

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



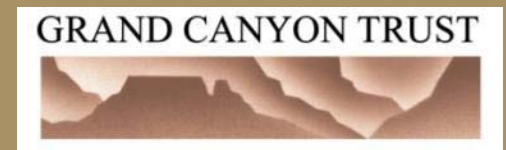
Emily Omana Smith*,
Brian Healy, Clay
Nelson, Melissa
Trammell



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

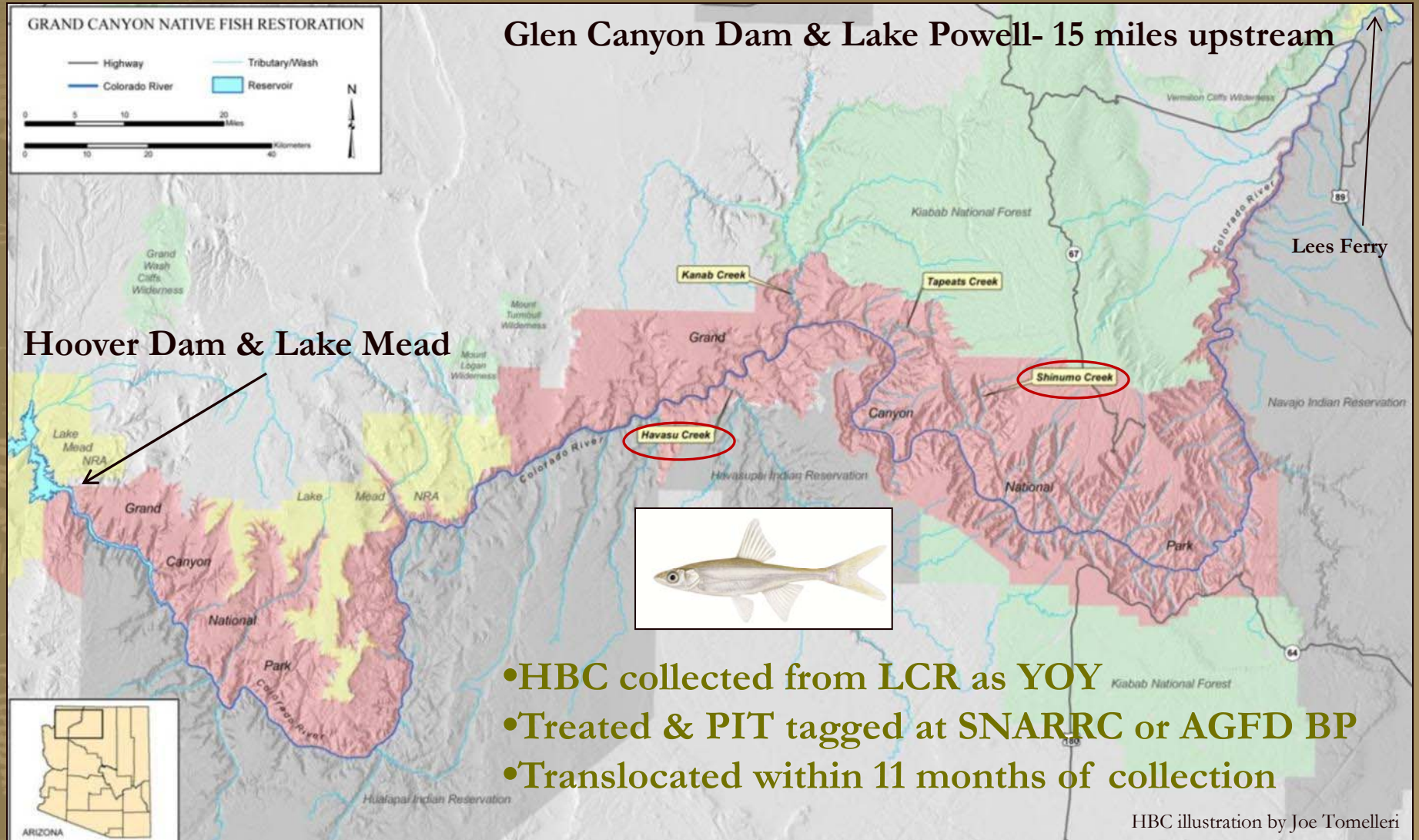


Next....

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



A scenic view of the Grand Canyon with steep red rock walls and a river at the bottom under a blue sky with scattered clouds.

Translocation Goals

- Experimental
 - Establish second spawning population in Grand Canyon
- and/or--
- Provide rearing habitat for juvenile Humpback Chub- Augmentation of Colorado River aggregations

Tributary	Hatchery Tagging Date	Average Length (mm)	Average Weight (g)	Release Date	Number Translocated
Shinumo Creek	May 18, 2009	127.9	18.7	June 15, 2009	302
Shinumo Creek	June 10, 2010	121.1	15.3	June 23, 2010	300
Shinumo Creek	May 5, 2011	88.9	5.4	June 21, 2011	300
Shinumo Creek	June 10, 2013	123.3	14.8	June 15, 2013	200

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

Shinumo Creek
Total= 1102



Tributary	Hatchery Tagging Date	Average Length (mm)	Average Weight (g)	Release Date	Number Translocated
Havasu Creek	May 5, 2011	86.1	4.8	June 28, 2011	243
Havasu Creek	May 10, 2012	124.7	16.7	May 13, 2012	298
Havasu Creek	May 9, 2013	123.1	14.9	May 14, 2013	300
Havasu Creek	May 9, 2014	123	16.4	May 14, 2014	300
Havasu Creek*	May 9, 2014	124	16.4	June 5, 2013	209

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

Havasu Creek
Total= 1350

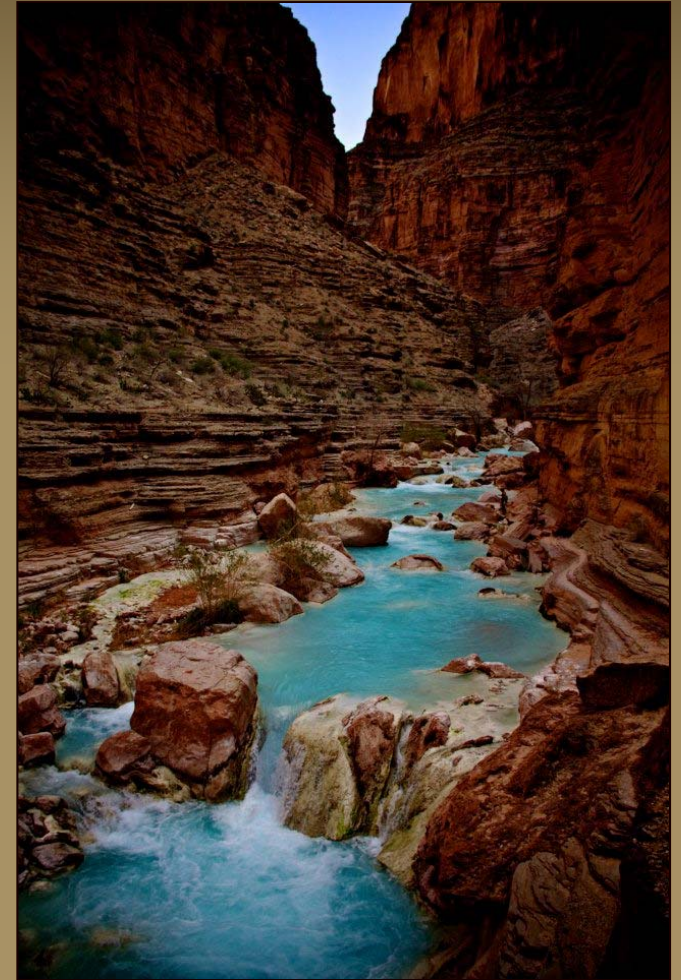


Monitoring Methods



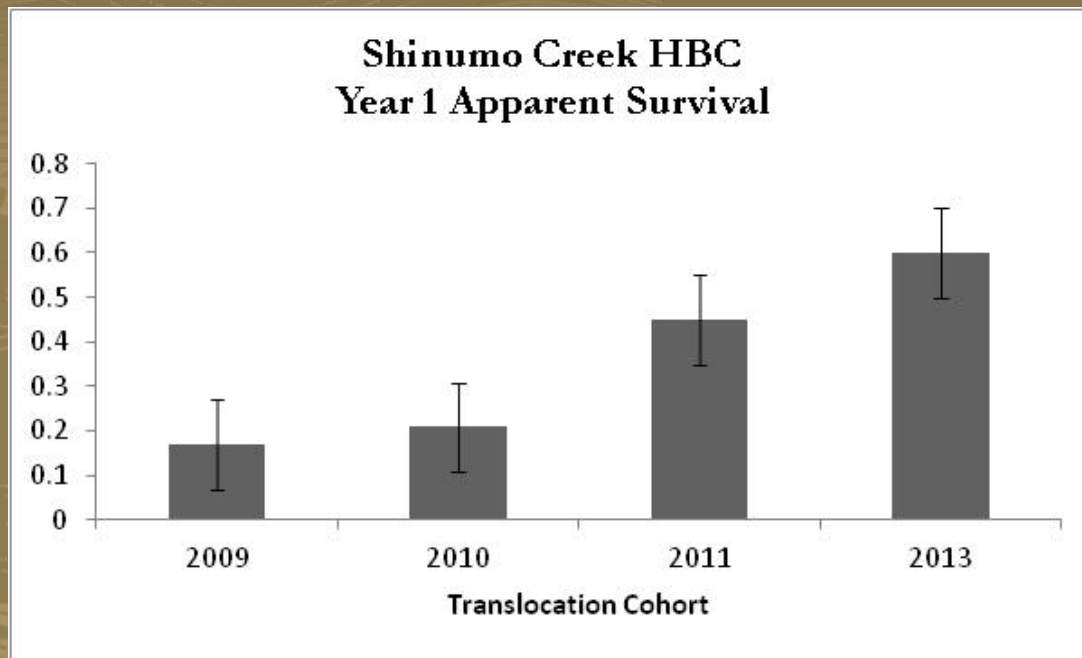
Questions about Translocations

1. Will chub remain & survive ?
2. Will chub augment mainstem?

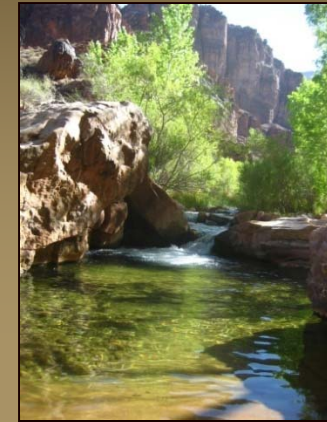


3. How will chub fare in the tributaries?
4. Will chub reproduce?

1. Will chub remain & survive?

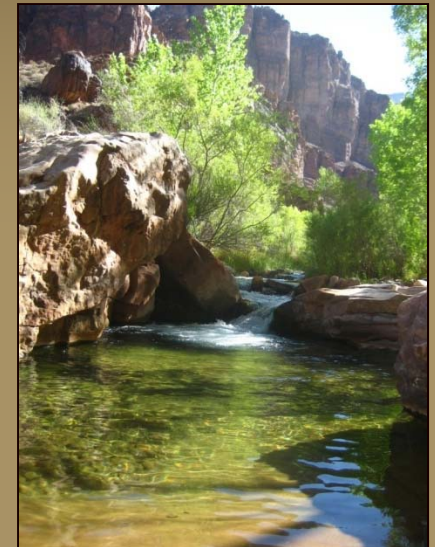
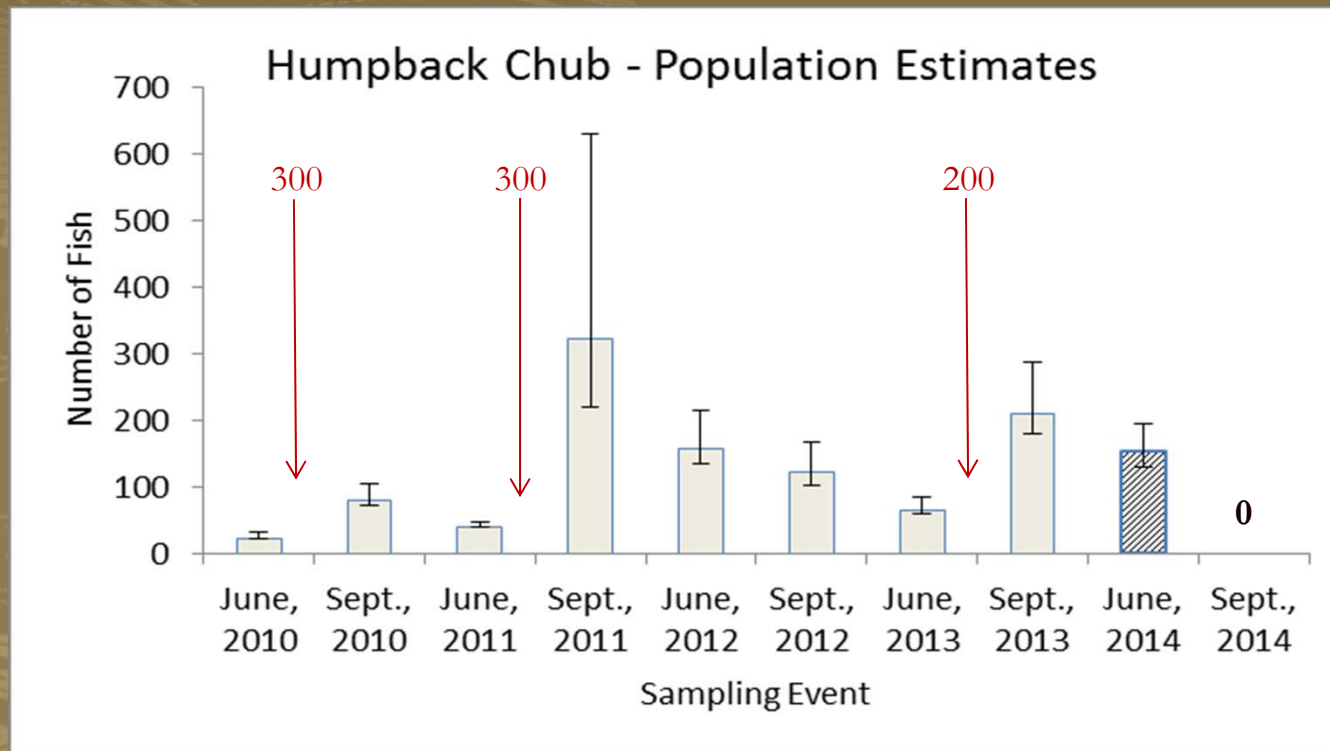


- Apparent survival has varied over time
- 2011- low Rainbow Trout densities
- 2013- soft release into new areas



- 50.4% as of January 2013
- Antenna efficiency: ??

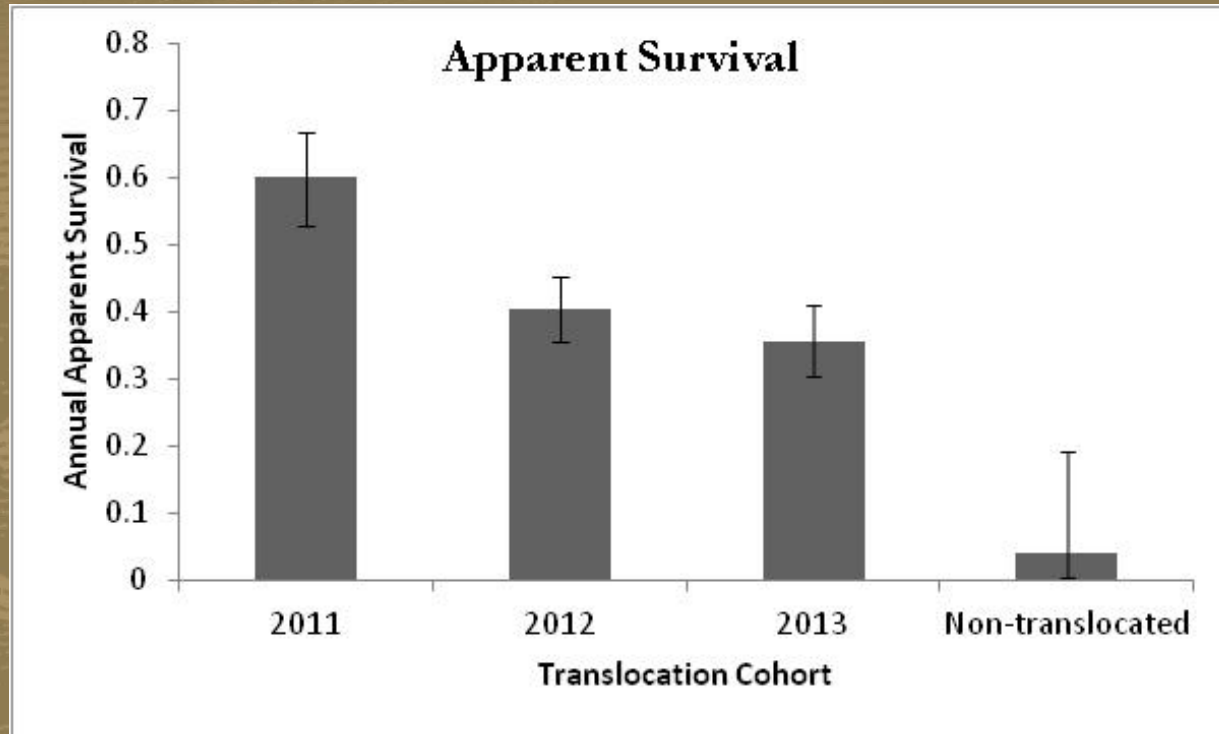
1. Will chub remain & survive?



**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)

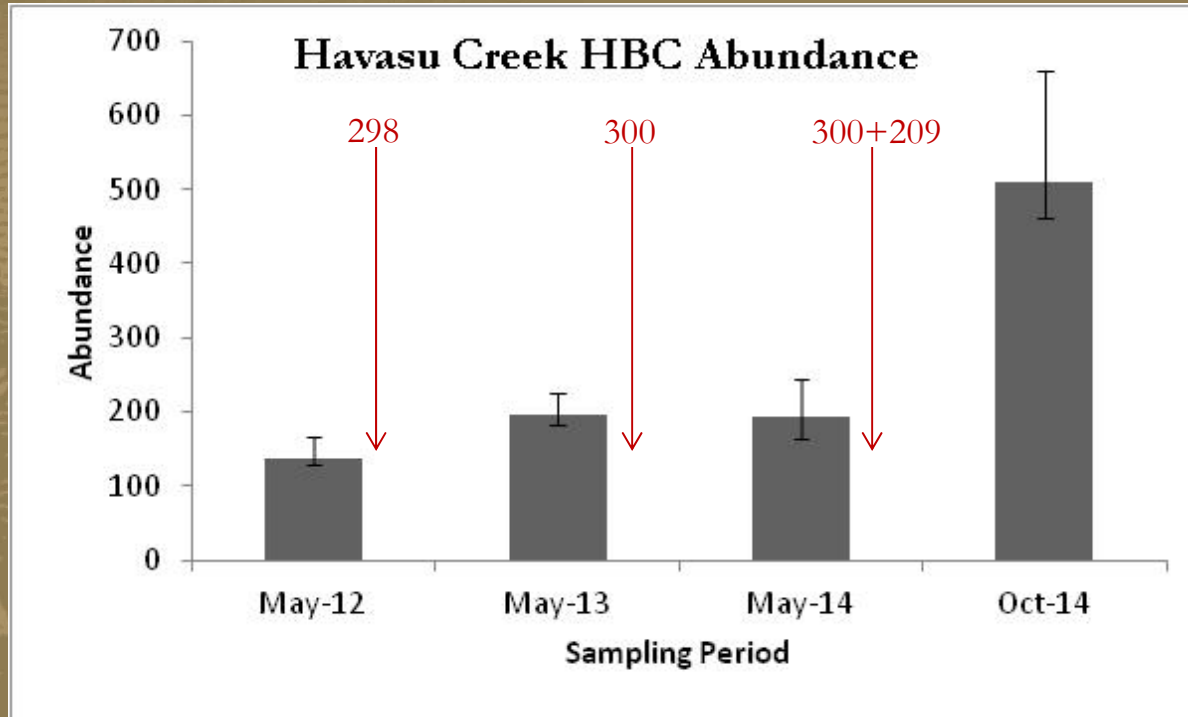
1. Will chub remain & survive?



- 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?



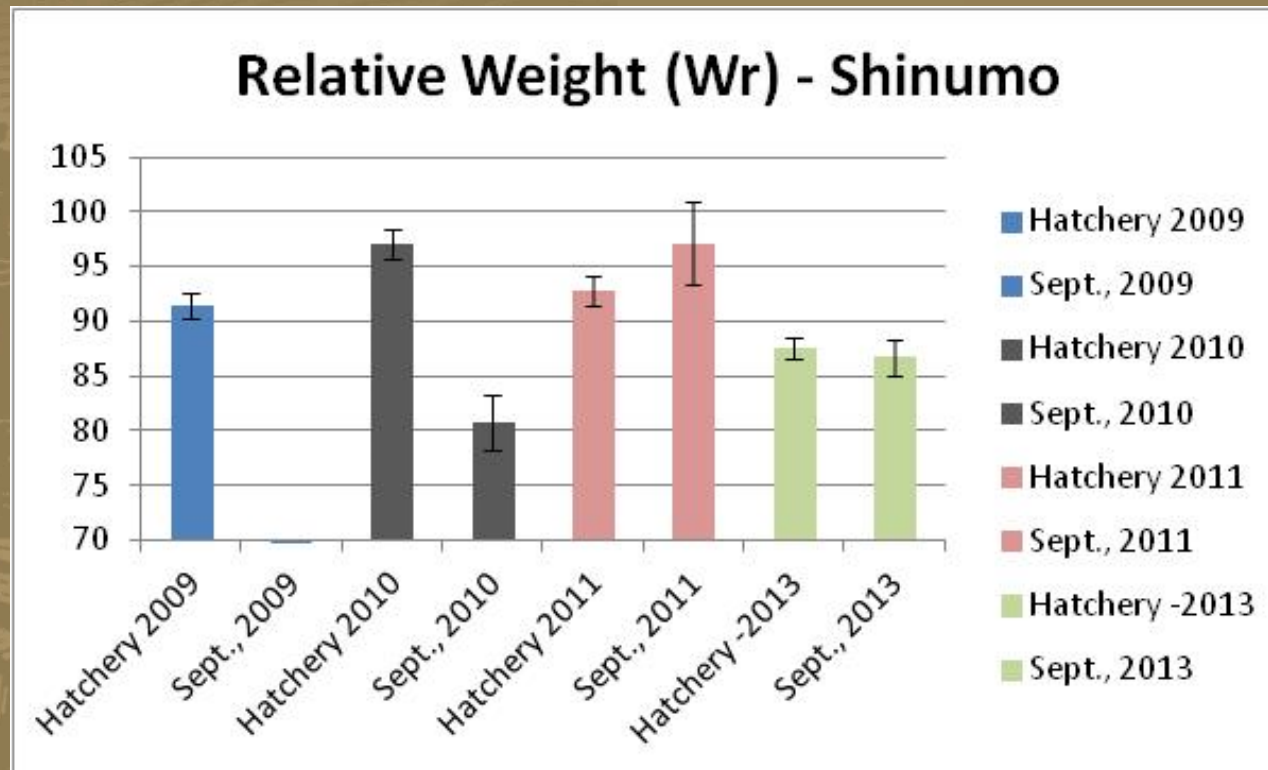
- These abundance estimates include both translocated and non-translocated Humpback Chub.
- Minimum of 200 HBC to be maintained in Havasu Creek if reproduction occurs (USFWS 2010, NPS CFMP 2013)

2. Will Translocations Augment Colorado River Humpback Chub Aggregations?

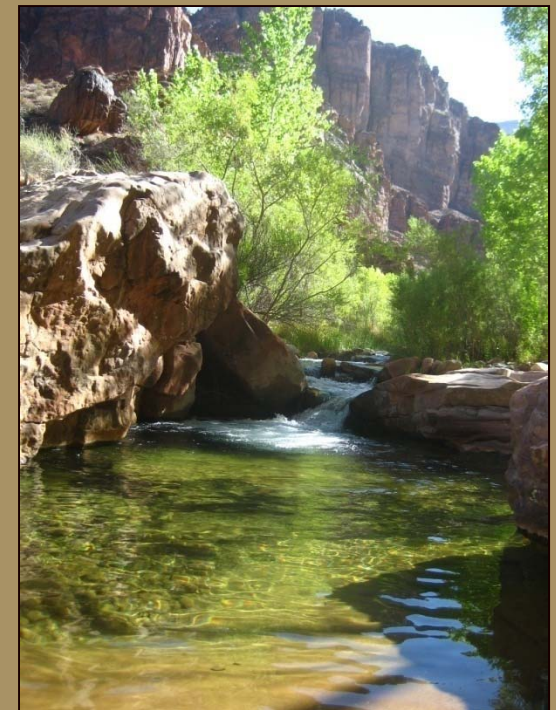


- NPS 2010-2014: 149 unique translocated chub caught in the mainstem Colorado River, many in multiple years (214 total captures)
- 3 HBC translocated to Shinumo Creek have been detected in antenna array in the Little Colorado River
- GCMRC/FWS presenting much more later today!

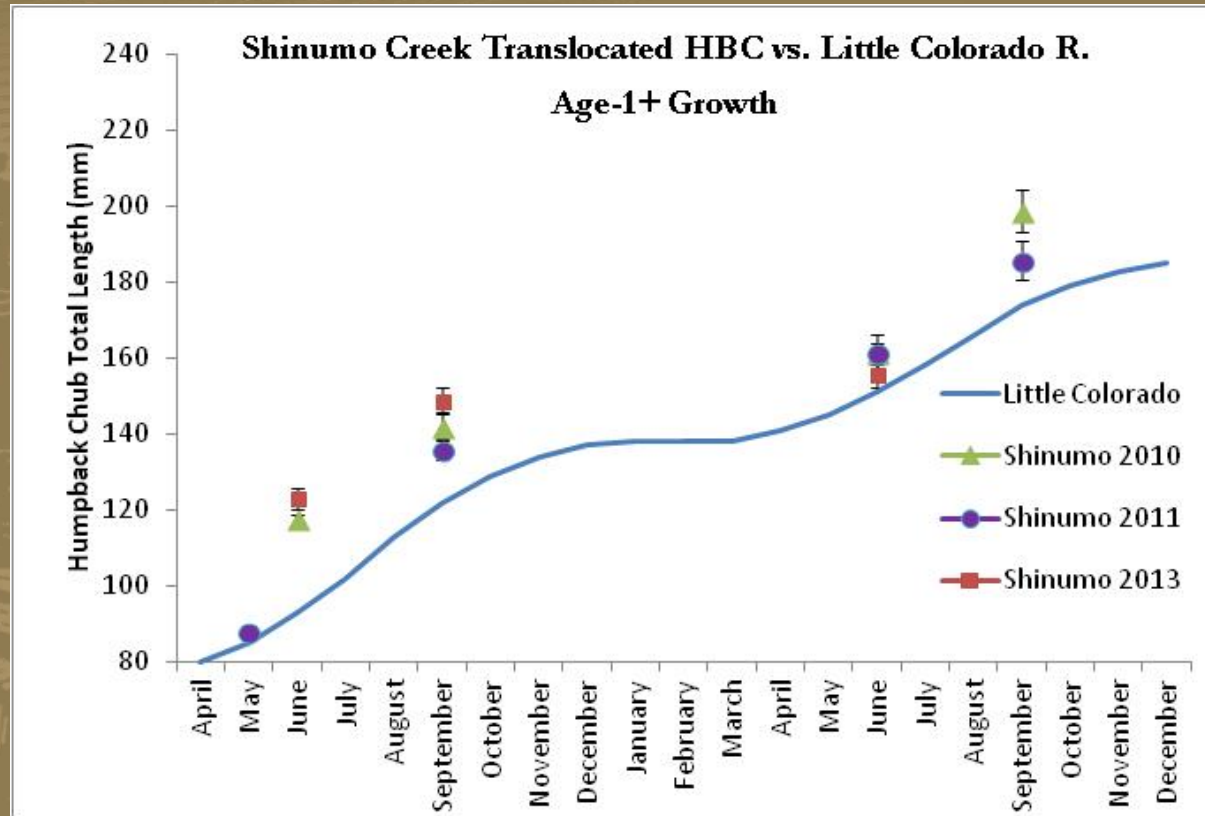
3. How will chub fare in the tributaries?



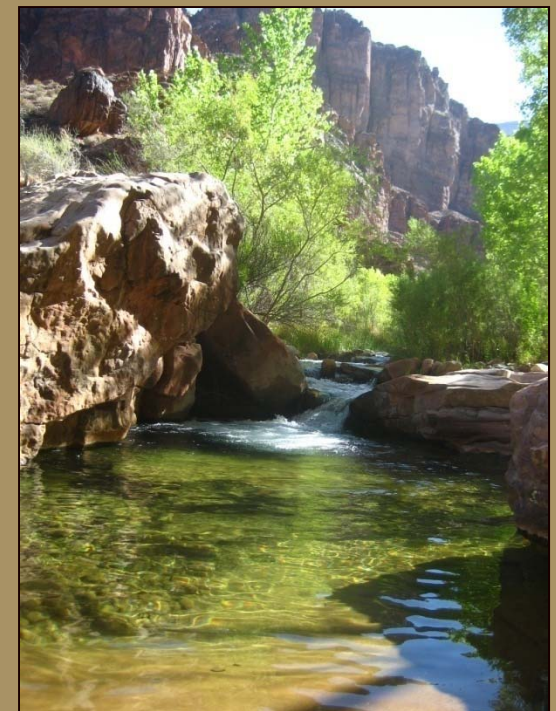
Hatchery relative weight vs. one summer in Shinumo Creek



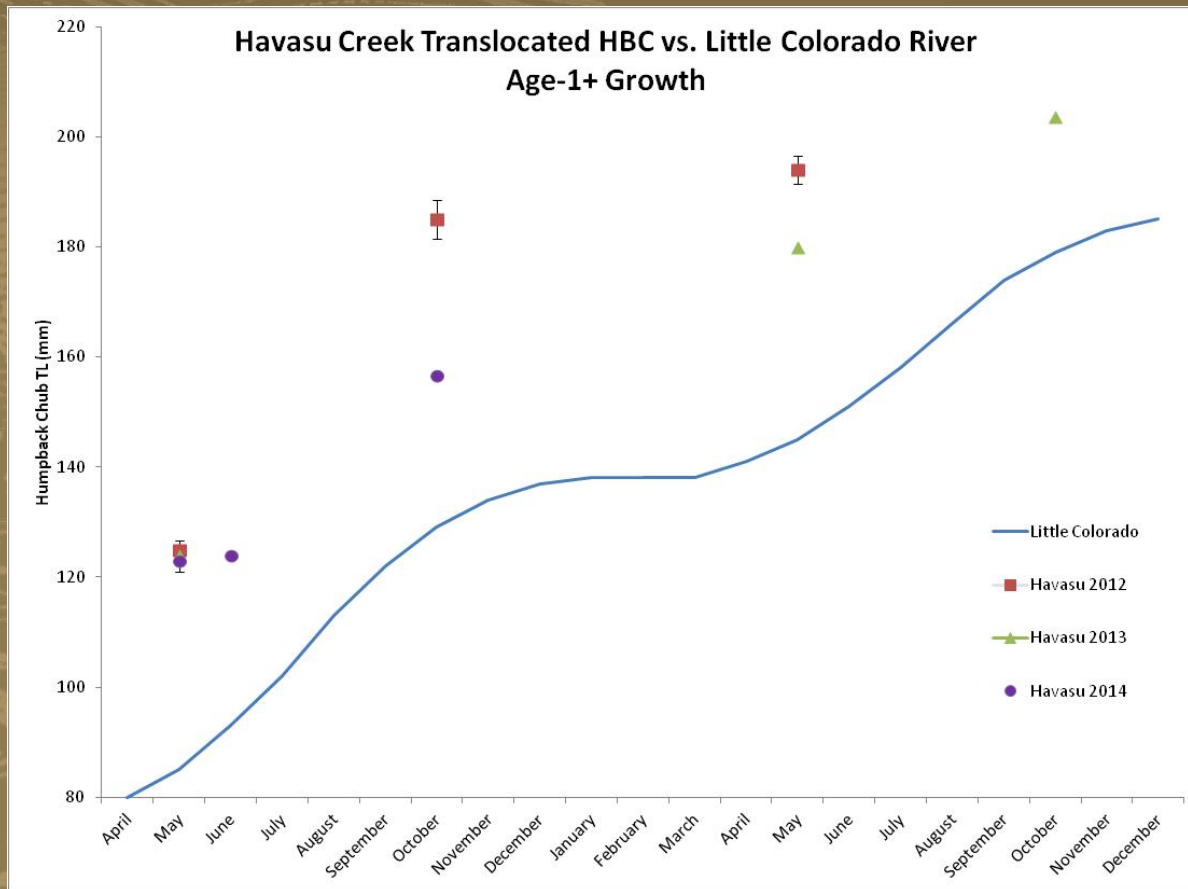
3. How will chub fare in the tributaries?



Theoretical LCR juvenile growth curve: Robinson & Childs 2001



3. How will chub fare in the tributaries?



Theoretical LCR juvenile growth curve: Robinson & Childs 2001



4. Will chub reproduce in tributaries?



Shinumo Creek

- No ripe fish
- Worn fins and spawning coloration detected

Havasu Creek

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



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

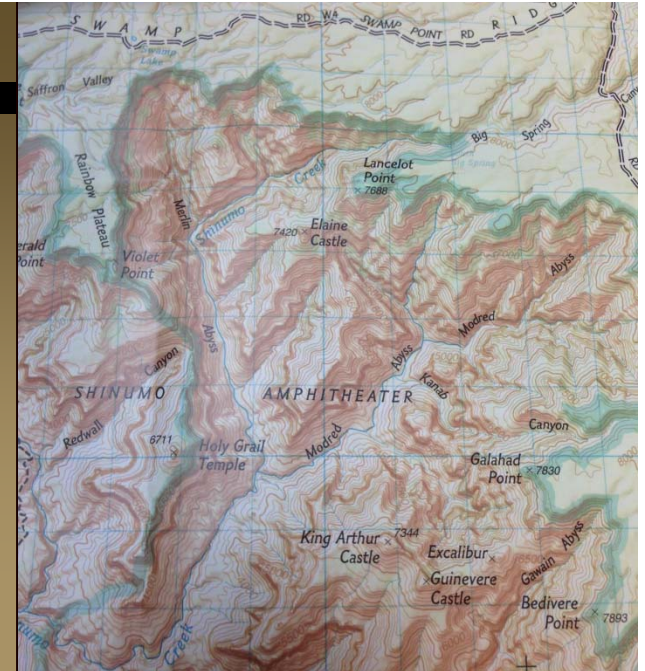
➤ September – NPS monitoring revealed severe flood disturbance & widespread deposition of charred wood

- 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



Brian Healy/NPS Photo



Jeff Sorensen/AGFD Photo



Pre- and Post- Flood/Galahad Fire photo-matching



Galahad Fire





Sept 2009 and Sept 2014 reach 1



Sept 2009 and Sept 2014

Low Trail first stream crossing: Reach 1/2



EXPERIENCE YOUR AMERICA

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



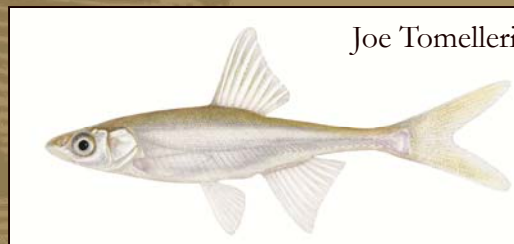
June 2011 and Sept 2014

“The Chub Pool” ; reach 4



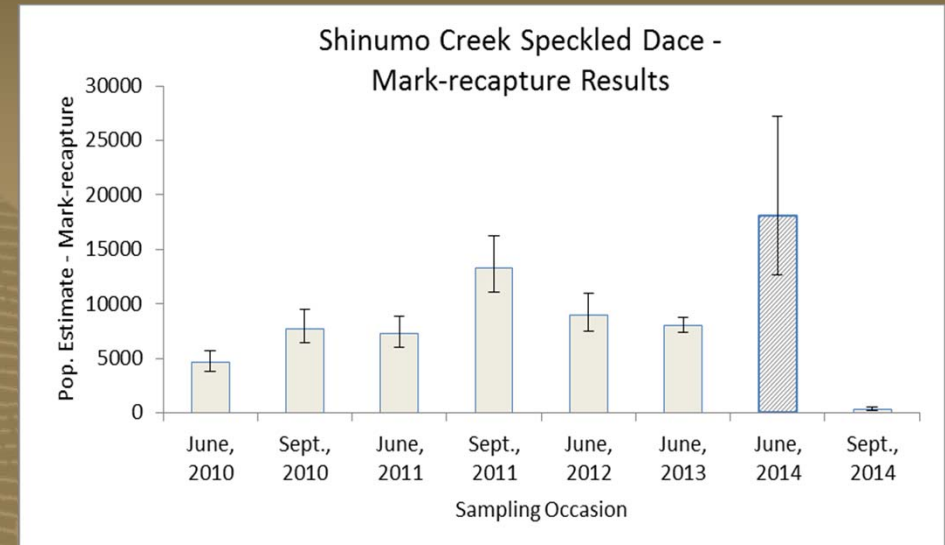
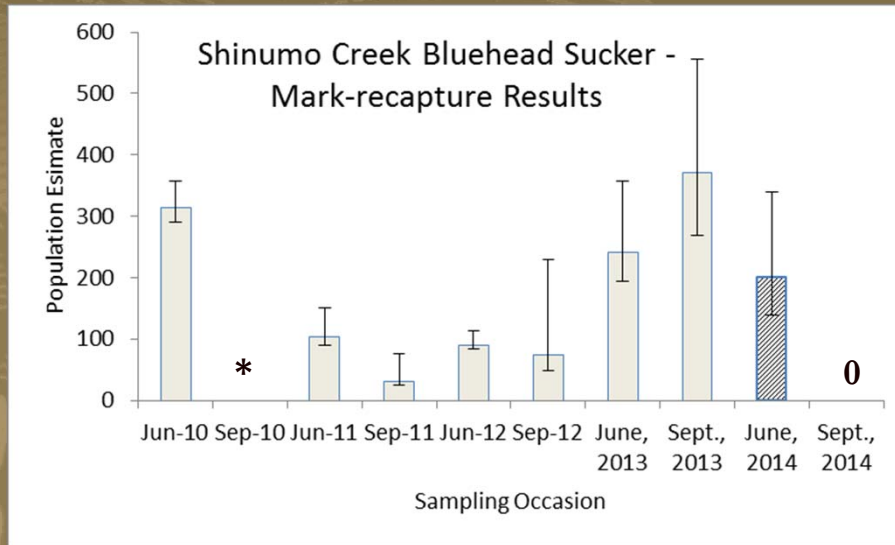
Translocation Publications

- Spurgeon, J., C. Paukert, B. Healy, M. Trammell, D. Speas, E. Omana Smith. 2014. Can translocated native fish retain their trophic niche when confronted with a resident invasive? Ecology of Freshwater Fish, pp 1-11. In Press. Translocations of Humpback Chub into tributary streams of the Colorado River: implications for conservation of large-river fishes. Transactions of the American Fisheries Society.
- Trammell, M., B. Healy, E. Omana Smith, and P. Sponholtz. 2012. Humpback chub translocation to Havasu Creek, Grand Canyon National Park: implementation and monitoring plan. NPS Natural Resource Report Series.
- Spurgeon, J. C. Paukert, B. Healy, C. Kelley, D. Whiting. 2014. Can translocated native fish retain their trophic niche when confronted with a resident invasive? Ecology of Freshwater Fish, pp 1-11. Doi: 10.1111/eff.12160



Joe Tomelleri

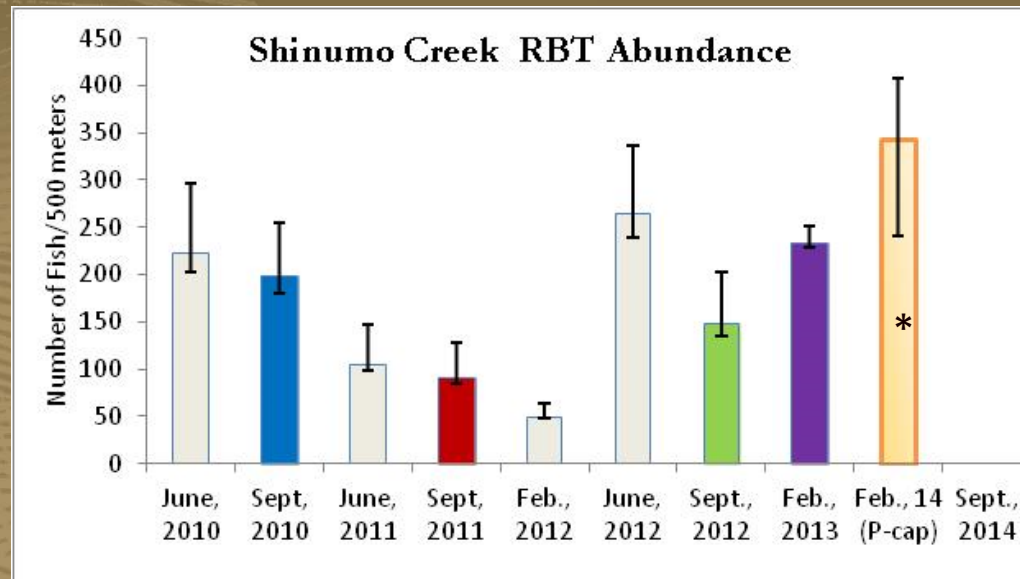
Shinumo Creek Bluehead Sucker & Speckled Dace



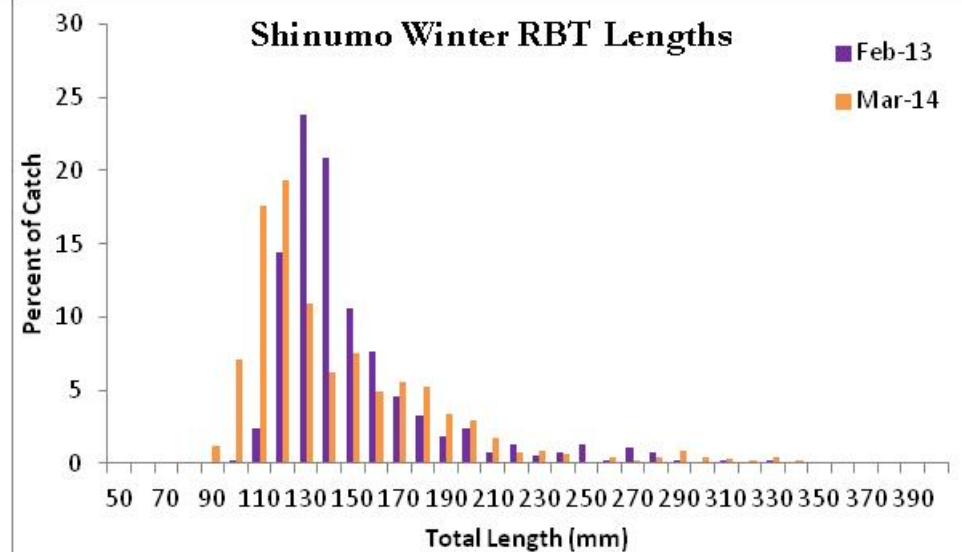
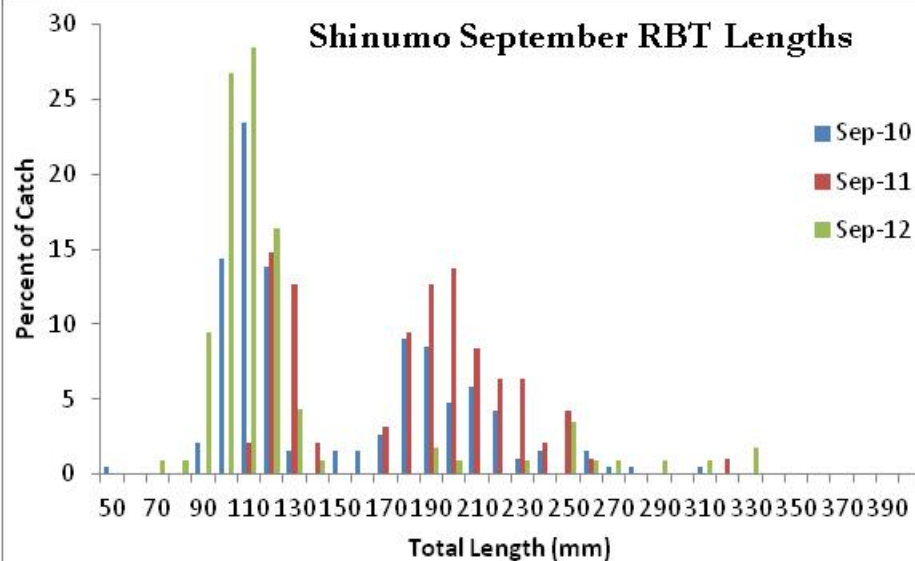
- *Cross-hatched population estimates based on preliminary modeled capture probability data derived from previous sampling events. The asterisk(*) indicates a sampling period for which no population estimate could be derived due to low capture probability.*
- Zero BHS captured in September 2014 following monsoon flooding and ash flows from the 2014 Galahad Point fire; 74 SPD caught



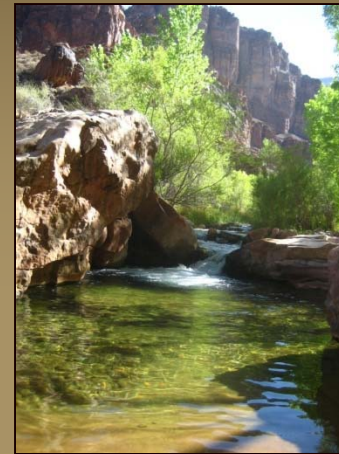
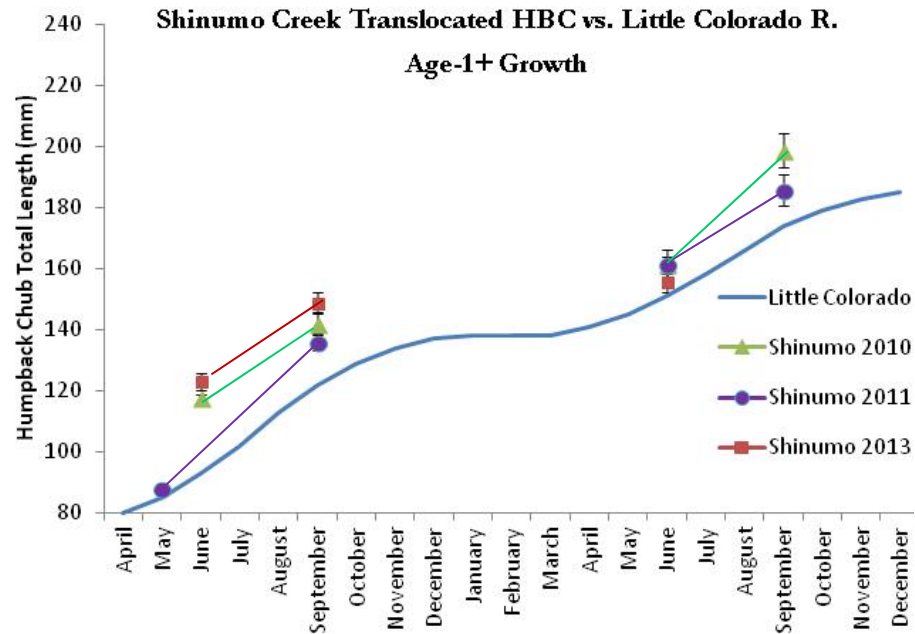
Shinumo Creek Rainbow Trout



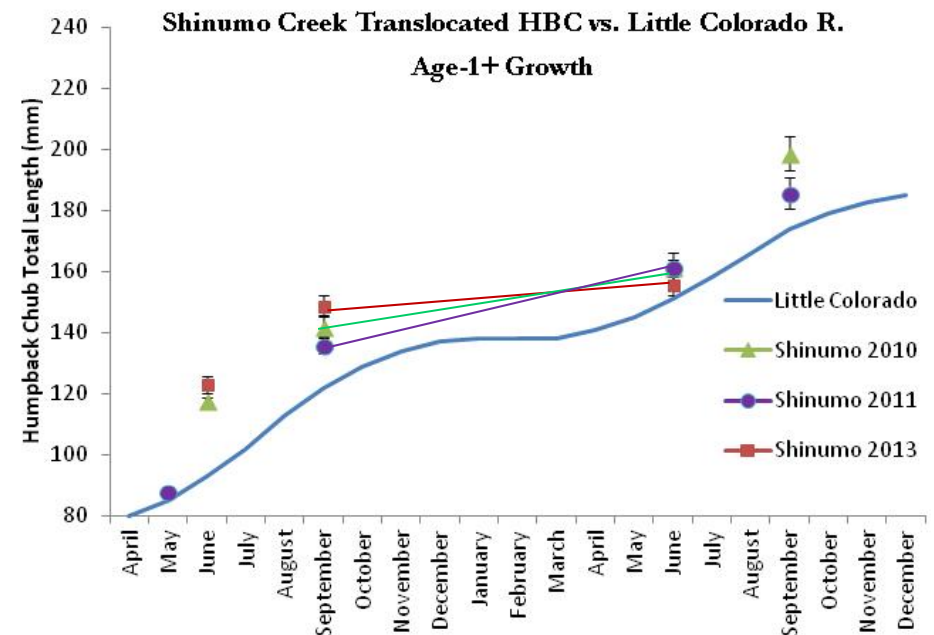
** population estimate based on preliminary modeled capture probability data derived from previous sampling events.*



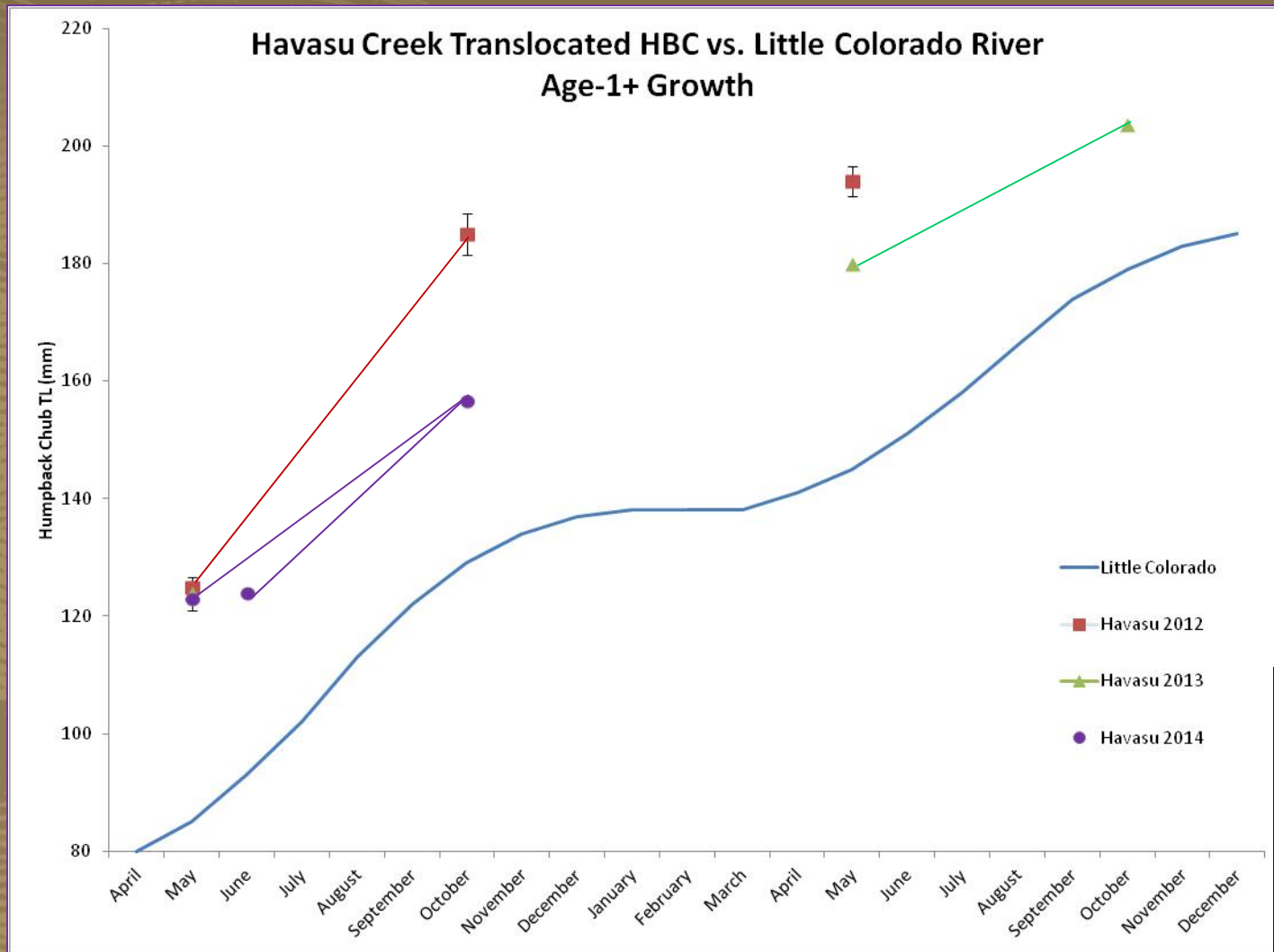
3. How will chub fare in the tributaries?



*Theoretical LCR juvenile growth curve:
Robinson & Childs 2001*



3. How will chub fare in the tributaries?



Theoretical LCR juvenile growth curve: Robinson & Childs 2001

