Updates from the GCDAMP Technical Work Group Annual Reporting Meeting: January 2015

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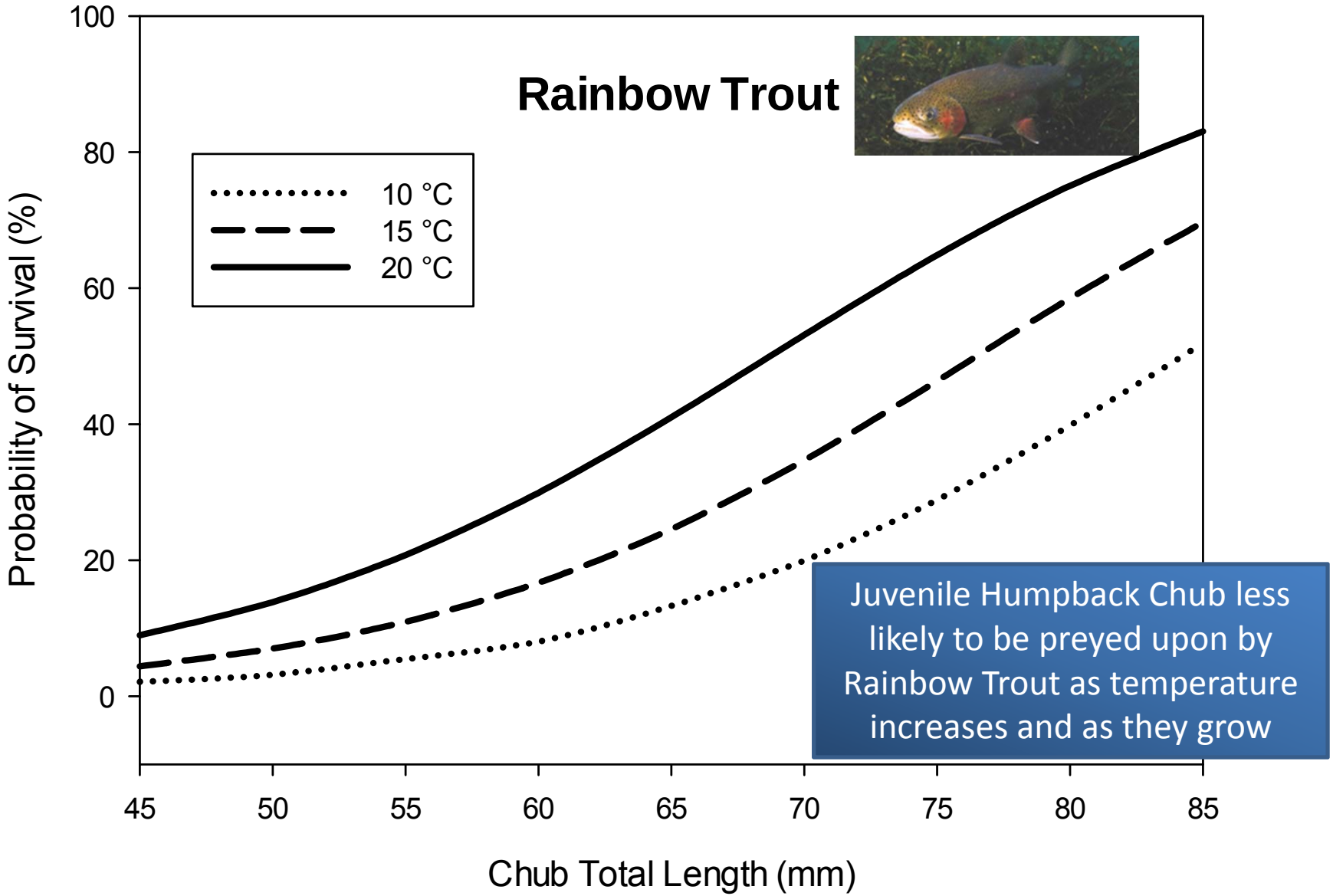
U.S. Geological Survey

Native-nonnative Interactions; Factors Influencing Predation and Competition
USGS



Percent (%) probability that a juvenile chub will survive predation by a 285 mm rainbow trout as chub size increases from 45-85 mm TL at 10, 15 and 20 °C, with trout size held constant at 285 mm TL.

(Preliminary data from Ward et al. 2014. Do Not Cite.)

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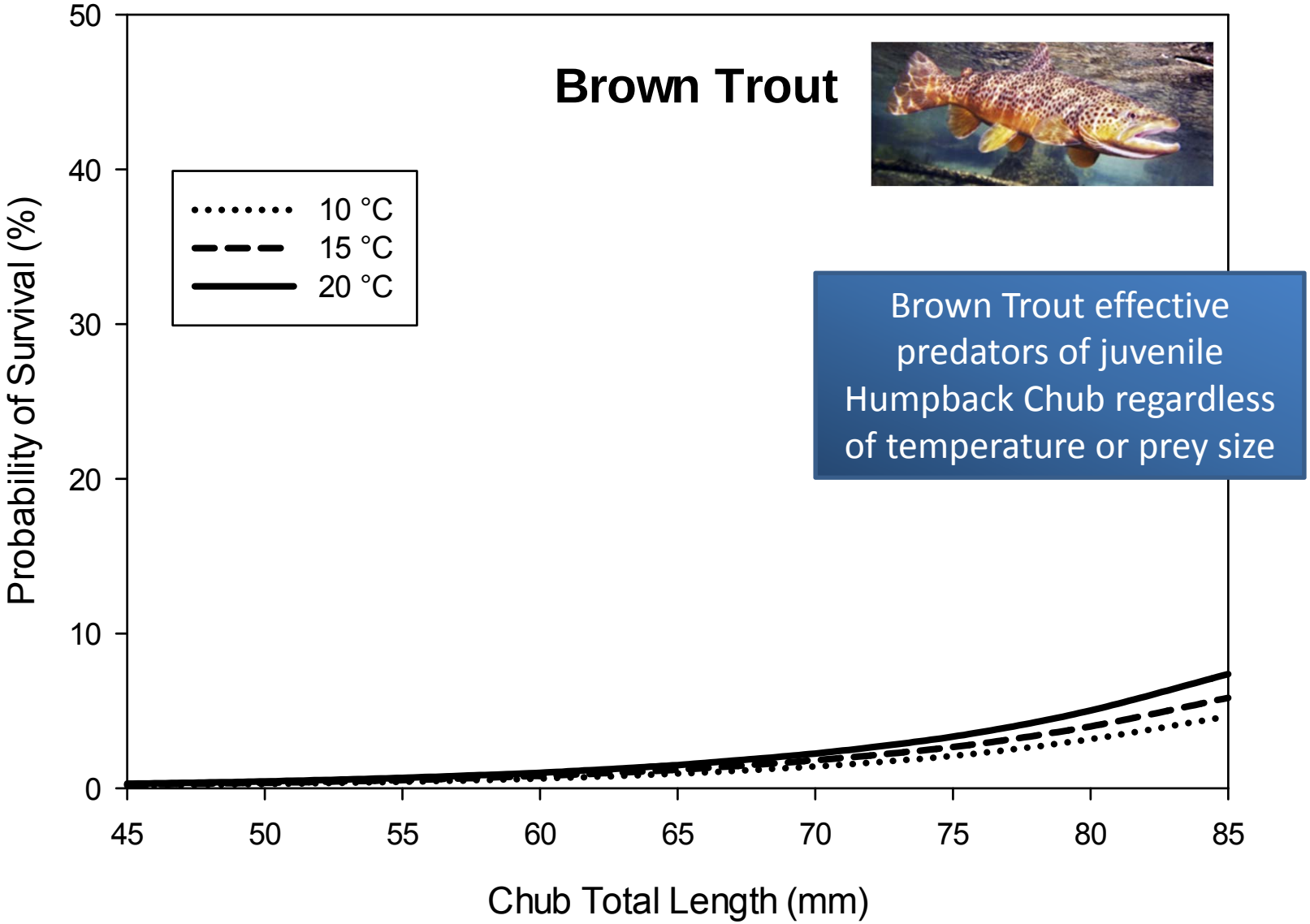

Percent (%) probability that a juvenile chub will survive predation by a 285 mm brown trout as chub size increases from 45-85 mm TL at 10, 15 and 20 °C, with trout size held constant at 285 mm TL. Note that the y-axis on the brown trout is reduced by half.

(Preliminary data from Ward et al. 2014. Do Not Cite.)

Rainbow Trout Predation Summary

Juvenile Humpback Chub less likely to be preyed upon by Rainbow Trout as turbidity increases.

Clear trials: 0 % survival

(Preliminary data from Ward et al. 2014. Do Not Cite.)

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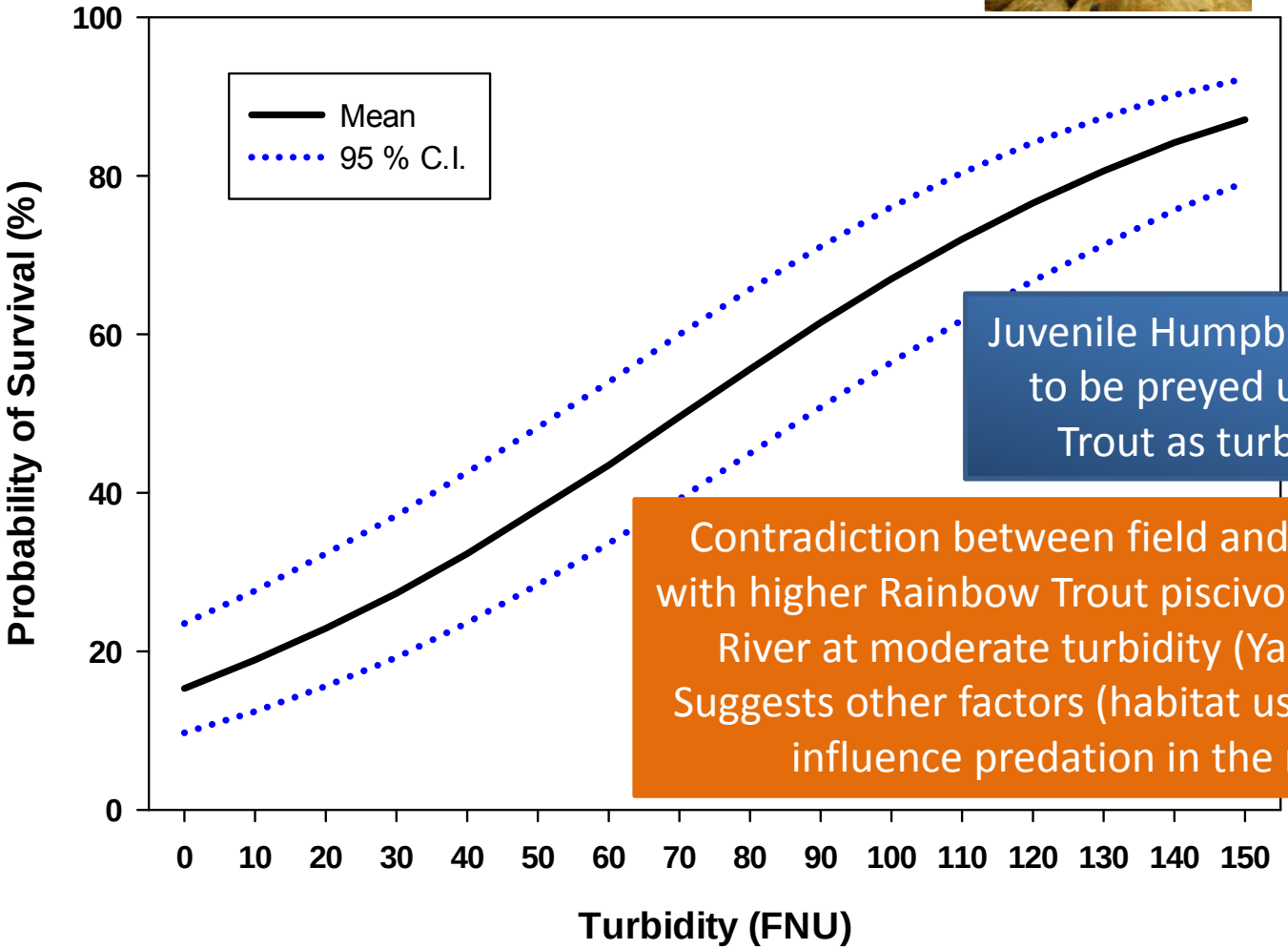
Rainbow trout



Juvenile Humpback Chub less likely to be preyed upon by Rainbow Trout as turbidity increases.

Contradiction between field and laboratory data with higher Rainbow Trout piscivory in the Colorado River at moderate turbidity (Yard et al. 2011). Suggests other factors (habitat use, behavior, etc.) influence predation in the real world.

Percent probability of survival for juvenile humpback chub (60 mm TL) exposed to predation by rainbow trout (285 mm TL) as turbidity increases from 0 – 150 FNU at 15° C.

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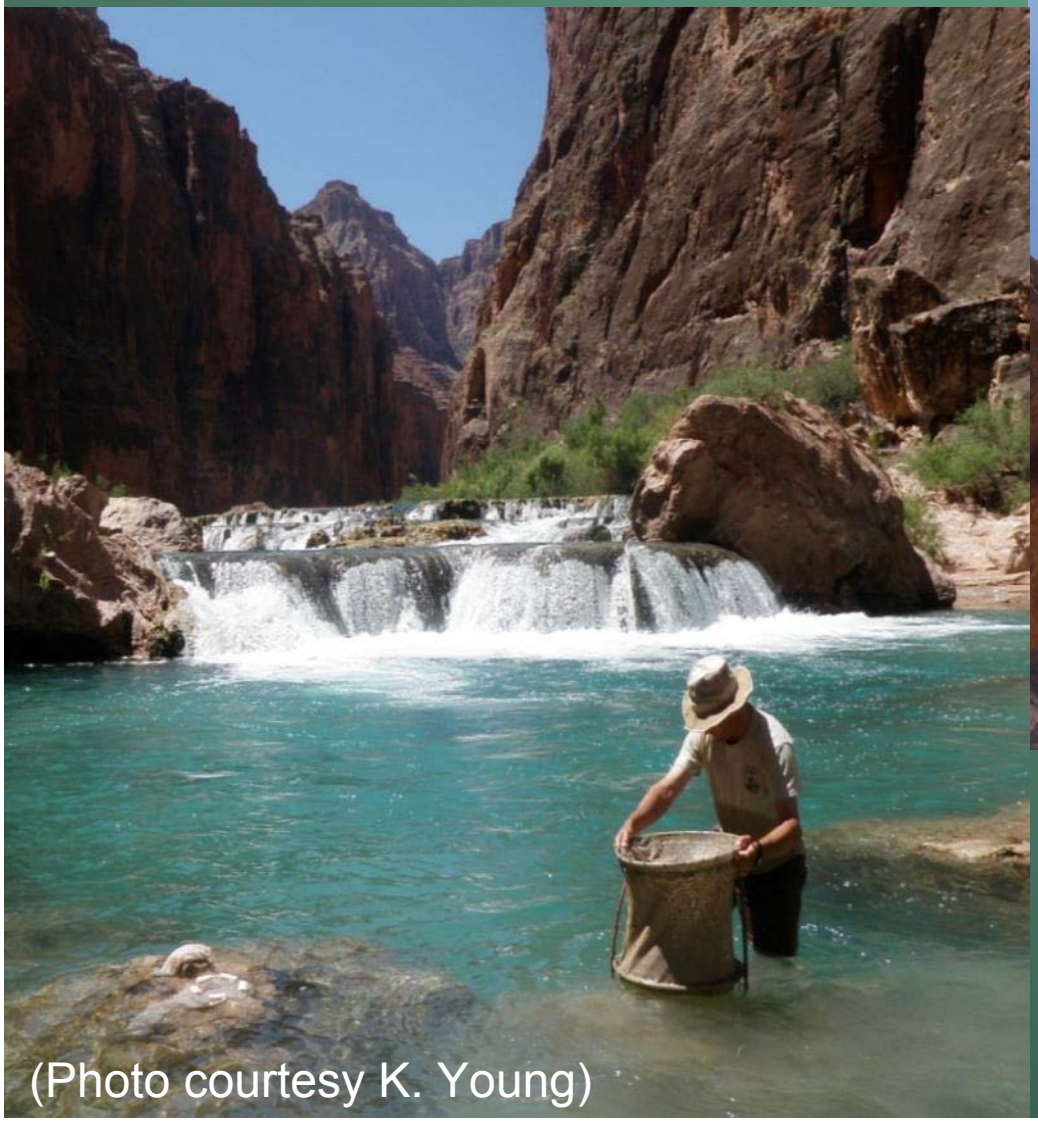
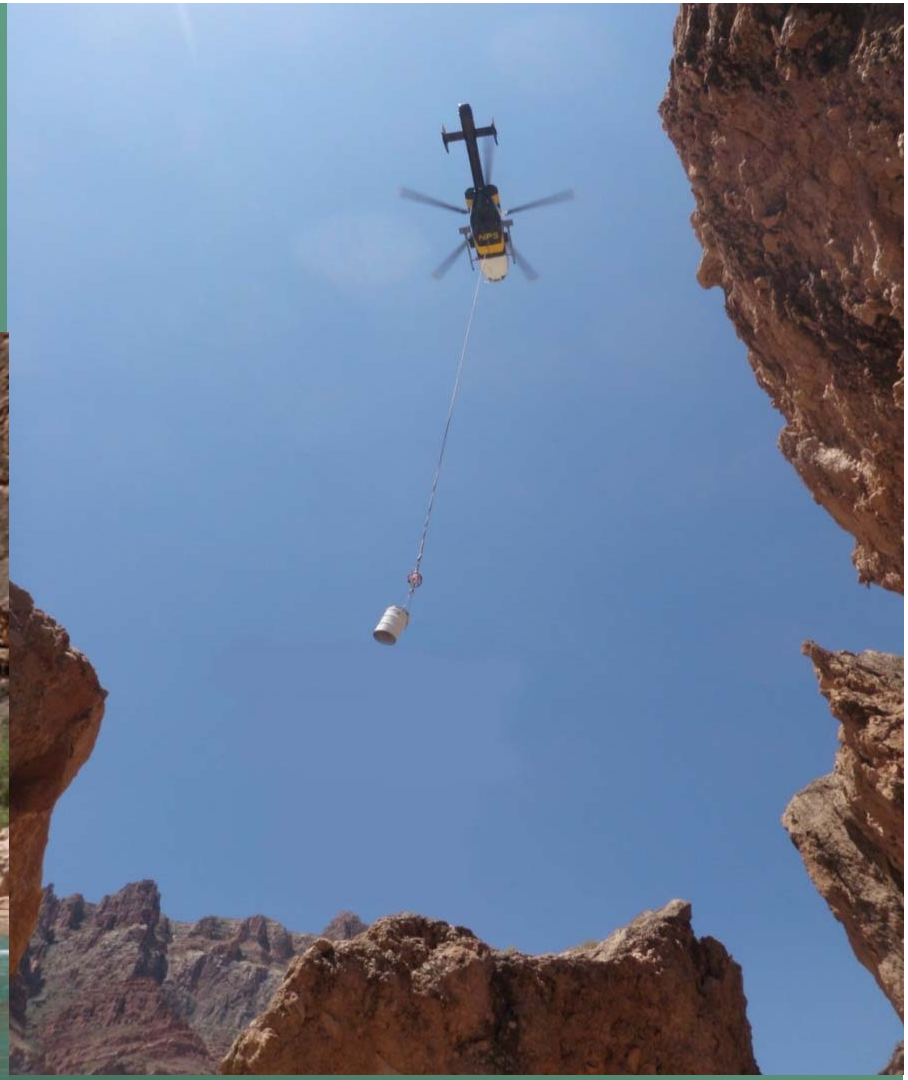
(Preliminary data from Ward et al. 2014. Do Not Cite.)

Humpback Chub Translocations

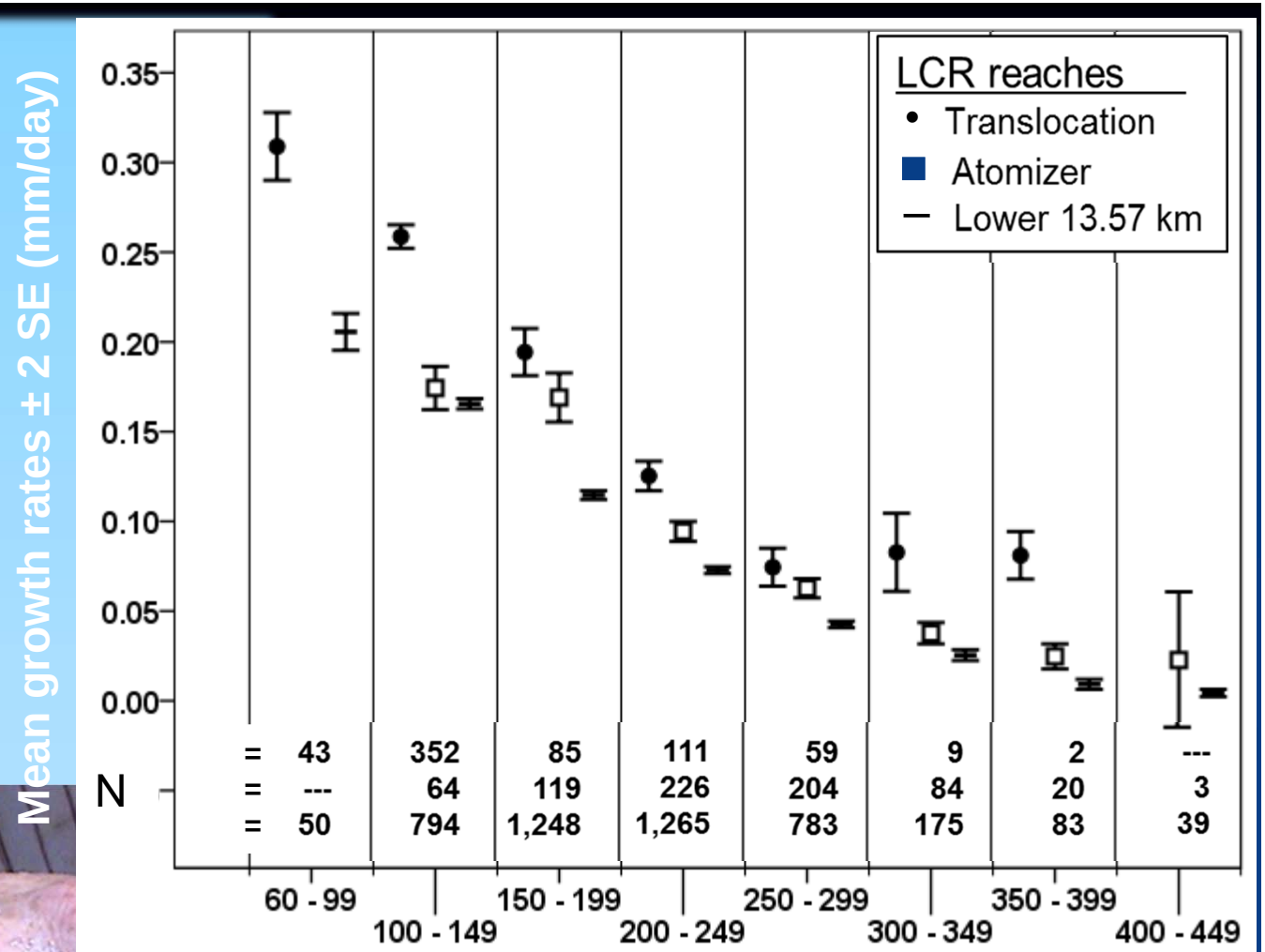


(Photo courtesy K. Young)



Chute Falls Translocations

Growth in translocated Humpback Chub generally high in the Little Colorado River. Also holds for larger size classes. Suggests favorable rearing conditions in translocation reaches.



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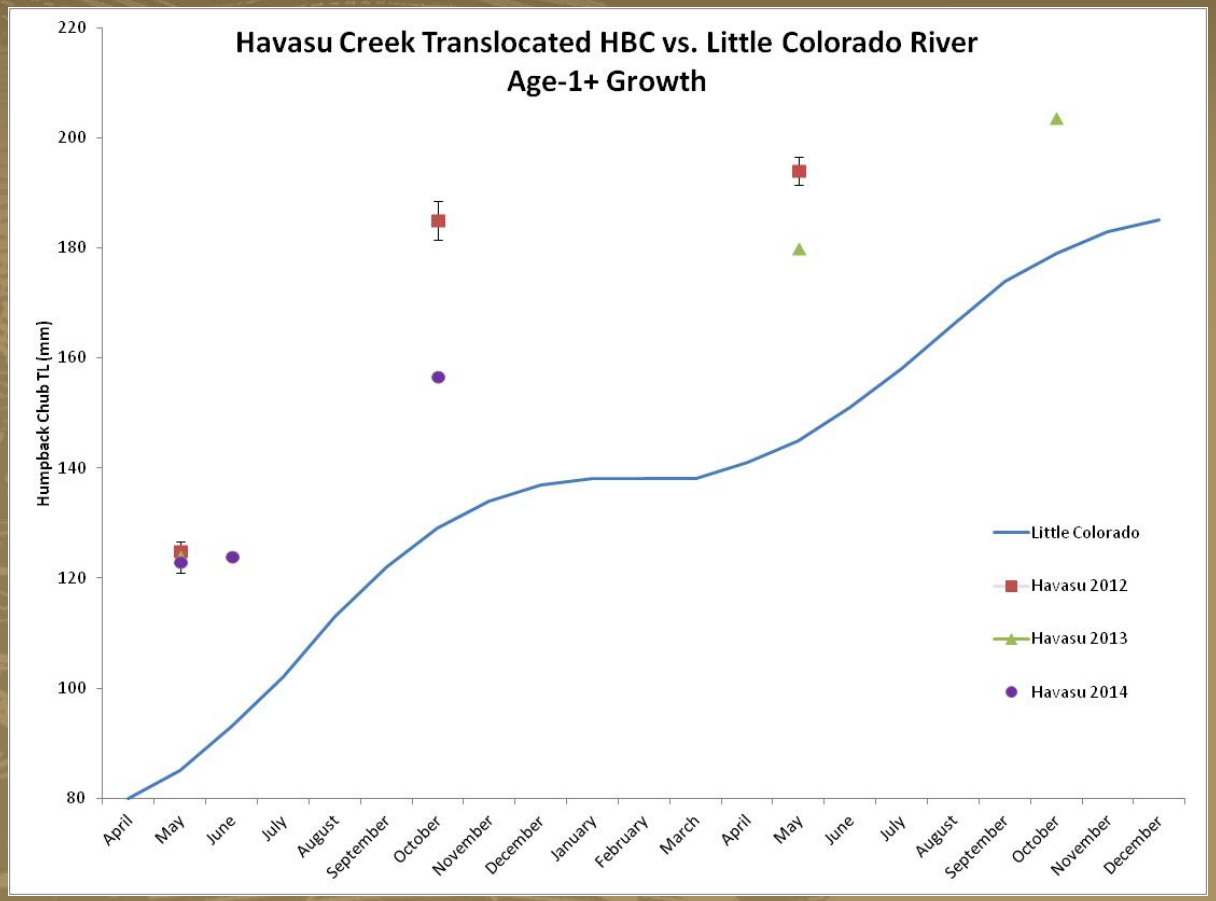
(Preliminary Data from Young et al. USFWS. 2014. Do Not Cite.)

3. How will chub fare in the tributaries?



Theoretical LCR juvenile growth curve: Robinson & Childs 2001

Growth in translocated Humpback Chub high in other tributaries too, suggesting favorable conditions for rearing.

(Preliminary Data from Omana-Smith et al. NPS. 2014. Do Not Cite.)

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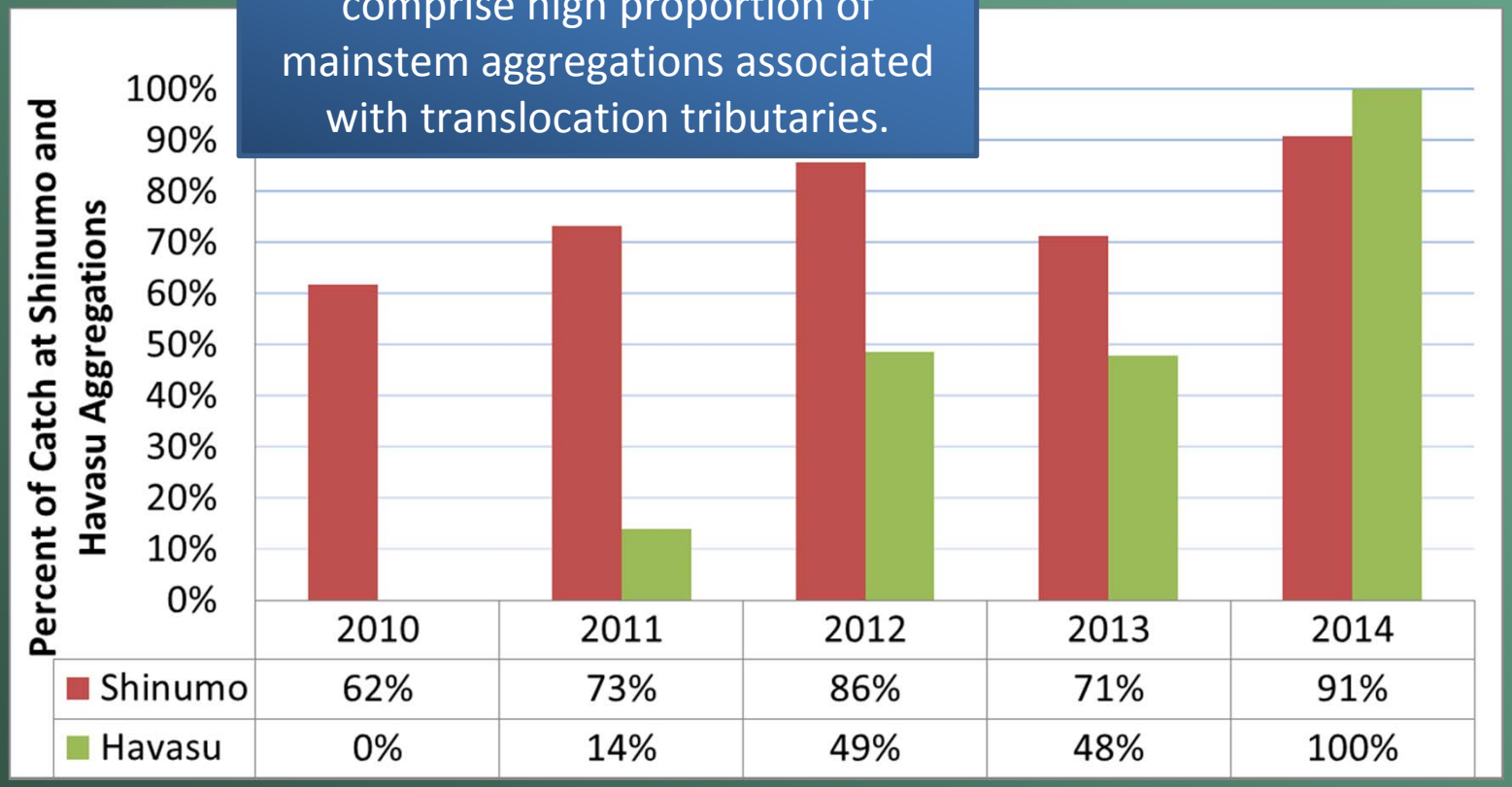
Humpback Chub Translocations and Mainstem Aggregations

Translocated Humpback Chub comprise high proportion of mainstem aggregations associated with translocation tributaries.



	2010	2011	2012	2013	2014
Shinumo	62%	73%	86%	71%	91%
Havasu	0%	14%	49%	48%	100%

Cumulative number of fish translocated

Shinumo	599	899	899	1099	1099
Havasu	0	243	541	841	1350

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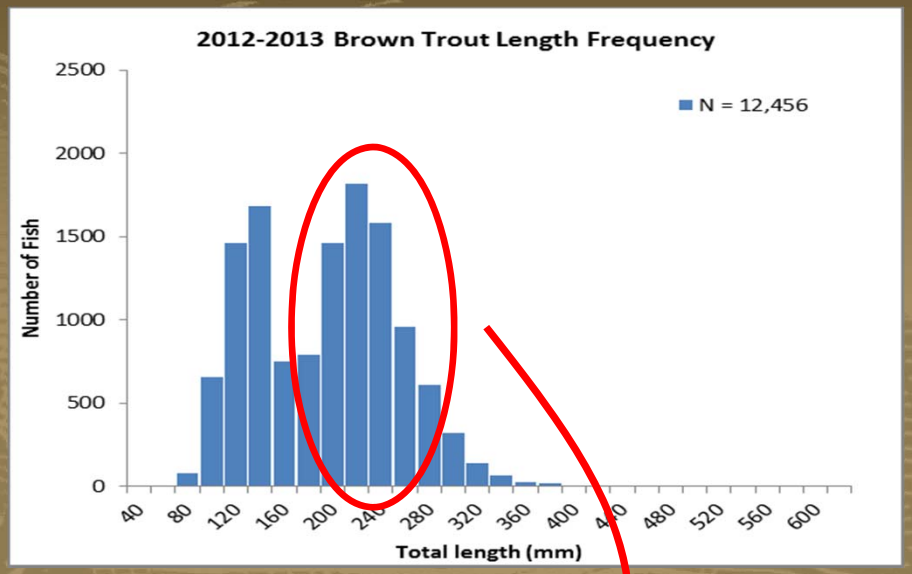
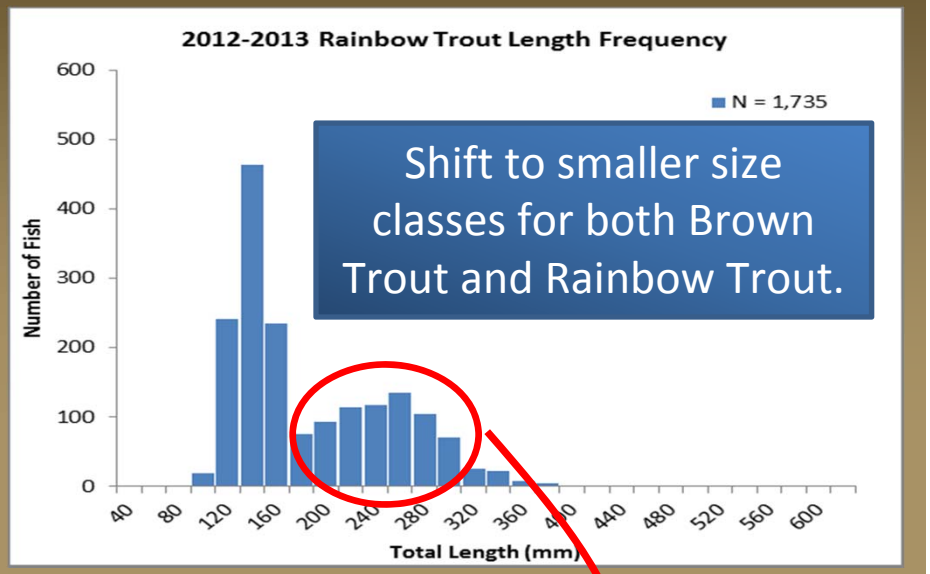
(Preliminary Data from Persons and VanHaverbeke. 2014. Do Not Cite)

Trout Removal in and near Bright Angel Creek

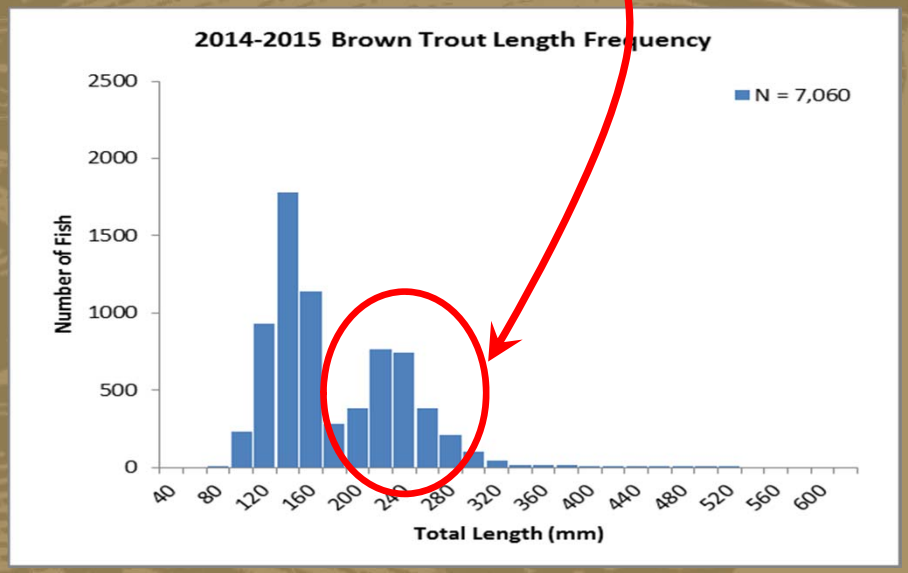
(Slide courtesy C. Nelson, NPS)

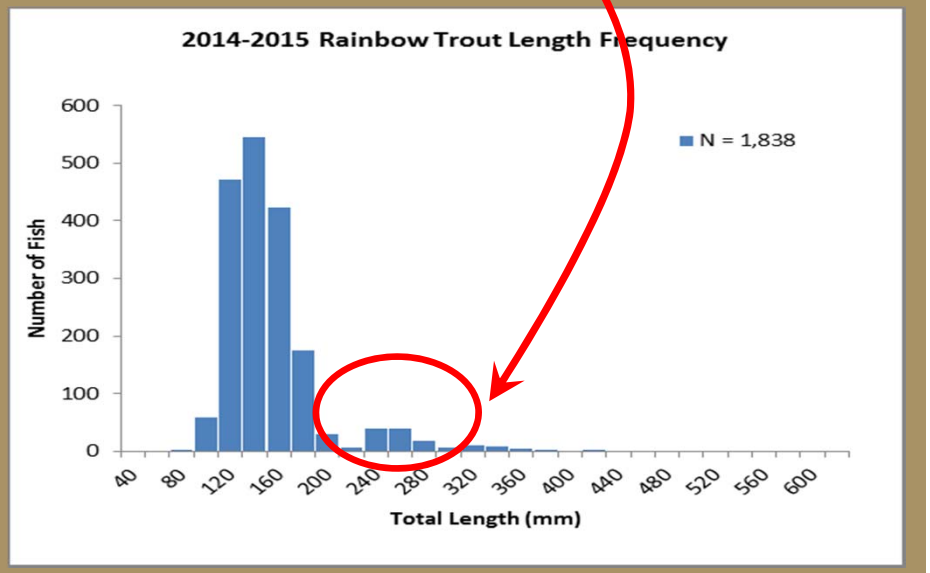
Trout Size Structure





Shift to smaller size classes for both Brown Trout and Rainbow Trout.





* Incomplete data for 2014-2015-in progress

(Preliminary Data from Nelson et al. NPS. 2014. Do Not Cite.)

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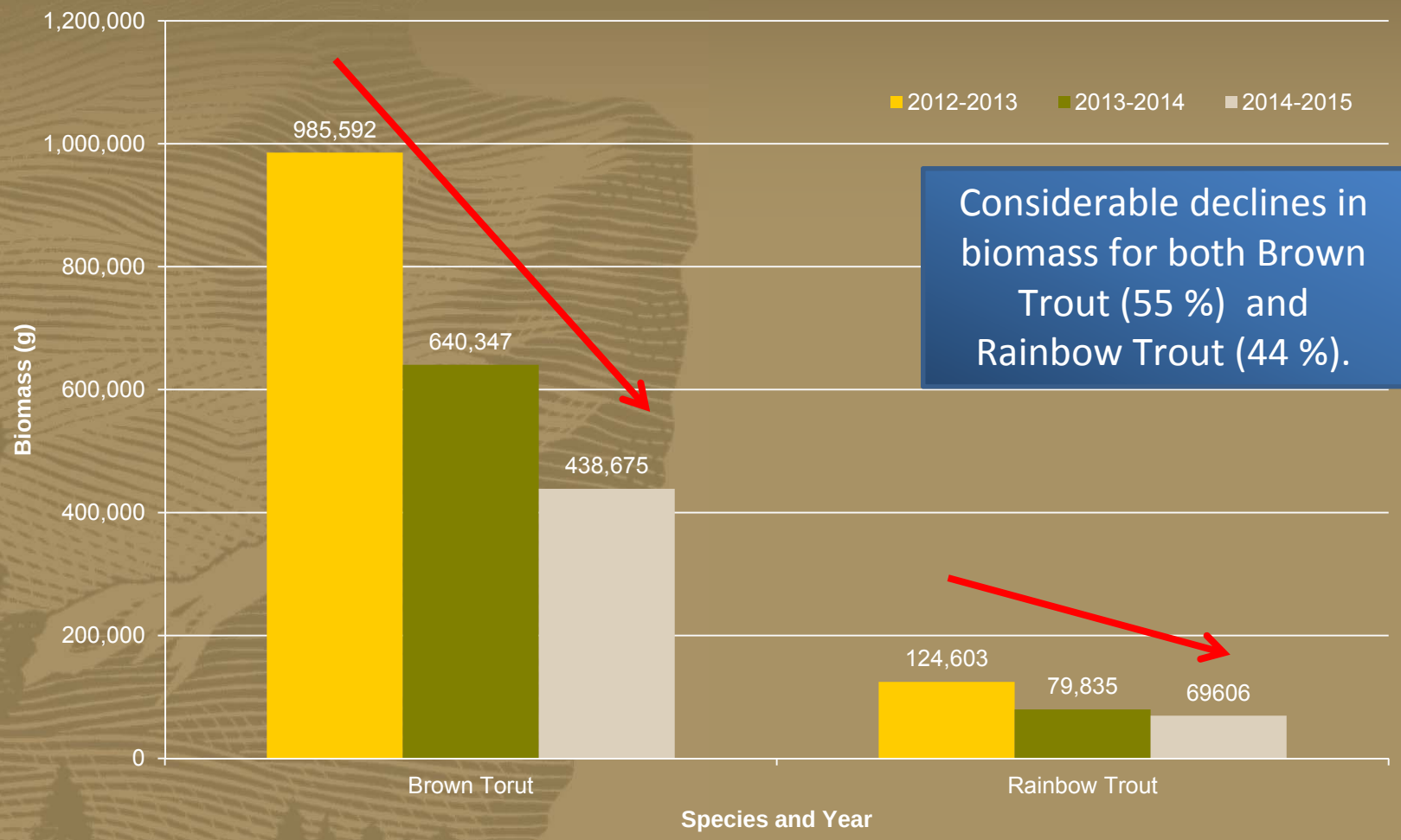
Biomass of Trout Removed



Considerable declines in biomass for both Brown Trout (55 %) and Rainbow Trout (44 %).

* Incomplete data for 2014-2015-in progress

(Preliminary Data from Nelson et al. NPS. 2014. Do Not Cite.)

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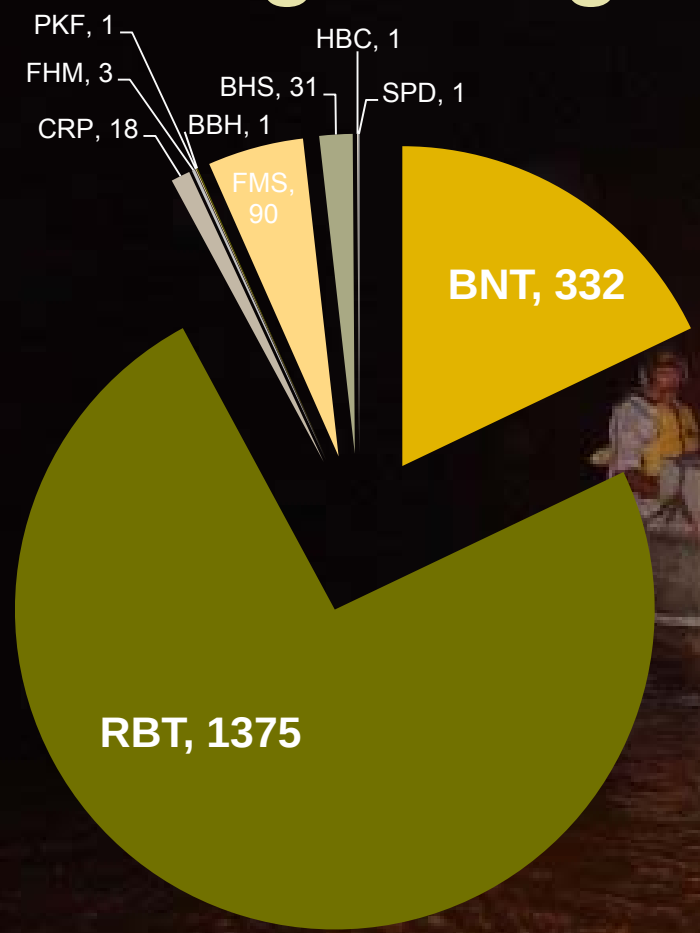
Bright Angel Inflow– Electrofishing



Despite influx of turbid water, over 1,700 trout removed during first effort.

- 52 Recaps
  - 11 RBT tagged in inflow
  - 1 BBH-75 mile
  - 1 CRP-Inflow
  - 31 BNT tagged in inflow
  - 1 at 102 mile
  - 1 at 138 mile to -11 to BACI

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(Preliminary Data from Nelson et al. NPS. 2014. Do Not Cite.)

Beneficial Use

- To date: > 40,000 trout to beneficial use

Trout processed and preserved (smoked or frozen) for beneficial use. Distributed to Tribal members and others.

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EXPERIENCE YOUR AMERICA

(Slide courtesy C. Nelson, NPS)

Lees Ferry Rainbow Trout Fishery

Photo: Rory Aikens

Photo: George Andrejko

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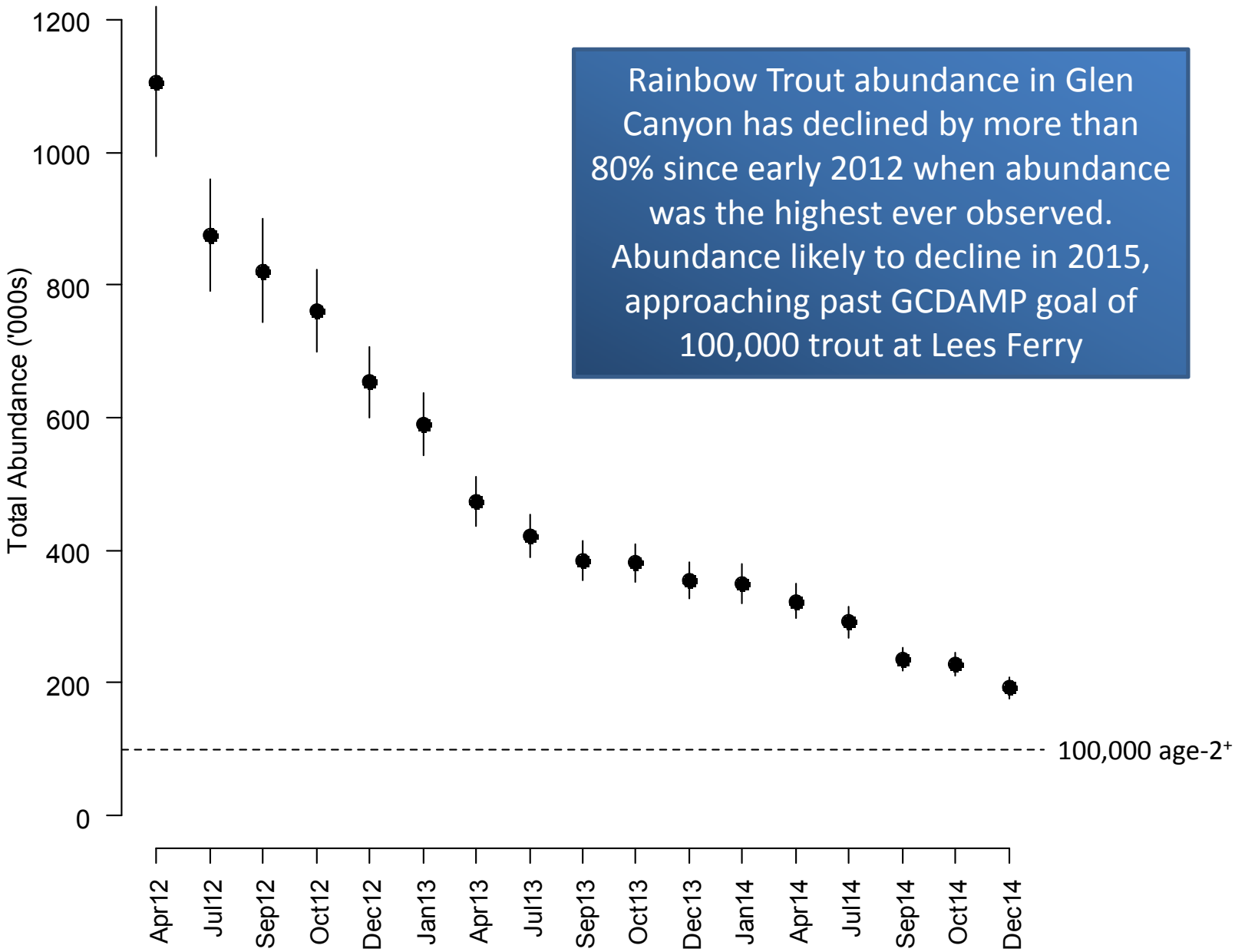
Estimated Rainbow Trout Abundance in Glen Canyon



Rainbow Trout abundance in Glen Canyon has declined by more than 80% since early 2012 when abundance was the highest ever observed. Abundance likely to decline in 2015, approaching past GCDAMP goal of 100,000 trout at Lees Ferry

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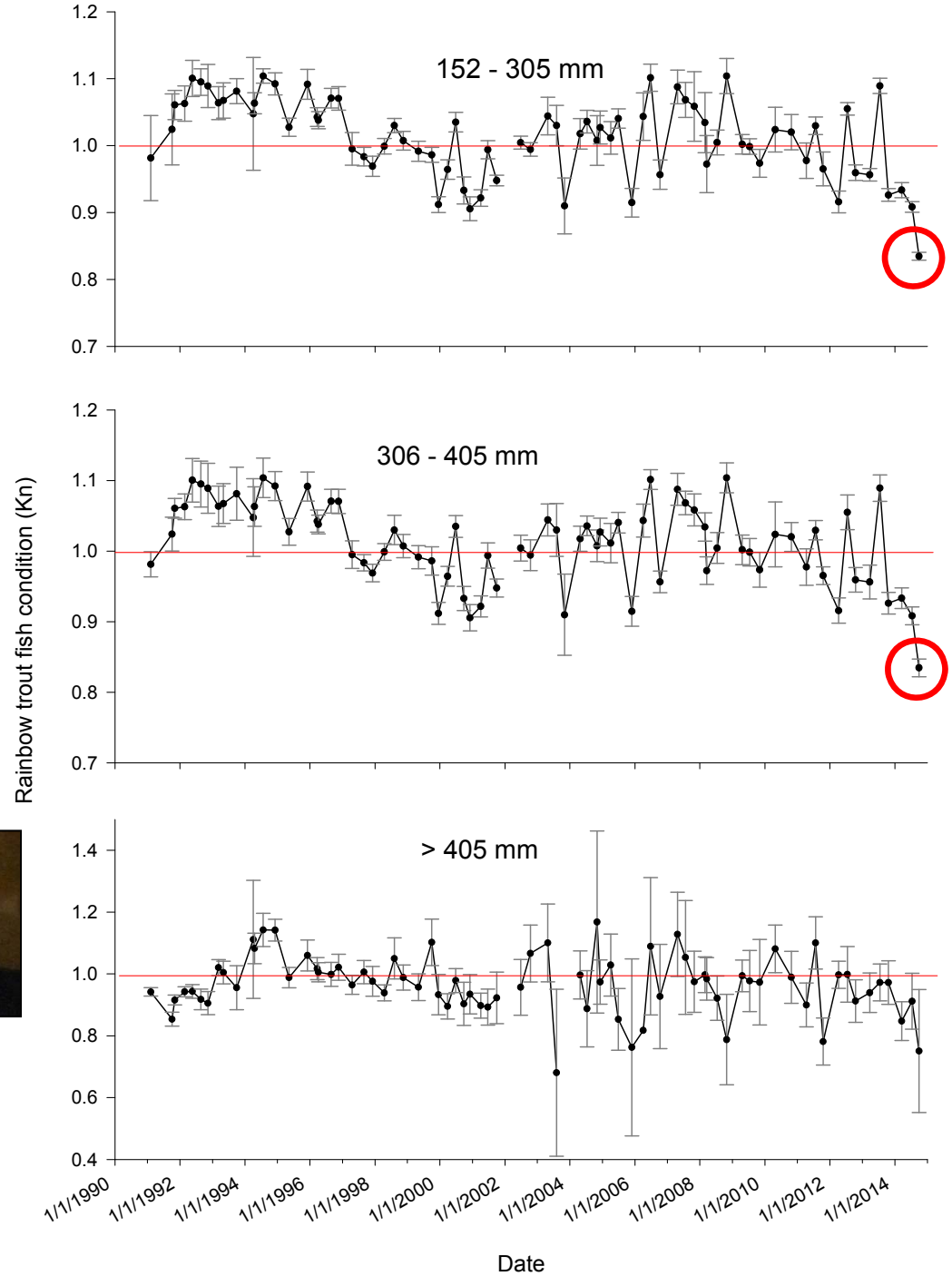
(Preliminary Data from Yard and Korman 2015. Do Not Cite.)

Rainbow trout condition (Kn)

- Relationship between length and weight. Average trout is 1.0

Rainbow Trout condition factor in 2014: lowest overall value observed in over 20 years of monitoring at Lees Ferry.

(Preliminary Data from Rogowski et al. AZG&F. 2014. Do Not Cite.)



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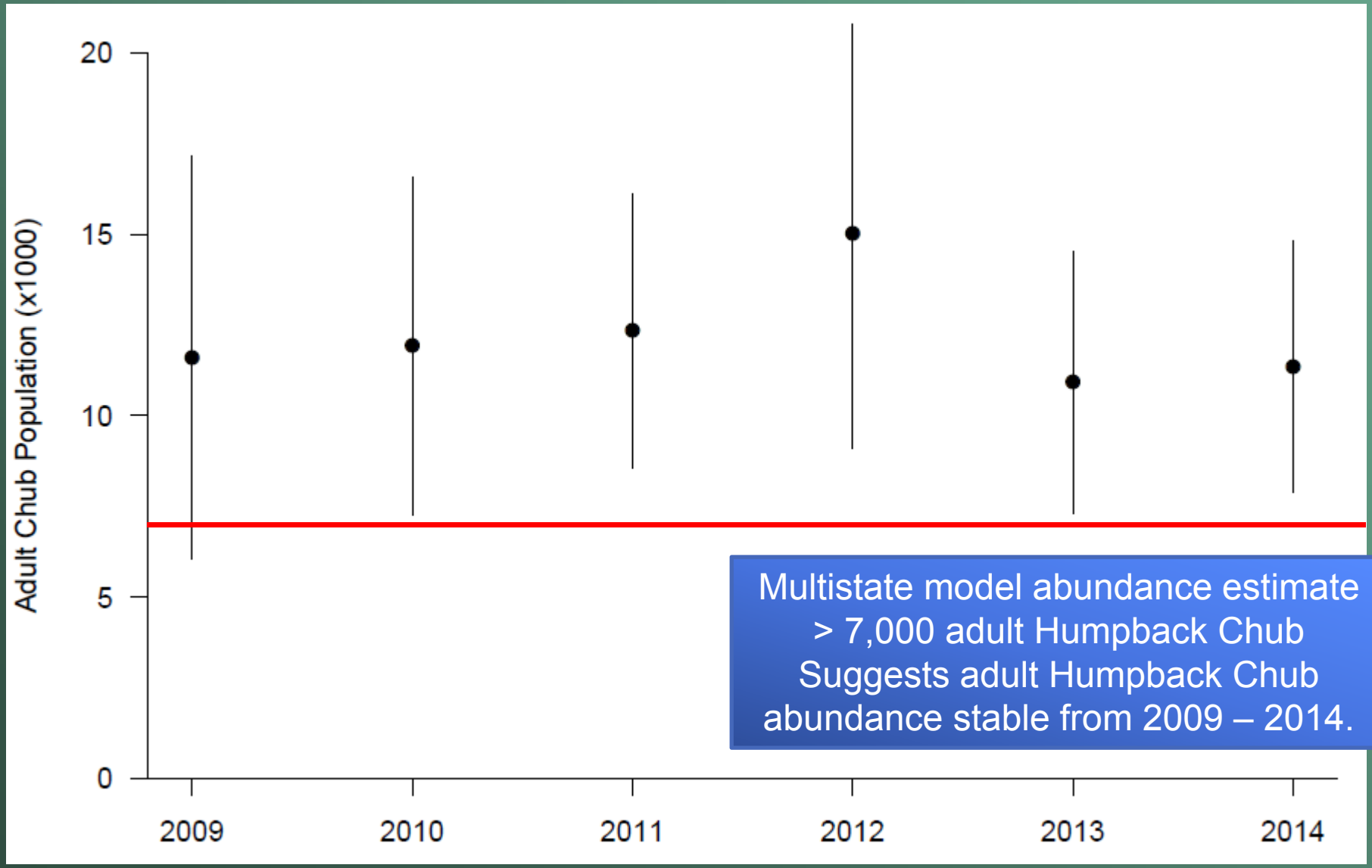
Biological Opinion Trigger Update: January 2015

USGS

Adult Humpback Chub Abundance Estimates: Multistate Population Model



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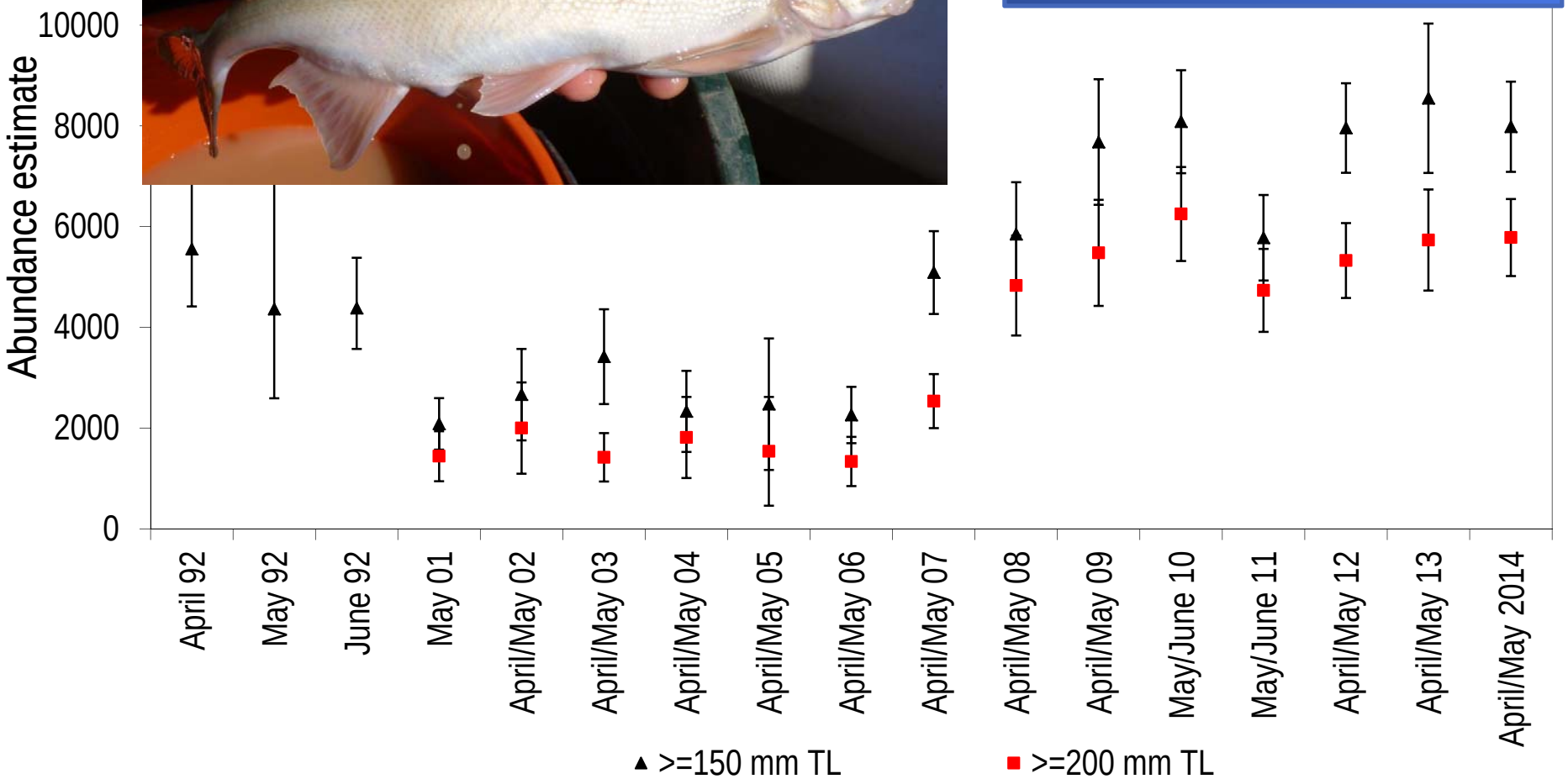
(Preliminary Data from Yackulic 2014. Do Not Cite.)

Annual spring abundances of humpback chub ≥ 150 mm and ≥ 200 mm in lower 13.6 km of LCR

2014 spring estimates indicate Humpback Chub abundance stable in the LCR



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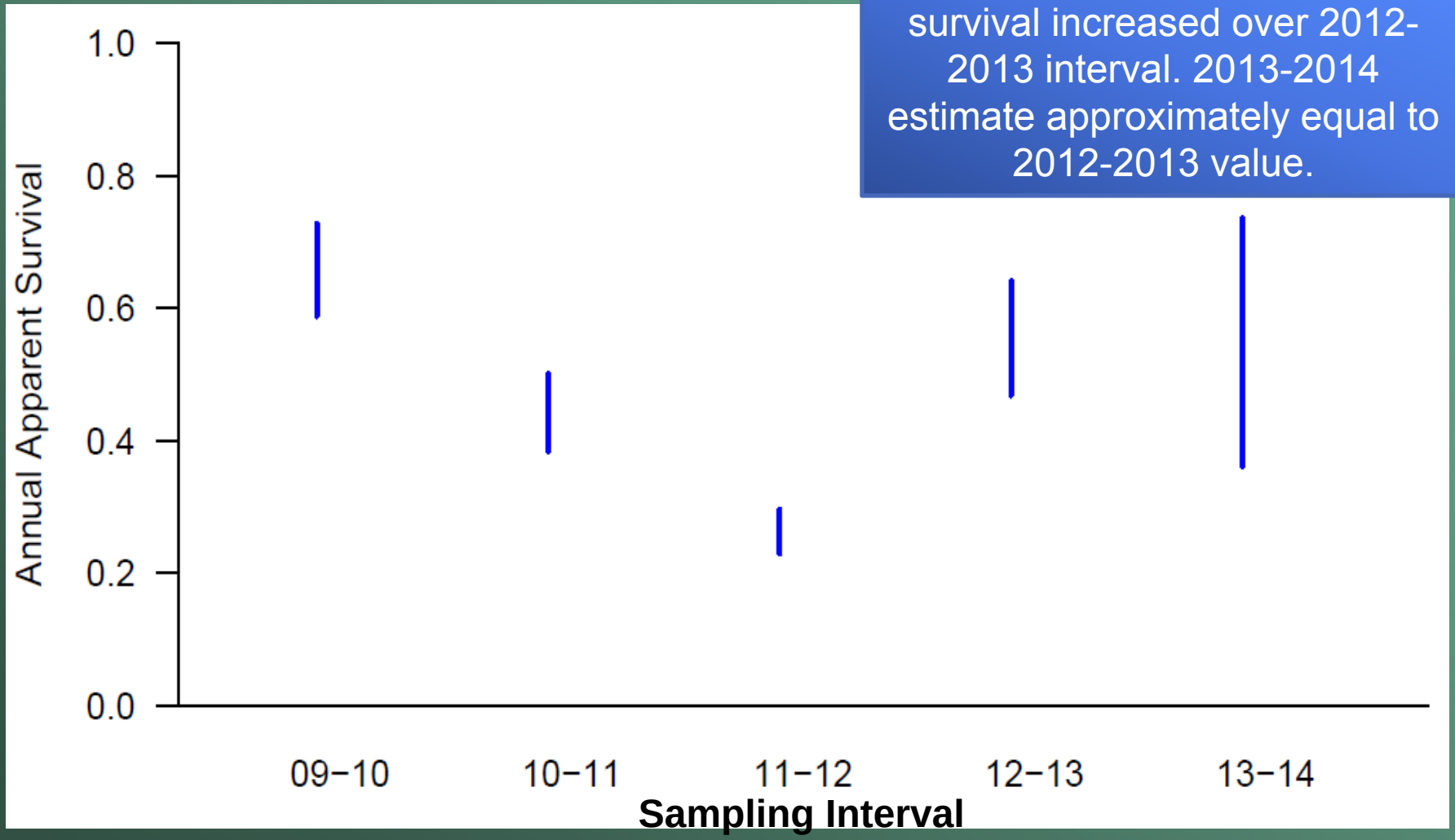
(Preliminary Data from VanHaverbeke et al. USFWS. 2014. Do Not Cite.)

Annual Survival of Humpback Chub (40-99 mm) in the Colorado River Study Site

Juvenile humpback chub survival increased over 2012-2013 interval. 2013-2014 estimate approximately equal to 2012-2013 value.



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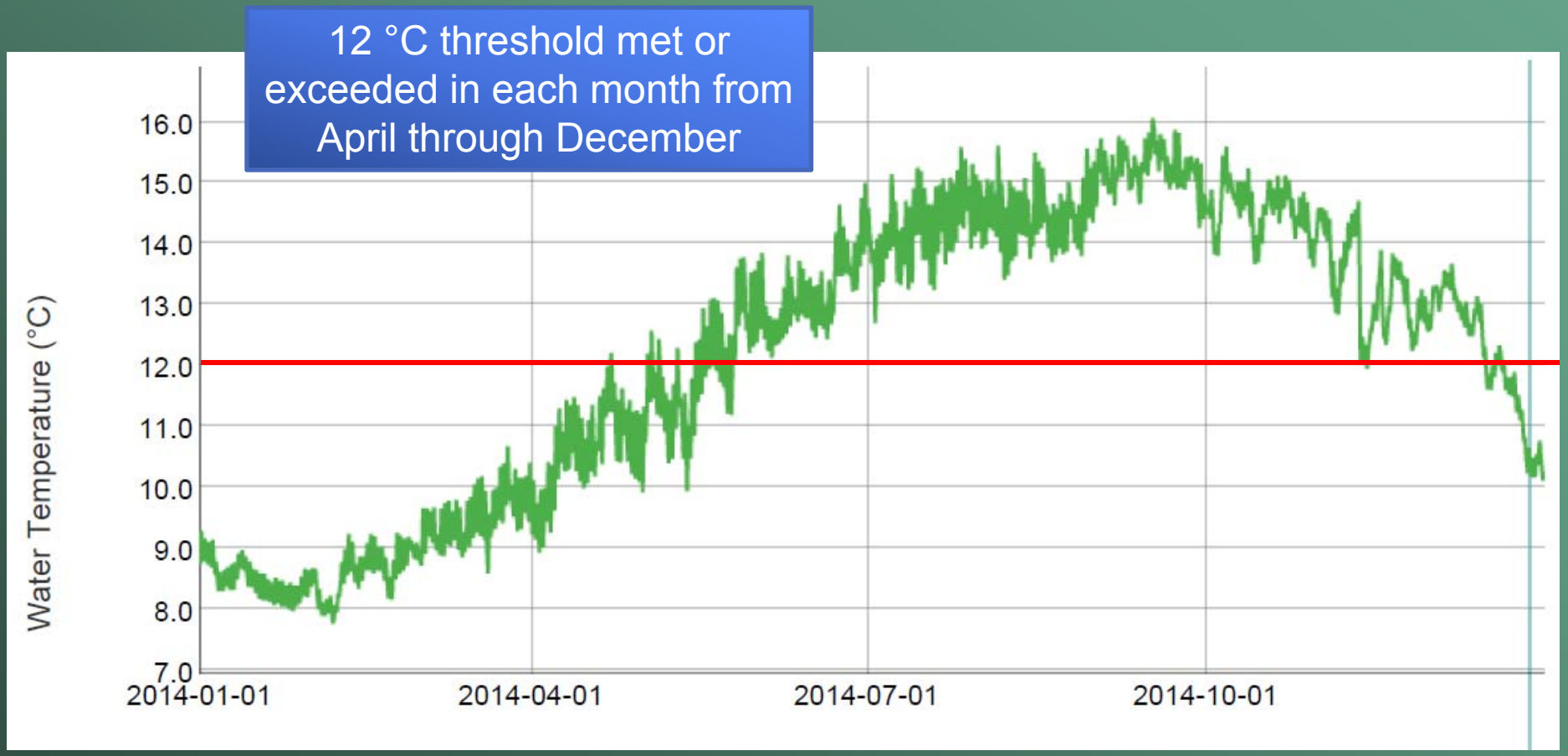
(Preliminary Data from Yackulic 2014. Do Not Cite.)

2014 Water Temperatures: Colorado River near Little Colorado River Confluence



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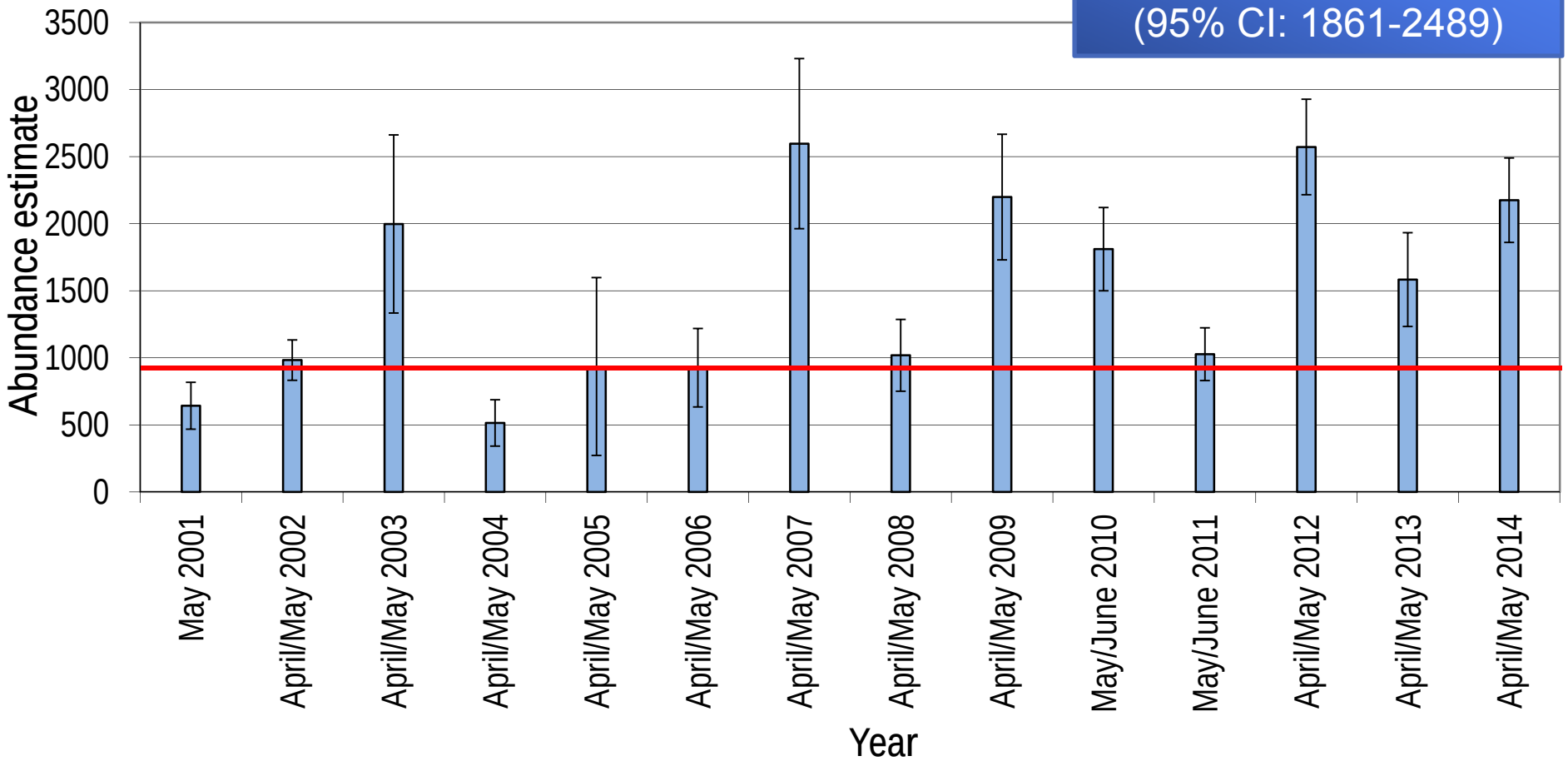
(UGSG gage 09383100: http://www.gcmrc.gov/discharge_qw_sediment/station/GCDAMP/09383100)

Spring LCR 150-199 mm humpback chub abundance estimates

2014 spring abundance estimate of 150-199 mm HBC = 2175 (95% CI: 1861-2489)



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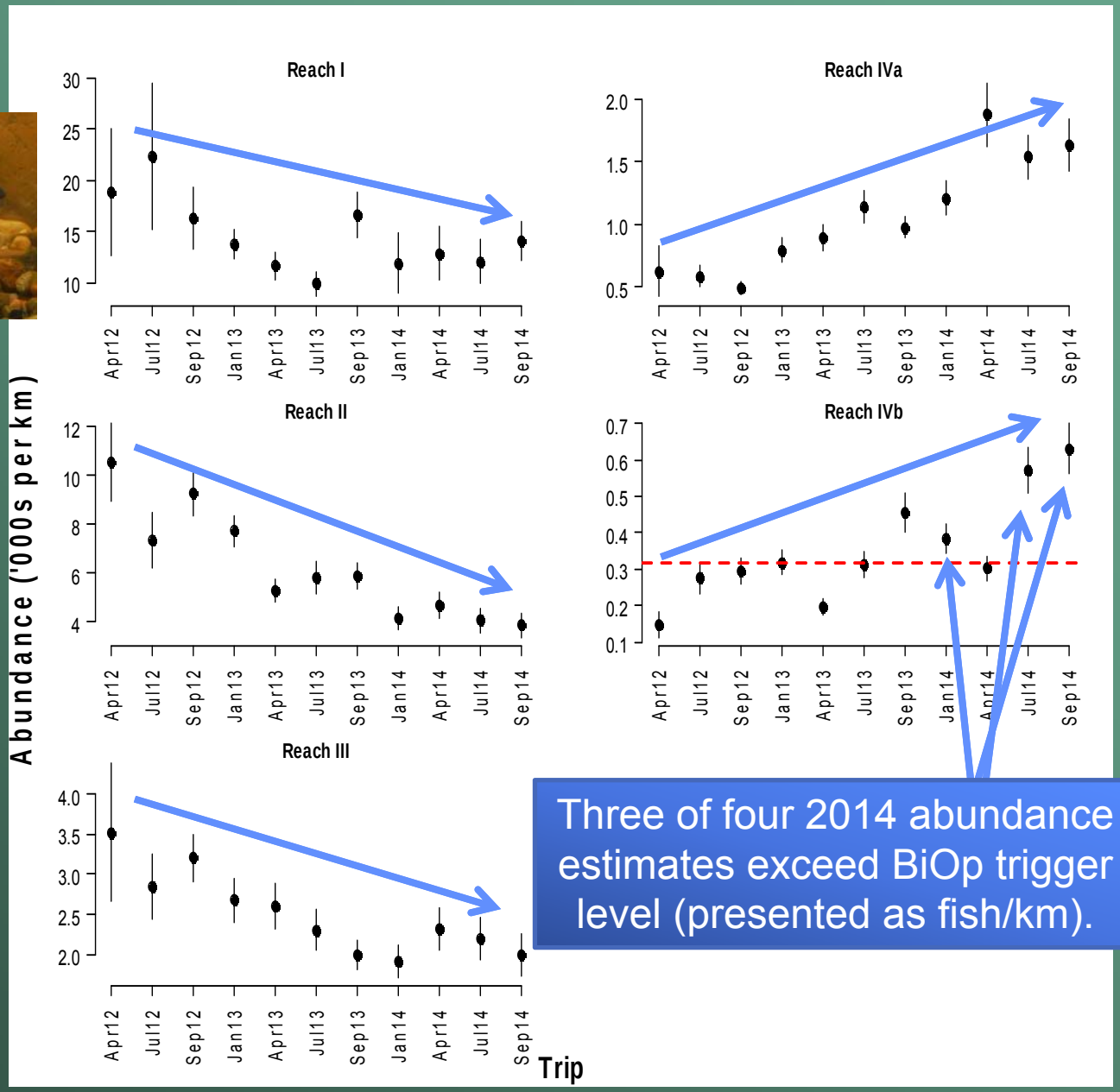
(Preliminary Data from VanHaverbeke et al. USFWS. 2014. Do Not Cite.)

Rainbow Trout Abundance By Reach



Three of four 2014 abundance estimates exceed BiOp trigger level (presented as fish/km).

I – Glen Canyon/Lees Ferry

II – House Rock

III – Buck Farm

IVa – Upstream of LCR

IVb – Downstream of LCR

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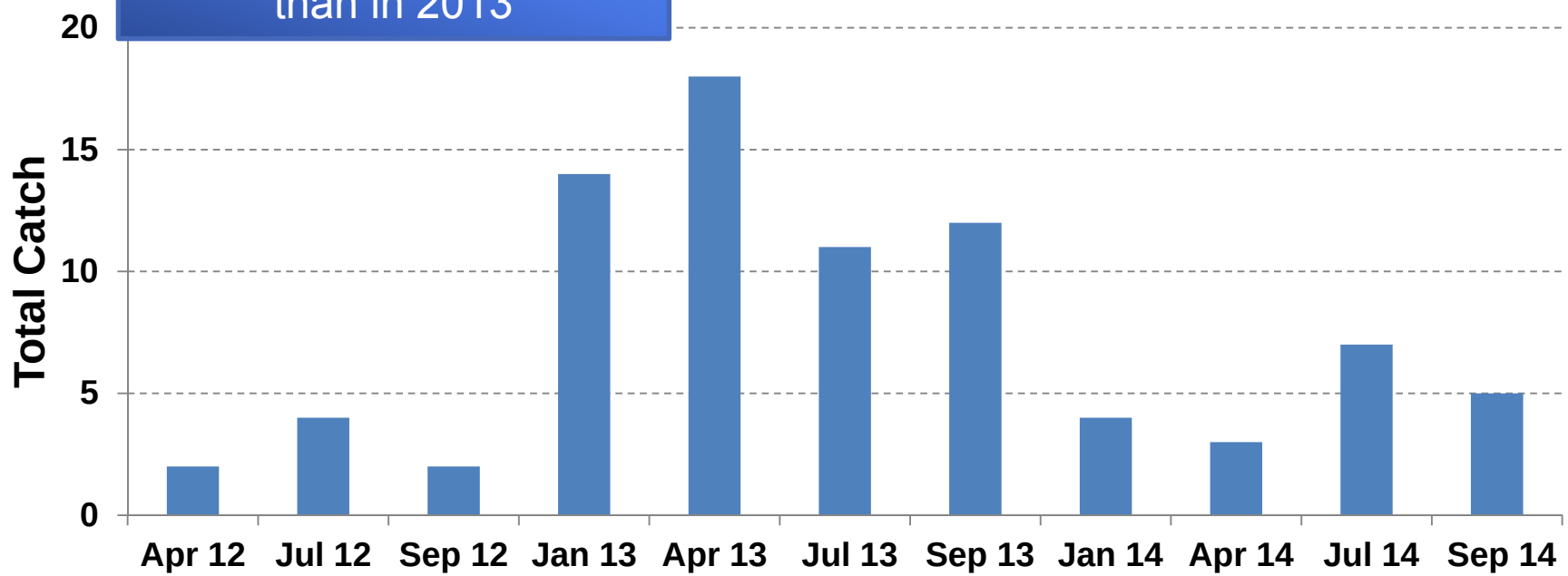
(Preliminary Data from Korman and Yard 2015. Do Not Cite.)

Brown Trout Catches: Below the Little Colorado River Reach

Catches peaked in April 2013, lower levels in 2014 than in 2013



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(Preliminary Data from Yard and Korman 2015. Do Not Cite.)

2011 USFWS Biological Opinion Non-native Fish Control Trigger

- Adult humpback chub <7000 fish? No
- OR
- ALL THREE? No
  - 3 of 5 years 150-199 mm humpback chub in the LCR drops below 910? No
  - Temperature <12° C for 2 consecutive years at LCR? No
  - Annual survival of 40-99 mm humpback chub in JCM drops 25% from preceding year? No

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2011 USFWS Biological Opinion Non-native Fish Control Trigger

- **AND**
- **Rainbow trout abundance over 760?** **Yes**

  Open model estimates exceed threshold for three of four trips in 2014 (Korman and Yard, preliminary data)
- **AND**
- **Brown trout abundance over 50?** **Unknown**

  2014 catches lower than in 2013, only 5 total caught in Sept. 2014 – catches too low to generate abundance estimate (Yard and Korman, preliminary data)

USGS

Acknowledgements

- Dave Rogowski and Lisa Winters – AZG&F
- Brian Healy, Clay Nelson, Emily Omana-Smith – NPS-GCNP
- Randy Van Haverbeke and Kirk Young – USFWS
- Josh Korman – Ecometric
- Bill Persons, David Ward, Charles Yackulic, Mike Yard – USGS-GCMRC

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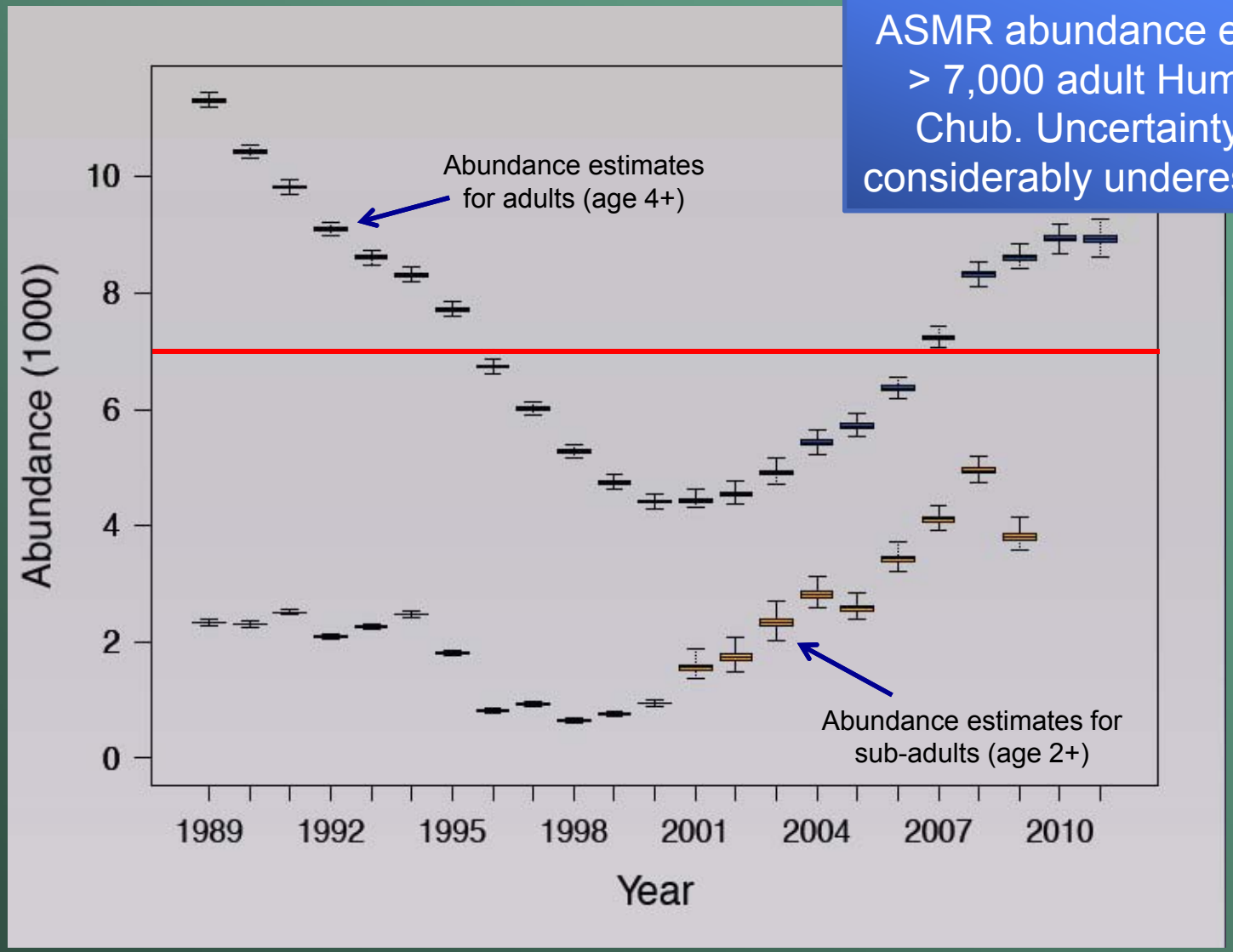
Questions?

Adult and Sub-Adult Humpback Chub Abundance Estimates

ASMR abundance estimate: > 7,000 adult Humpback Chub. Uncertainty likely considerably underestimated.



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(S. Martell, preliminary data. Do Not Cite)