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Humpback Chub Translocations to Havasu and Shinumo creeks, Grand Canyon National Park
Previous cooperators
• Funded by Reclamation and NPS
• Many, many volunteers helped too!
Why Translocate Humpback Chub?

- USFWS 1994 Biological Opinion – 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- establish second population in Grand Canyon
  1. Havasu Creek
  2. Shinumo Creek
  3. Bright Angel Creek, excluded due to “large number of predators…”
<table>
<thead>
<tr>
<th>HBC 1</th>
<th>Establishment of a second spawning and recruiting population in the mainstem or tributary</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBC 2</td>
<td>Sufficient survival and growth to provide a rearing (&quot;grow-out&quot;) opportunity to augment the local mainstem aggregation</td>
</tr>
<tr>
<td>HBC 3</td>
<td>Failure of at least 20% of HBC to survive in the creek or adjacent mainstem aggregation for at least one year</td>
</tr>
</tbody>
</table>
1. Conduct Baseline Surveys

2. Collect, hold, treat, and tag Humpback Chub

3. Translocate Humpback Chub

Trammell et al. 2012. Humpback Chub Translocation to Havasu Creek, Grand Canyon National Park: Implementation and Monitoring Plan
4. Monitor translocated Humpback Chub and fish community in creeks and nearby Colorado River mainstem
   a. Survey twice annually
   b. Survey the mainstem Colorado River annually- GCMRC/FWS & NPS
   c. Remove non-native fish captured during surveys

Trammell et al. 2012. Humpback Chub Translocation to Havasu Creek, Grand Canyon National Park: Implementation and Monitoring Plan
Translocation Monitoring Metrics

A. Retention of translocated humpback chub over the first year
B. Similar or increased juvenile survival relative to the Little Colorado River and mainstem Colorado River near the Little Colorado River inflow
C. Similar or increased growth rates relative to the Little Colorado River and mainstem Colorado River near the Little Colorado River inflow
D. Contribution to and retention of translocated fish to an adjacent mainstem aggregation
E. Evidence of successful reproduction (presence of larval or young-of-year fish)
F. Evidence of recruitment to mature size

NPS Comprehensive Fisheries Management Plan 2013
EXPERIENCE YOUR AMERICA
Began in 2011
<table>
<thead>
<tr>
<th>Hatchery Tagging Date</th>
<th>Average Length (mm)</th>
<th>Average Weight (g)</th>
<th>Release Date</th>
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<td>86.1</td>
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<td>May 14, 2013</td>
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<td>May 9, 2013</td>
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<td>May 9, 2014</td>
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<td>16.4</td>
<td>June 5, 2014*</td>
<td>209</td>
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<tr>
<td>May 13, 2015</td>
<td>131</td>
<td>20.3</td>
<td>May 20, 2015**</td>
<td>300</td>
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</table>

Total = 1650 translocated Humpback Chub, to date
Fisheries Management Plan Goal = Maintain a minimum of 200 HBC in Havasu Creek
• Fisheries Management Plan Goal = 20% annual/ 87.5% monthly

√ Similar survival relative to Little Colorado River and nearby mainstem (which is higher, Yackulic et al. 2014)

• May 2016 sampling event will provide 2015 survival estimate- new release location
Theoretical LCR juvenile growth curve: Robinson & Childs 2001
Similar or increased growth rates relative to the Little Colorado River and mainstem Colorado River (which is lower, Yackulic et al. 2014)
<table>
<thead>
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<th>Year</th>
<th>TL</th>
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</table>

September 2015 translocated HBC captures in the mainstem near Havasu Creek (thanks to FWS Mike and Randy!) GCMRC/FWS presenting about their trips later today. Contribution to and retention of translocated fish to adjacent mainstem aggregation.
Ripe translocated HBC

Males 137-304 mm
Females 156-284 mm

Ripe non-translocated HBC

Males 175-280 mm
Females 299-321 mm
Outcome E - Evidence of Reproduction
Untagged HBC, by Capture Year

- **Untagged HBC captured in 2011**: n = 15
- **Untagged HBC captured in 2012**: n = 27
- **Untagged HBC captured in 2013***: n = 6
- **Untagged HBC captured in 2014**: n = 10
- **Untagged HBC captured in 2015**: n = 22
Ripe non-translocated fish in the upper 200 mm range (May 2012-15) Recruitment to mature size?
Havasu Creek - Next Steps

• Outcome 1: Establishment of a second spawning and recruiting population in the tributary achieved if monitoring detects evidence of successful reproduction and/or evidence of recruitment to mature size.

• Triggers additional HBC translocations to maintain genetic diversity (see FWS 2010)
  • Minimum of 200 adults maintained
  • At least 10 migrants/ generation (or add additional 10)
  • 45-1000 released over a generation (10 years)
Galalahad Fire, 2014

Started by lightning in May and then managed; burned approximately 6500 acres and 10% of the watershed

Two floods caused severe flood disturbance & widespread deposition of charred wood & ash

Water level appeared to have risen at least 12 -15 feet above baseflow
Riparian vegetation reduced by approximately 80-90%
At least one archeology site damaged (Bass Camp)
Macroinvertebrate densities and taxa richness significantly reduced
Fish community reduced by 99%
No Chub or Bluehead Suckers remained
Two Fall 2014 trips into Merlin & Modred Abyss

- 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
June & September

Hoopnetting in the Mainstem Colorado River - Bass Rapid to Shinumo Rapid

Invertebrate monitoring in Shinumo Creek
39 individual HBC captured - 27 recaps: 15 from Shinumo translocations, 12 non-translocated - 12 untagged

27 individual HBC captured - 15 recaps - all from Shinumo translocations - 12 untagged
- 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

Jeff Sorensen/AGFD Photo