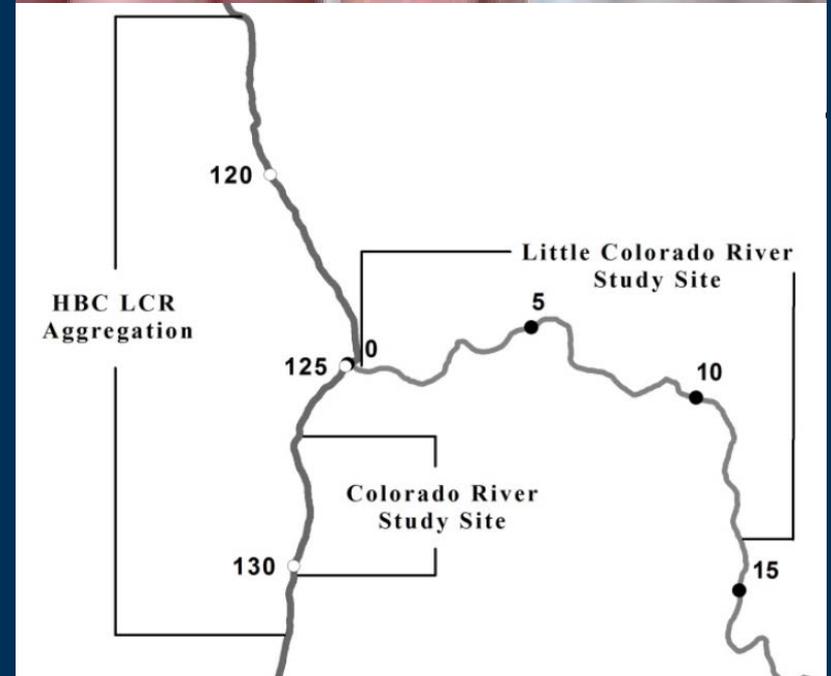


Humpback chub (*Gila cypha*) that spawn in the Little Colorado River: status and potential drivers

Annual Reporting for FY15
January 27, 2016

Charles B. Yackulic (US Geological Survey –
GCMRC), Presenter – email: cyackulic@usgs.gov

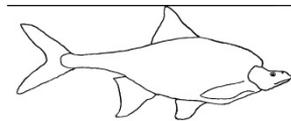
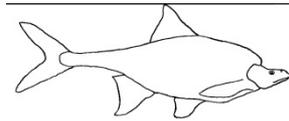
Maria Dzul (US Geological Survey – GCMRC)



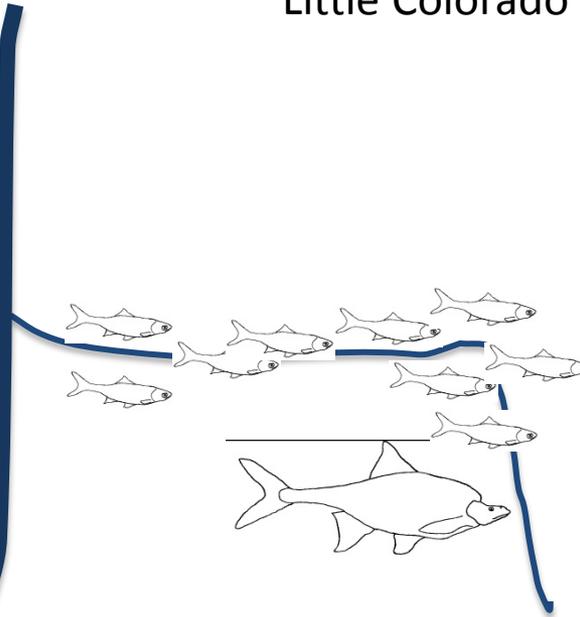
Quick review of Chub Life History Basics

Basics of Chub Life History around the Little Colorado River (LCR)

- Juvenile chub growth thought to be driven primarily by temperature. Juvenile chub survival thought to be affected by trout.



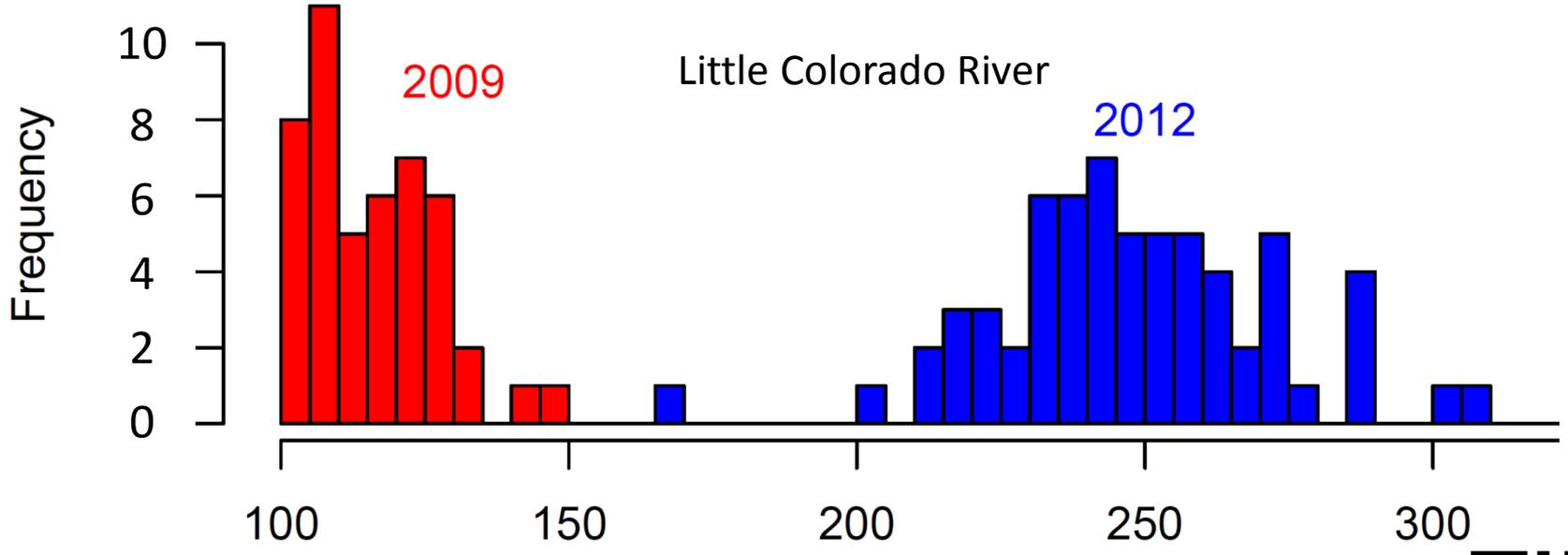
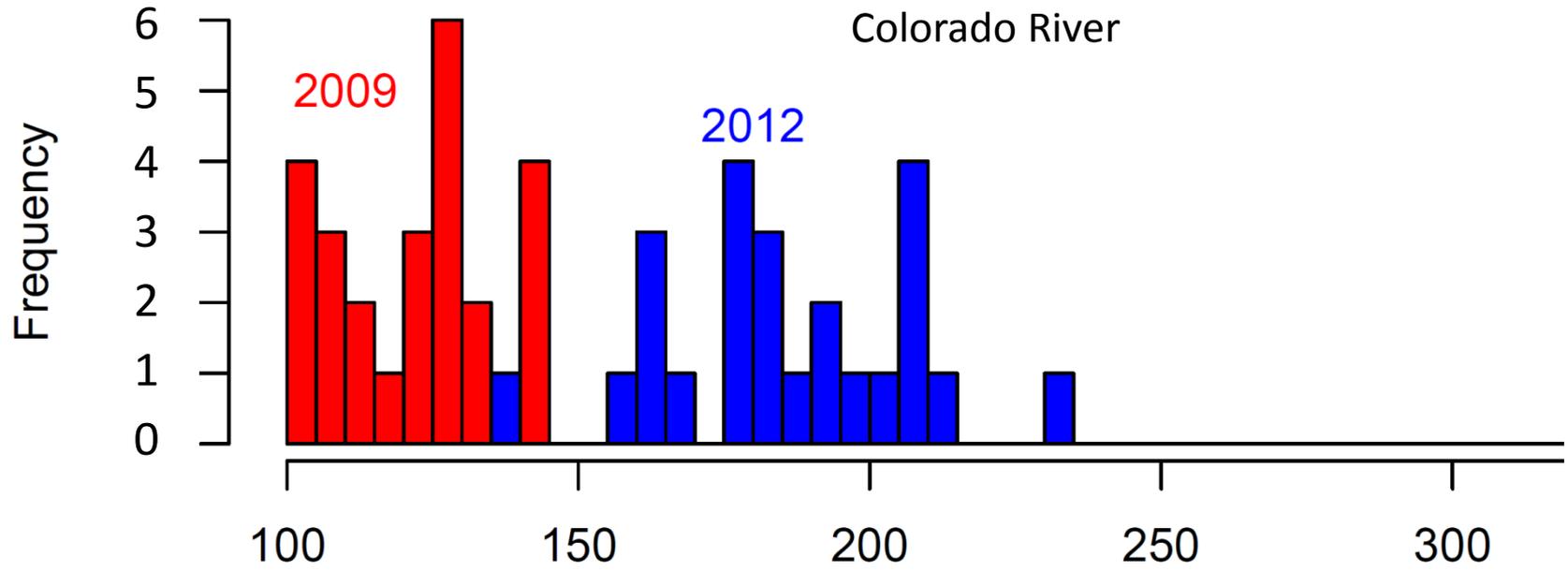
- Majority of chubs recruitment in the Little Colorado River .



- Some proportion of juvenile chub leave Little Colorado River, and most of this outmigration occurs during July – Sept. of their first year.
- Most adults live in Colorado River and migrate back to Little Colorado River to spawn, small proportion of adults appear to live year-round in Little Colorado River.



Chub that grow up in the Colorado River take much longer to reach maturity (cold water).



preliminary data. Do not cite.

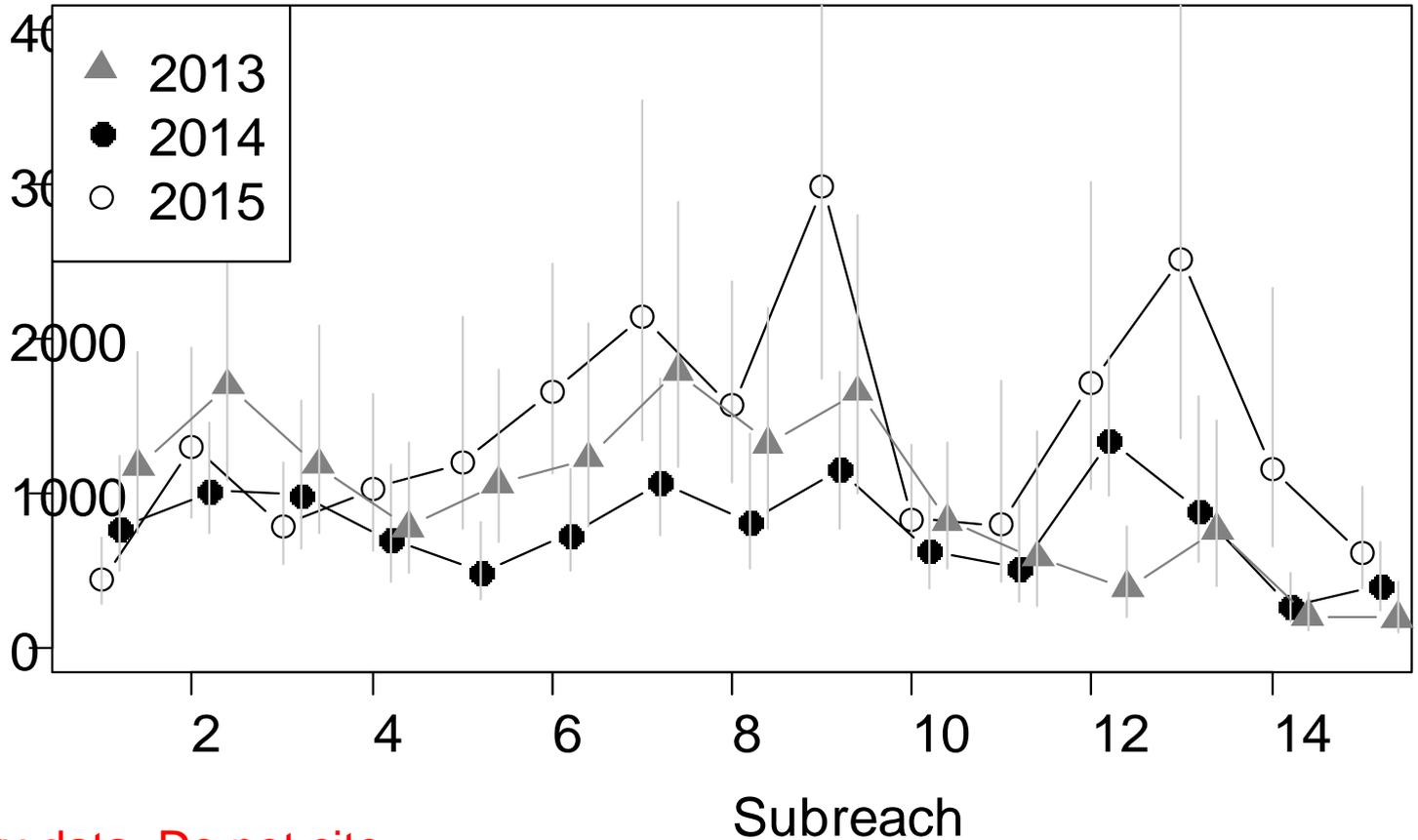
Fish Length (mm)



Outline

- **Recruitment in Little Colorado River**
- **Juvenile survival and growth in the Colorado River**
- **Subadult growth in Little Colorado River & Colorado River**
- **Adult Chub**

Abundance HBC



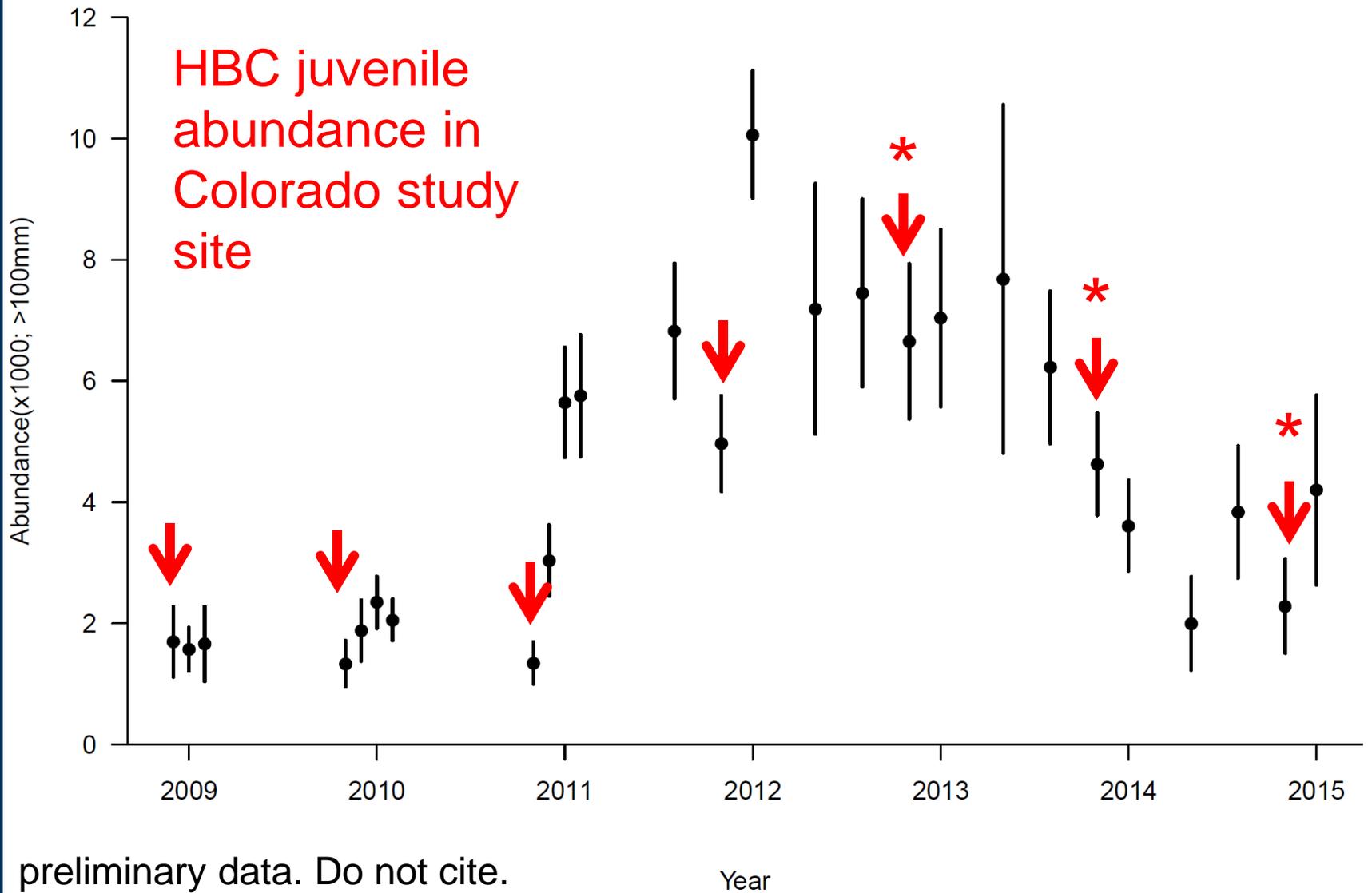
preliminary data. Do not cite.

	2.5% quantile	50% quantile	97.5% quantile
2013	12108	15380	20732
2014	9635	12118	15321
2015	16823	21470	27512

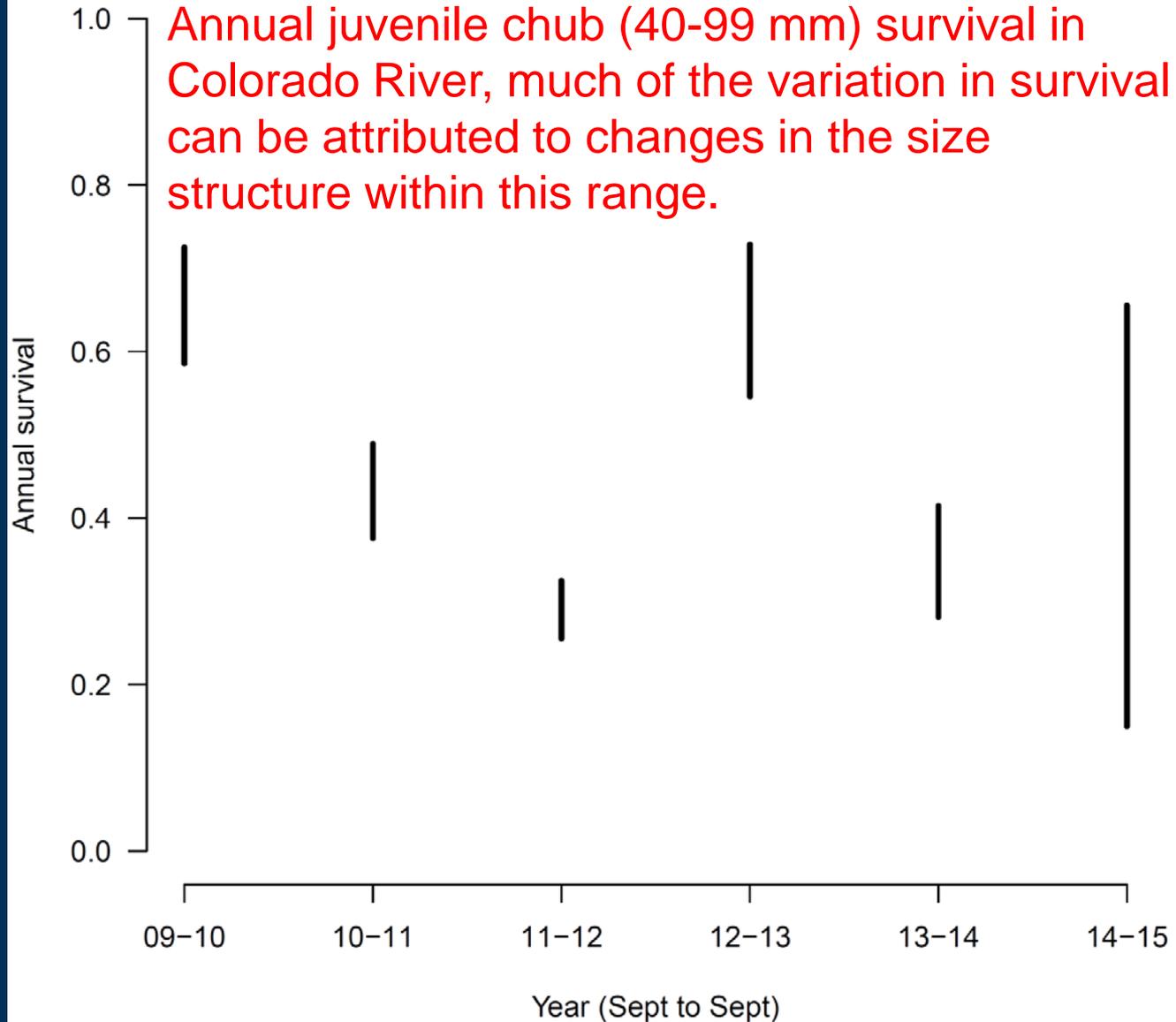


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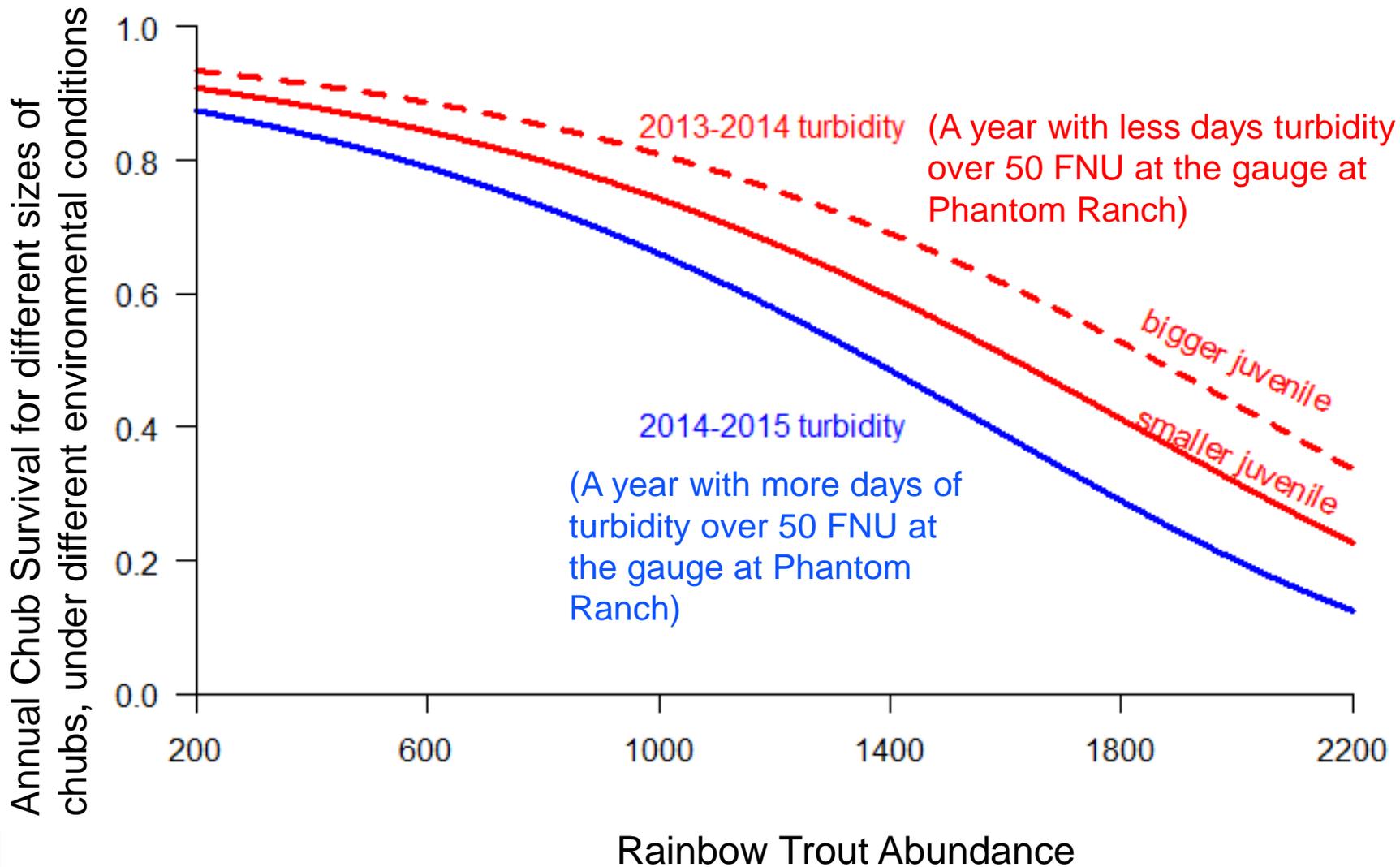


Annual juvenile chub (40-99 mm) survival in Colorado River, much of the variation in survival can be attributed to changes in the size structure within this range.



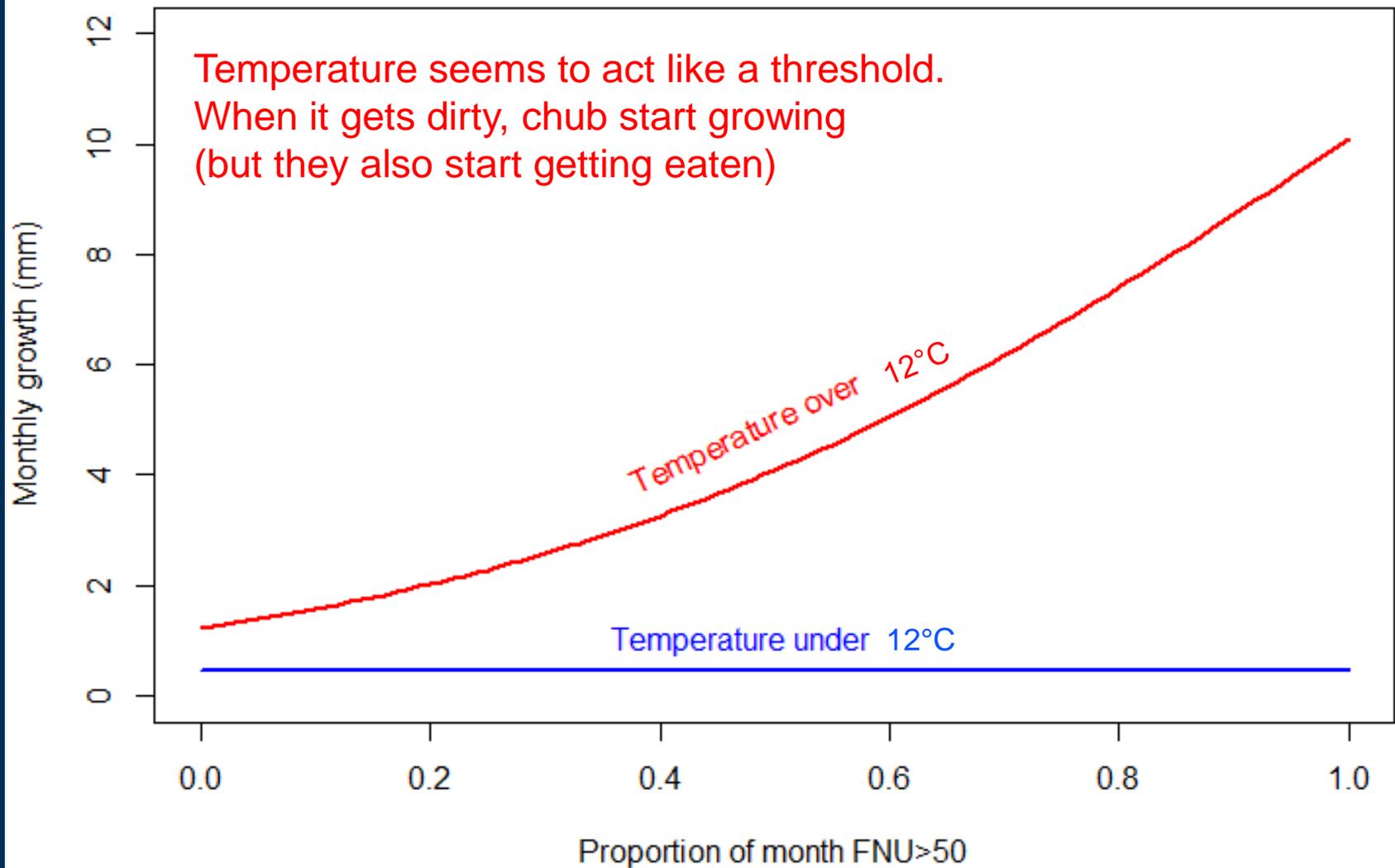
Mini-multistate

- Small (40 – 59 mm), medium (60 – 79 mm), large (80-99 mm) juveniles.
- Survival increases with size, growth declines
- Correlates of survival:
 - Trout (-)
 - # of days with Turbidity greater than 50 FNU (-)
- Correlates of growth:
 - $T > 12$ °C (+)
 - # of days with Turbidity greater than 50 FNU (+)



preliminary data. Do not cite.

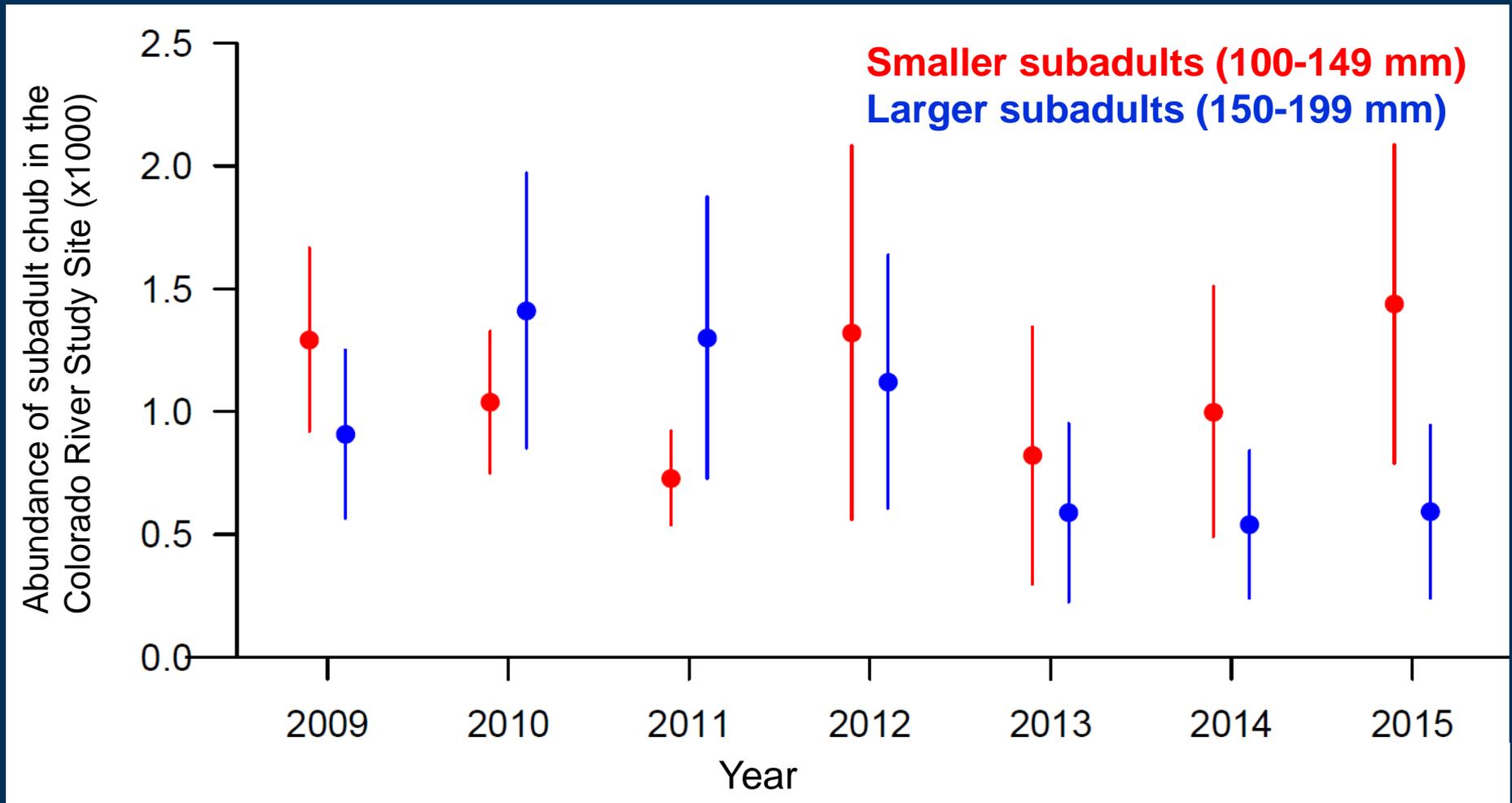




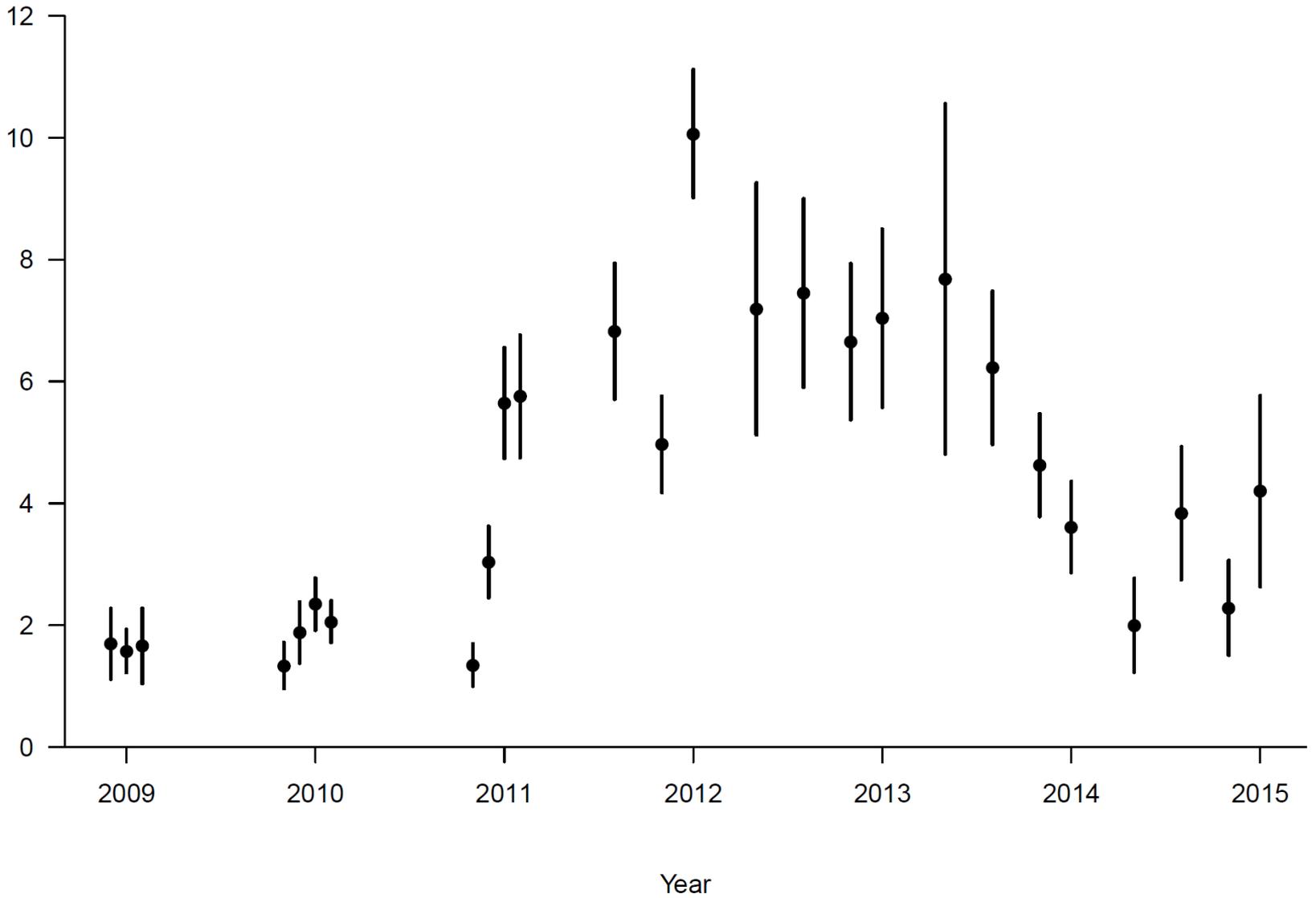
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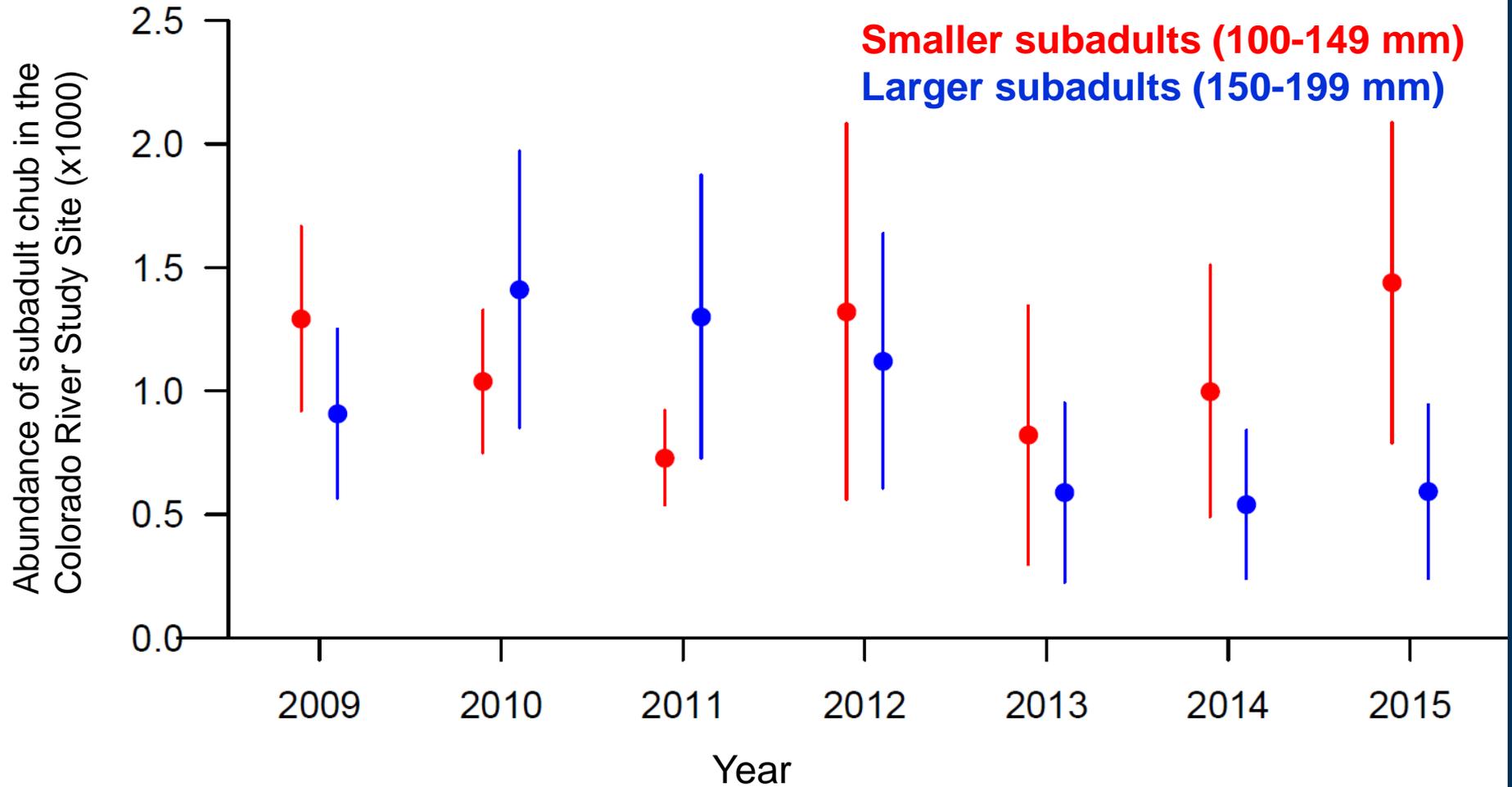
Subadult Abundance chub in Colorado River study site



Juvenile (40-99mm) Abundance of chub in the Colorado River study site

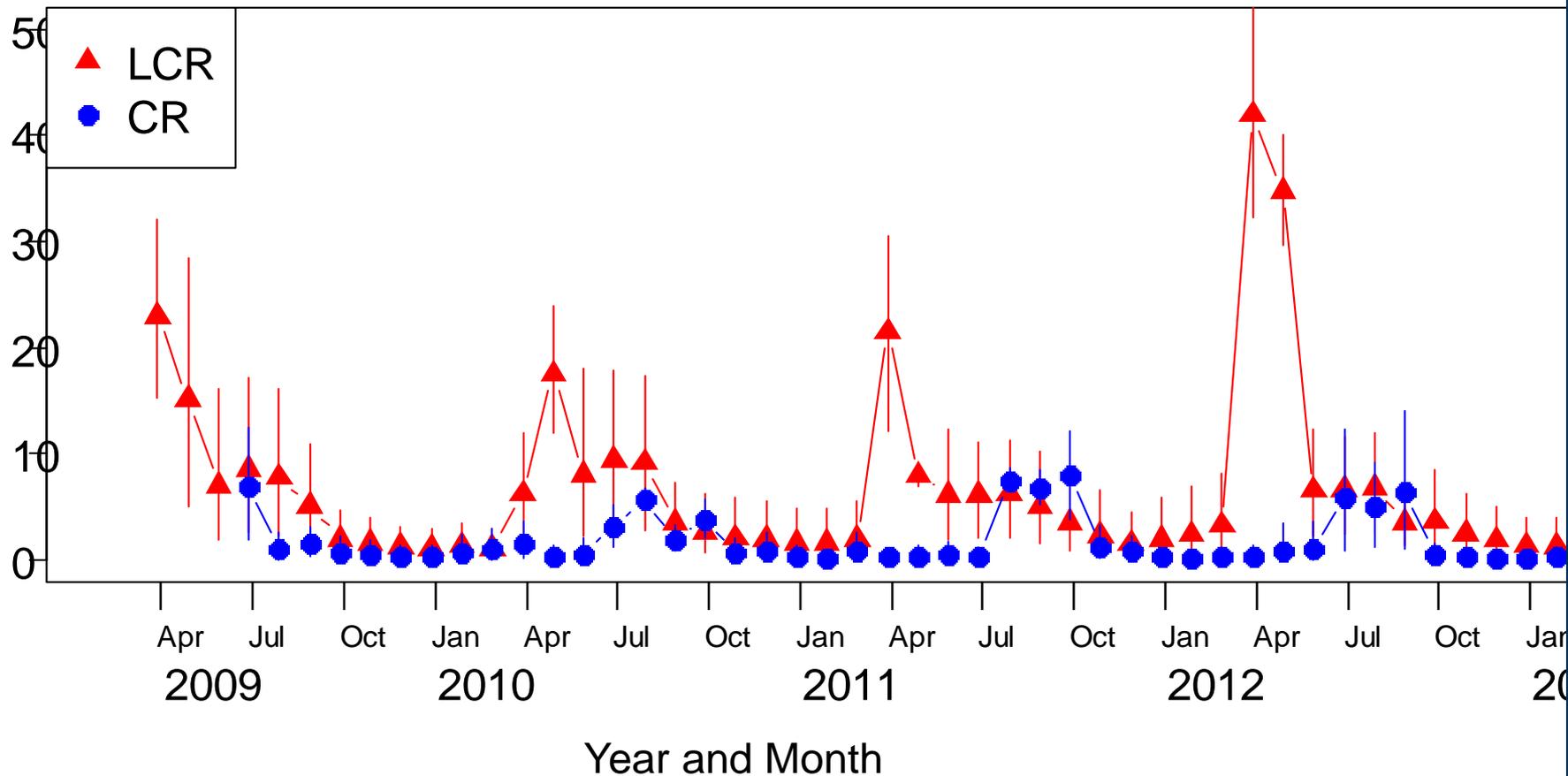


Subadult Abundance chub in Colorado River study site



Best Colorado River model: temperature and turbidity duration
Best Little Colorado River model: temperature and food availability

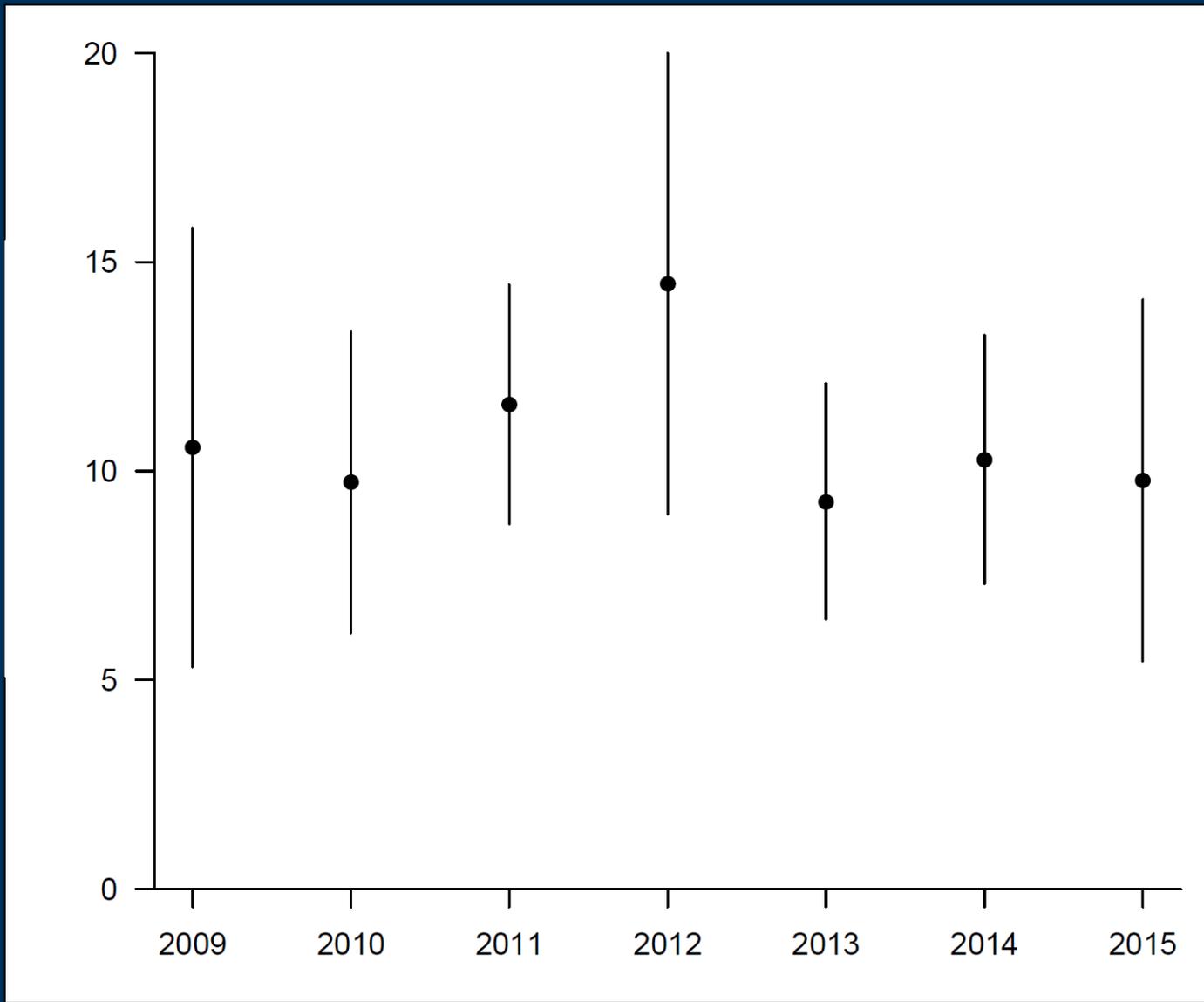
Growth of 130 mm humpback chub (mm/month)



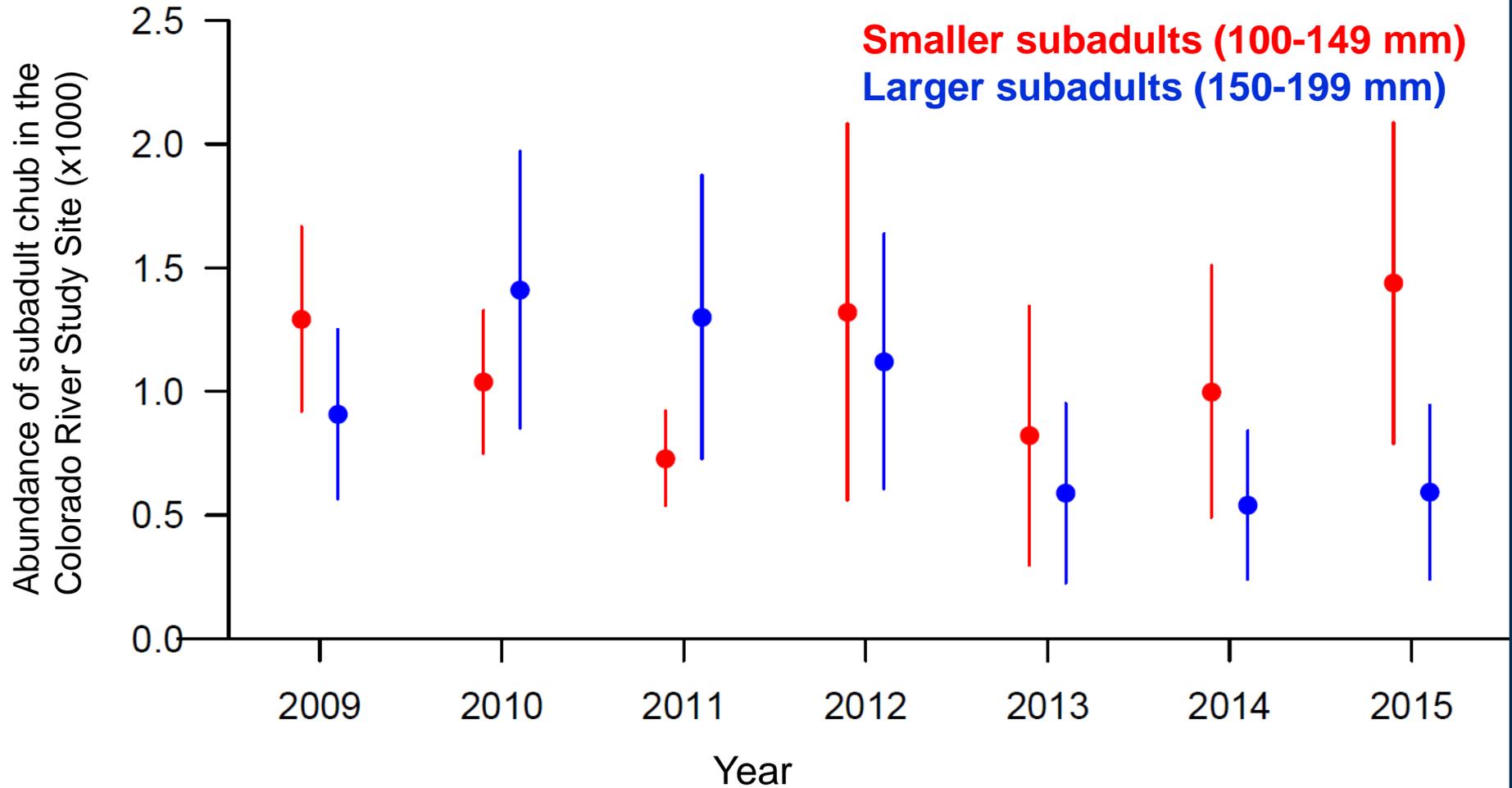
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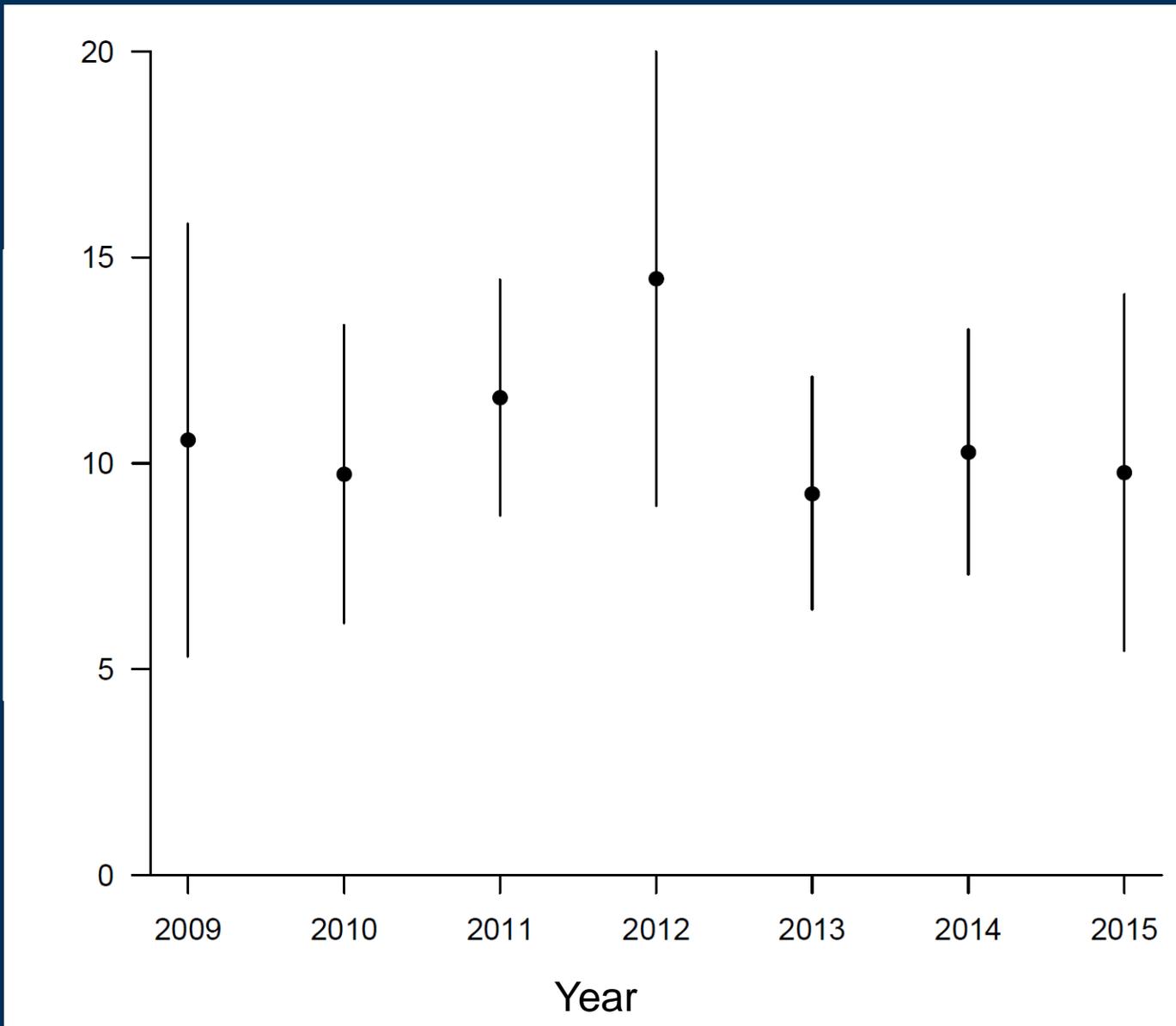
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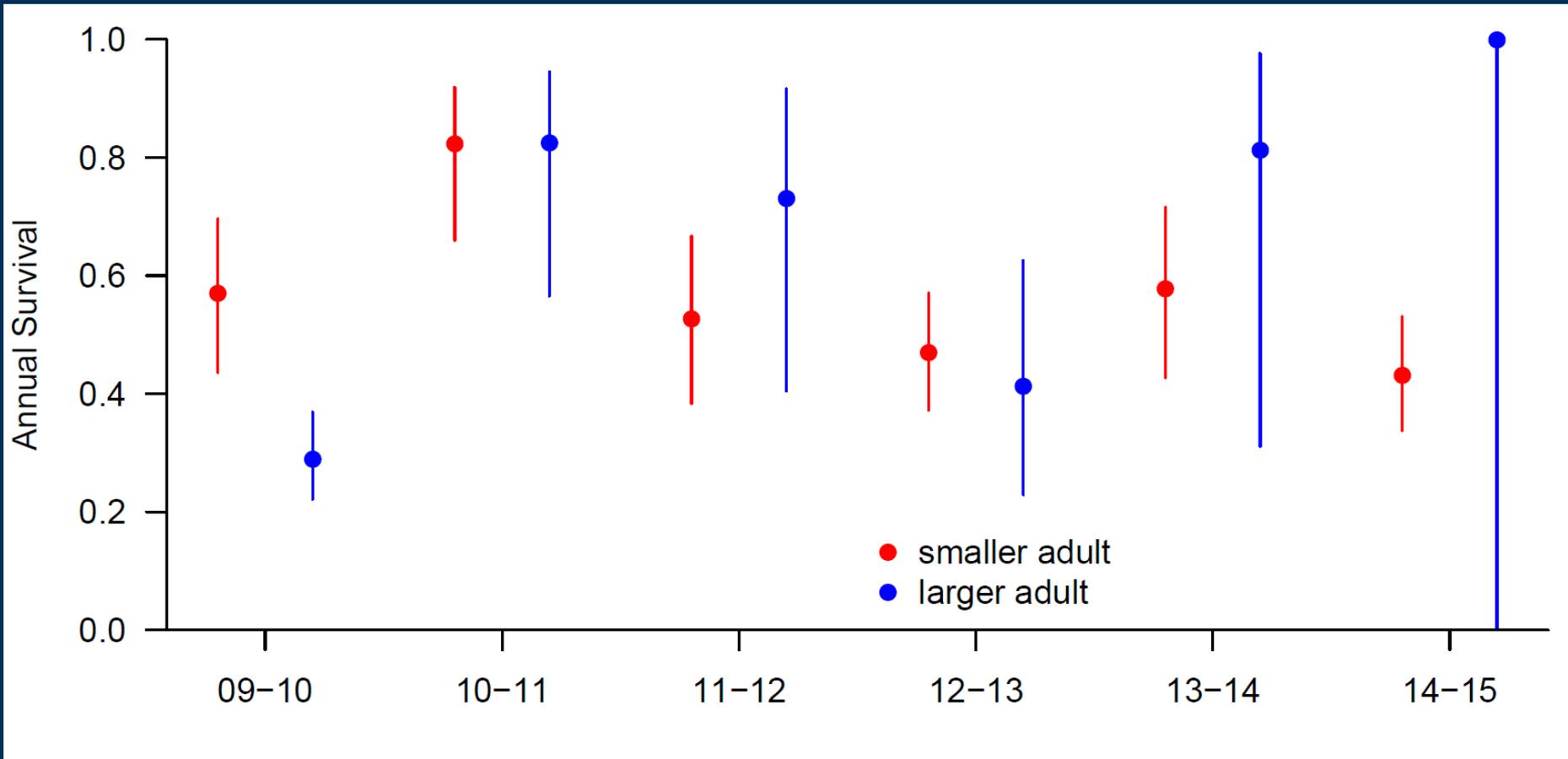
Subadult Abundance chub in Colorado River study site





So what happened this spring in the Little Colorado River?

Little Colorado River – Annual Survival

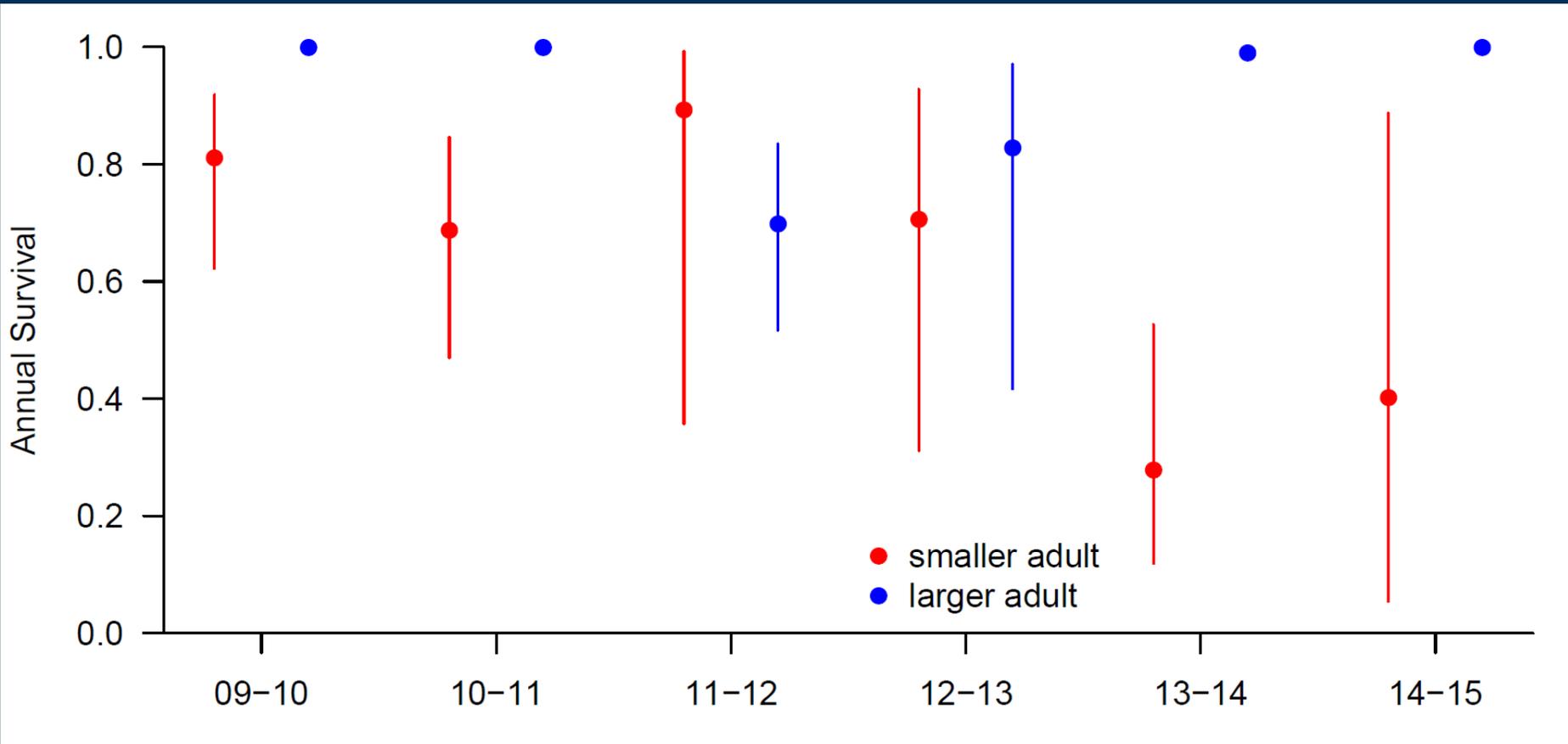


Annual Interval (Sept. to Sept.)



preliminary data. Do not cite.

Colorado River – Annual Survival

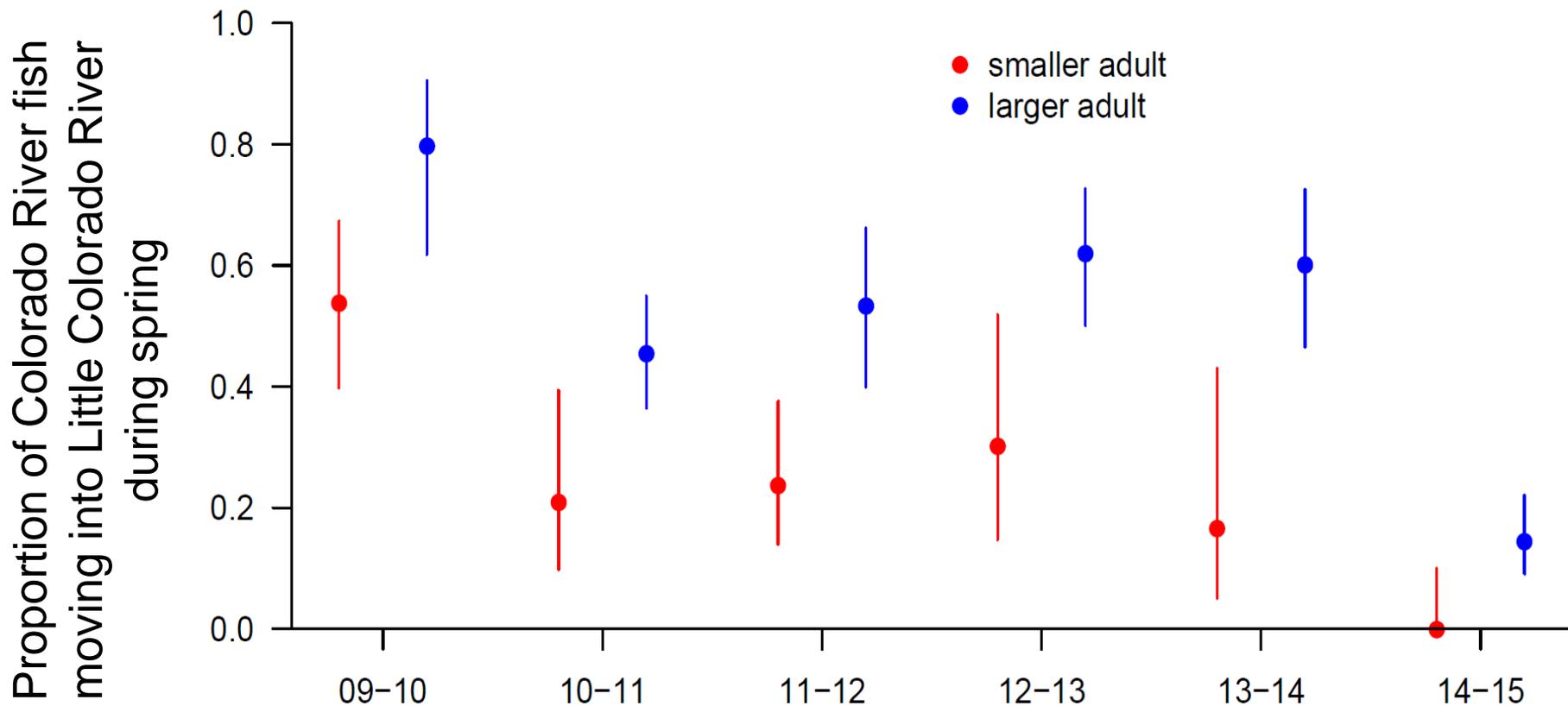


Annual Interval (Sept. to Sept.)



preliminary data. Do not cite.

Proportion of Colorado River fish moving into Little Colorado River during spring



Annual Interval (Sept. to Sept.)

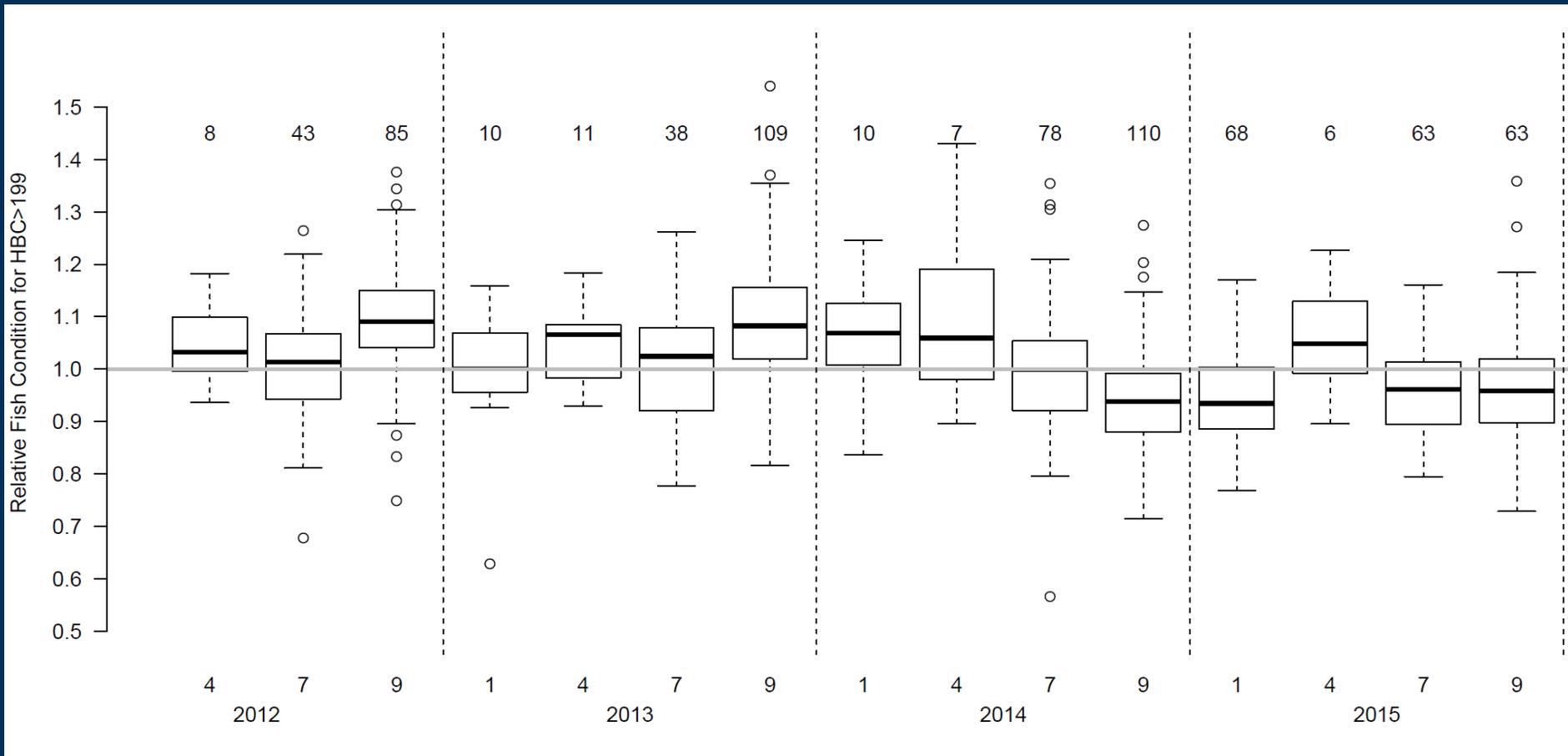


preliminary data. Do not cite.

Condition Factor

- Determined by comparing the ratio of observed weights of individuals fish to the predicted weight based on their total length. Predictions are based on a regression of the log of weight as a function of the log of length. Values over 1 indicate fish that are fatter than predicted, values under 1 indicate fish that are skinnier.

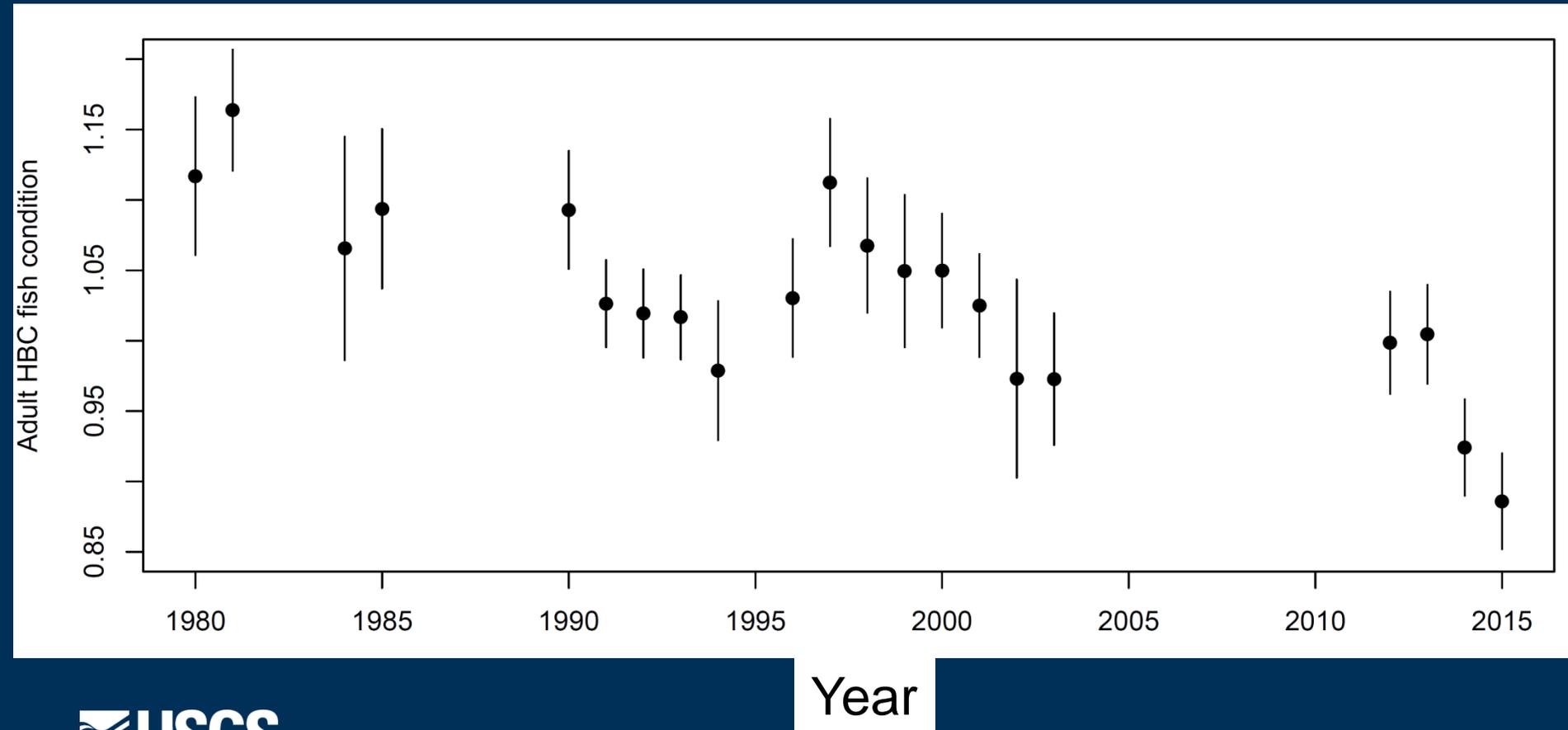
Adult chub condition – fat or skinny?

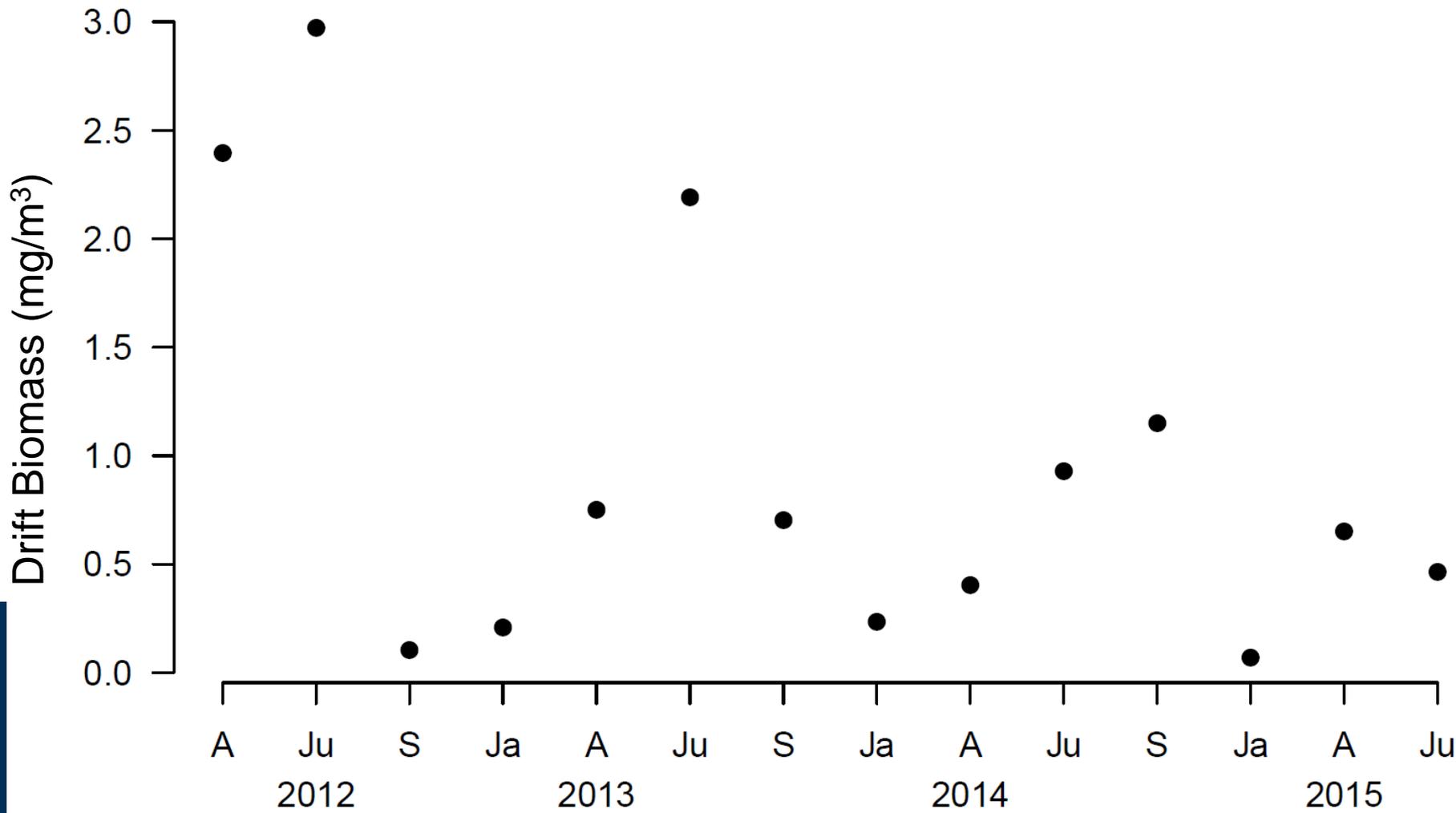


Year and Month

preliminary data. Do not cite.

Adult chub condition – fat or skinny?





Year - month



preliminary data. Do not cite.

Summary

- **Highly variable juvenile recruitment in the Little Colorado River**
 - **this can override variation in survival over short time scales**
- **Temps over 12 °C with turbidity lead to juvenile growth in Colorado River.**
- **Turbidity and trout lower juvenile survival in the Colorado River.**
- **Adult chub appear stable, but skinny and may not spawn in great numbers in 2016.**

Acknowledgements

- Mike Yard , Josh Korman, Ted Kennedy, Mike Dodrill, David Ward, Luke Avery, Scott Vanderkooi
- US Fish and Wildlife Service
- Near Shore Ecology Group
- David Ward, Luke Avery, Michael Dodrill and others involved with July Little Colorado River
- Glen Canyon Adaptive Management Group
- Bureau of Reclamation
- Navajo Nation Department of Fish and Wildlife

