
Sept 2014
new driftwood on
top of very tall rock
Sept 2014
Reach 2; note height of debris on tree, about 12’ above stream level
June 2009 and Sept 2014
looking across stream at bottom of Glide Pool, top of reach 3
June 2009 and Sept 2014
“The Glide Pool”; bottom of reach 4
June 2011 and Sept 2014
“The Chub Pool” ; reach 4
Translocation Publications


Shinumo Creek Bluehead Sucker & Speckled Dace

• Cross-hatched population estimates based on preliminary modeled capture probability data derived from previous sampling events. The asterisk (*) indicates a sampling period for which no population estimate could be derived due to low capture probability.

• Zero BHS captured in September 2014 following monsoon flooding and ash flows from the 2014 Galahad Point fire; 74 SPD caught.
Shinumo Creek Rainbow Trout

*population estimate based on preliminary modeled capture probability data derived from previous sampling events.*
3. How will chub fare in the tributaries?

**Theoretical LCR juvenile growth curve:**
Robinson & Childs 2001
3. How will chub fare in the tributaries?

Havasu Creek Translocated HBC vs. Little Colorado River
Age-1+ Growth

Theoretical LCR juvenile growth curve: Robinson & Childs 2001