



GCMRC Report to the Upper Colorado River Commission

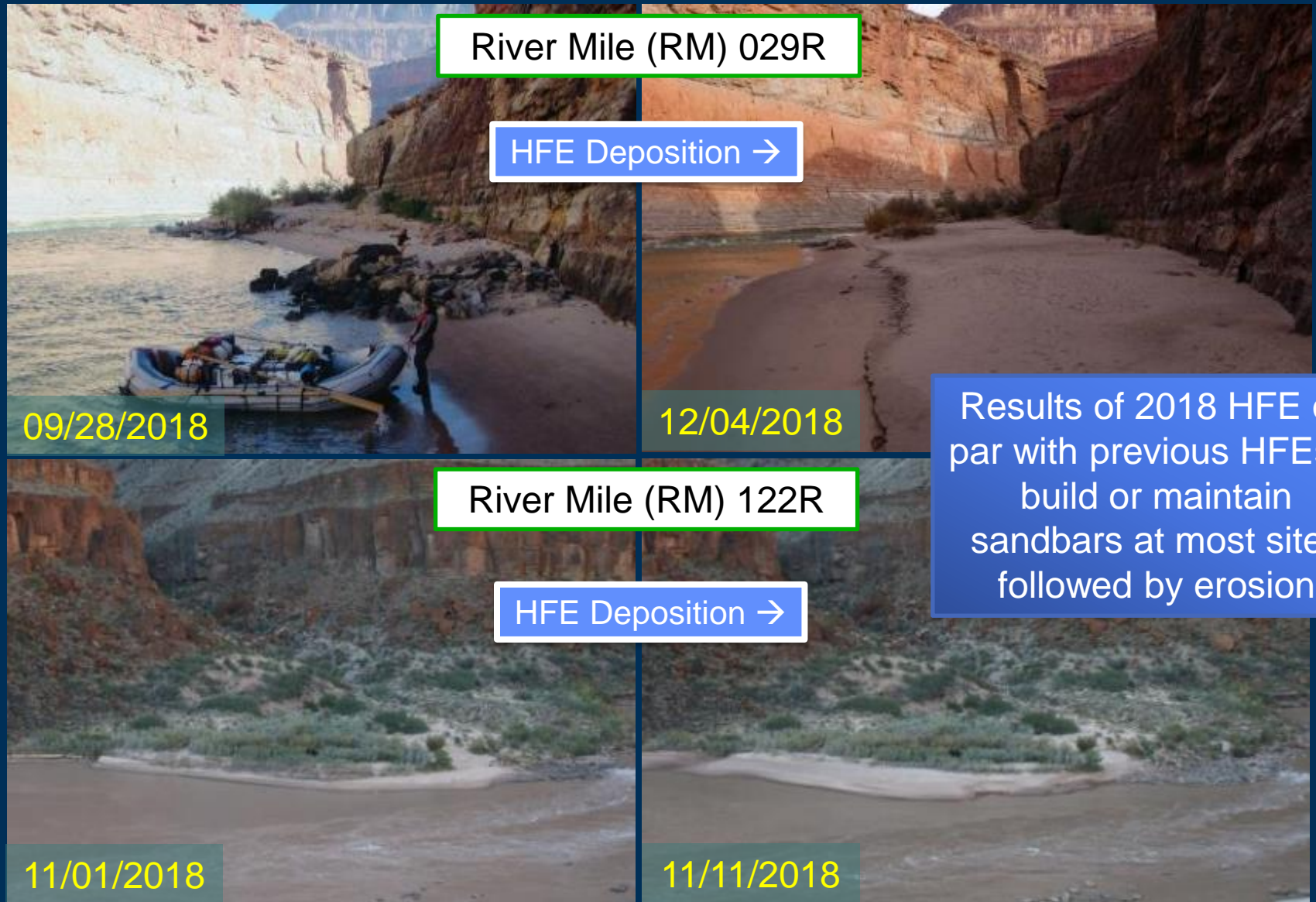
Scott VanderKooi

Grand Canyon Monitoring and Research Center

Southwest Biological Science Center

December 14, 2020

November 2018 High-flow Experiment



Sandbar changes during the HFE Protocol

Summary

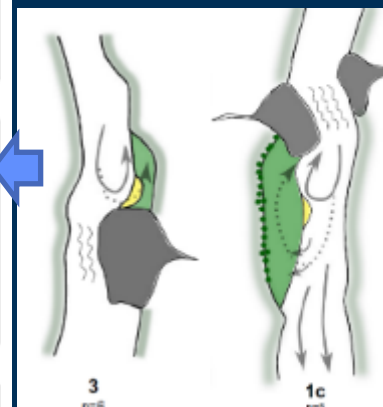
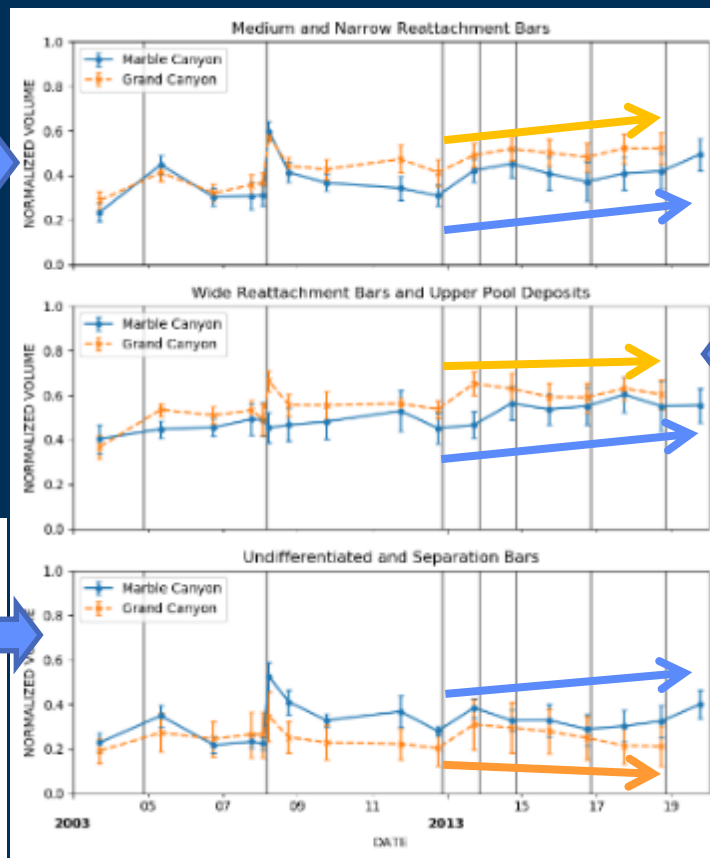
Increased HFE frequency is maintaining sandbars at a majority of sites

Trends are similar in Marble and Grand Canyons

However, separation and undifferentiated eddy bars show a slight decline in Grand Canyon



Narrow to medium reattachment bars



Wide, vegetated bars

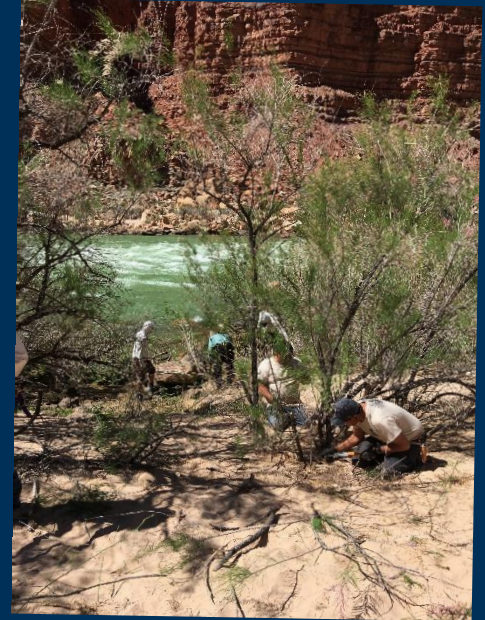


Undifferentiated and separation bars

Vegetation Removal Experiments

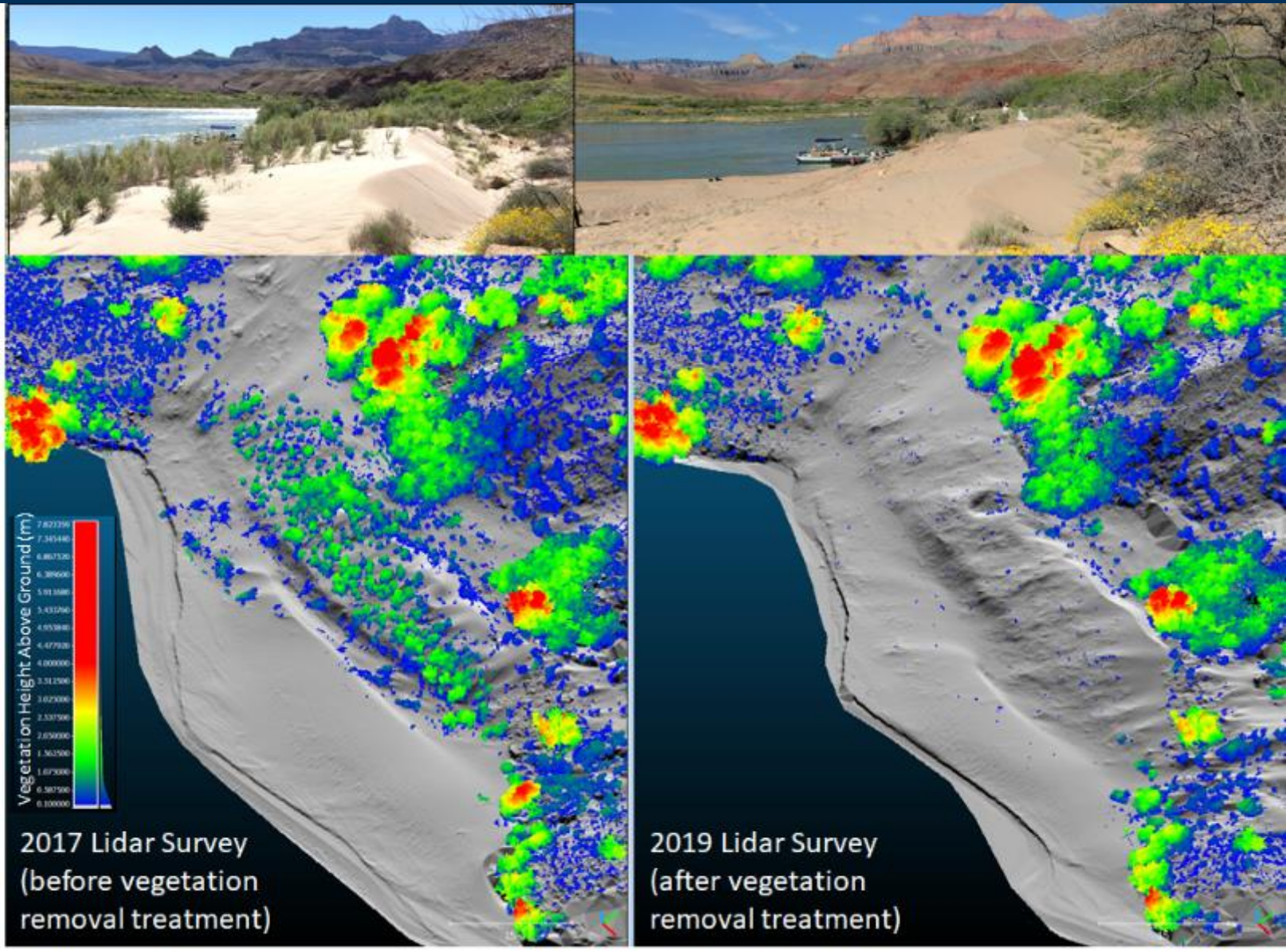
In 2019 and 2020 the NPS implemented experimental vegetation removal treatments on several sandbars in Grand Canyon to increase campsite area and to increase the supply of HFE sediment via aeolian processes to dunefields that host archaeological sites

GCMRC is monitoring the outcome of the vegetation treatments relative to future HFEs



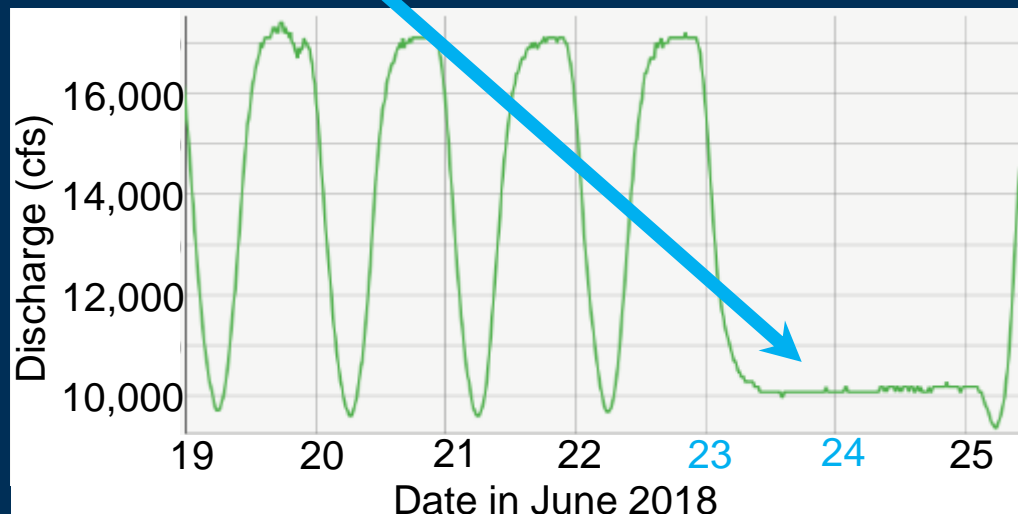
(Dec 14, 2020)

Vegetation Removal Experiments



“Bug Flows” at Glen Canyon Dam

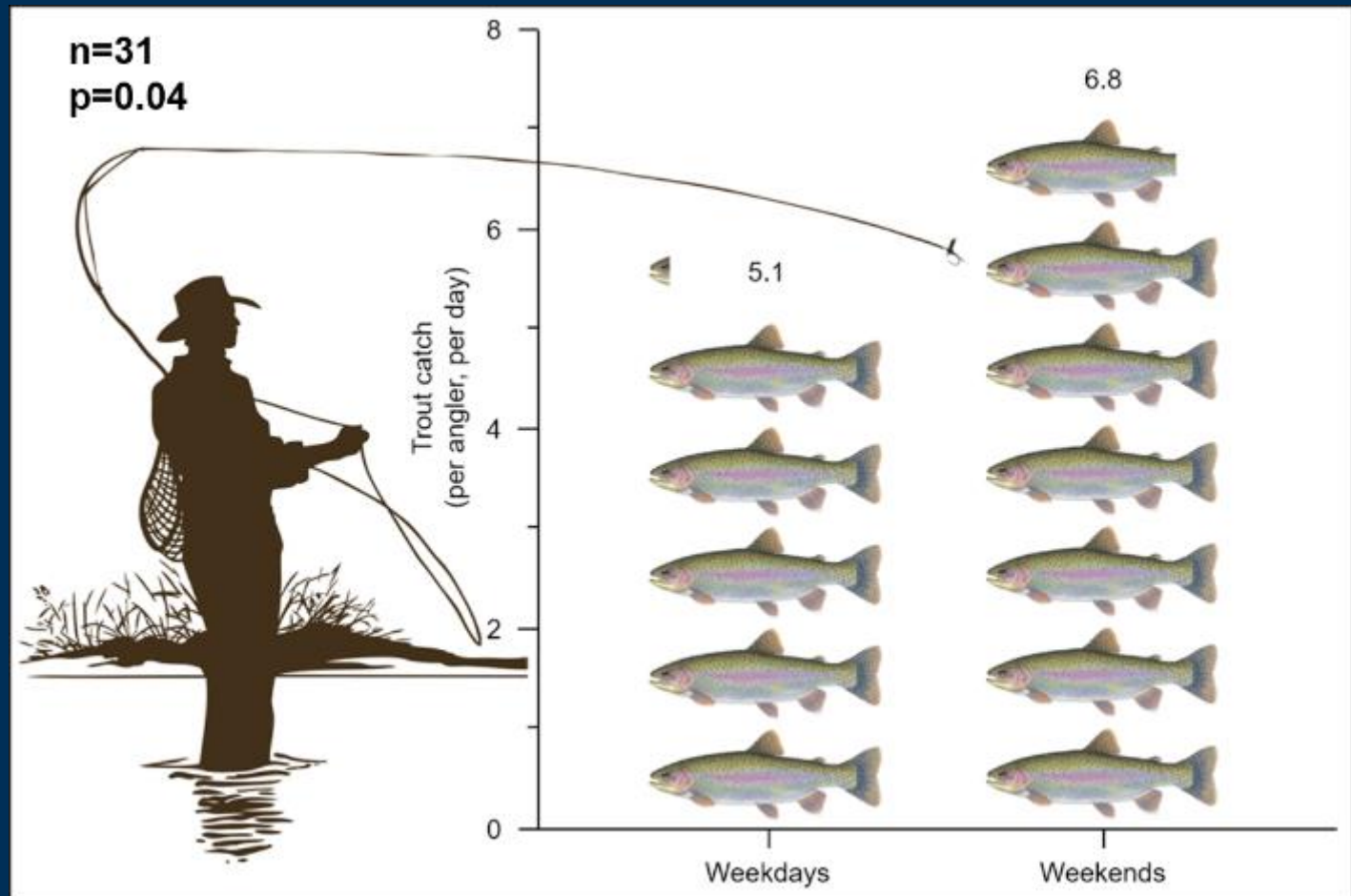
- “Give bugs the weekends off!”
 - Improve egg-laying conditions for insects
 - Increase insect abundance/diversity
- May – August 2018, 2019, 2020
- Stable, low flows on summer weekends
 - Eggs laid on **weekends** won’t dry/die



(Dec 14, 2020)

Bug Flows Outcomes

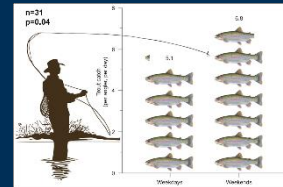
- Better fishing on weekends



Metcalf et al. 2020
Boatman's Quarterly Review

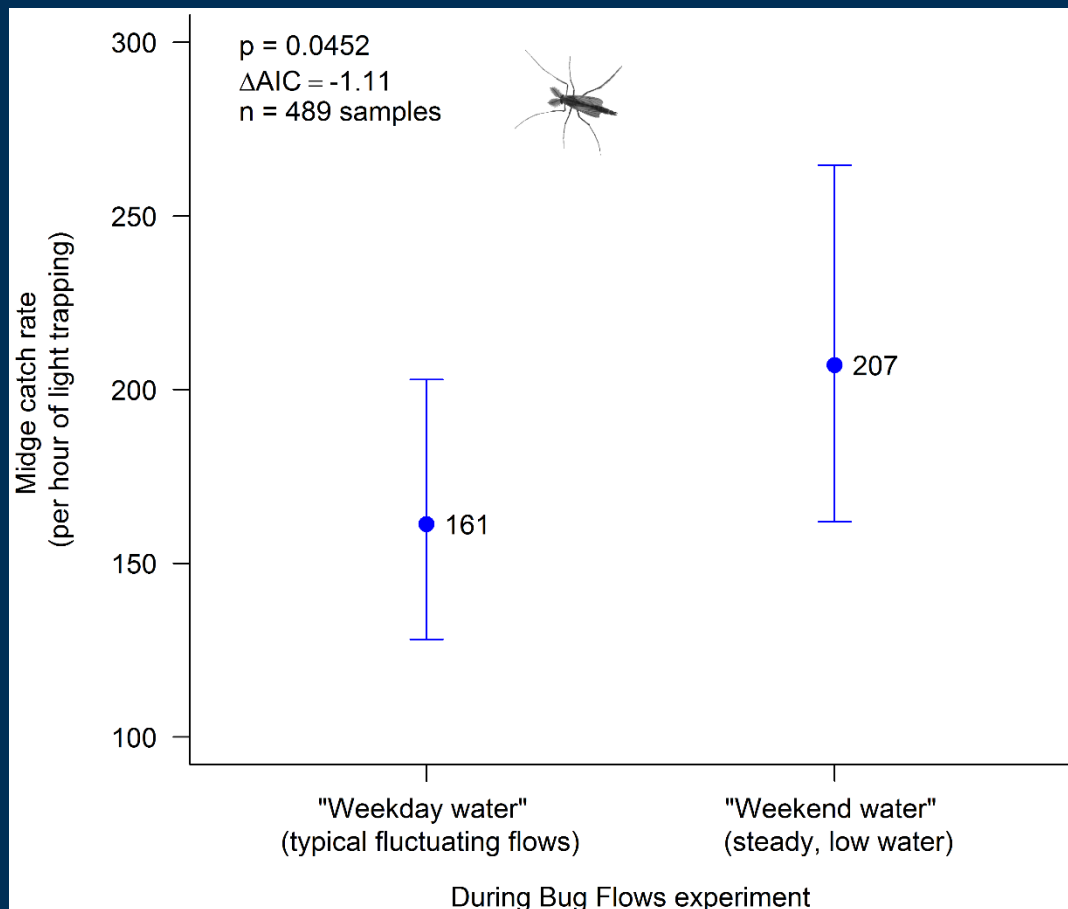
Bug Flows Outcomes

- Better fishing on weekends
- Increased weekend emergence/egg-laying



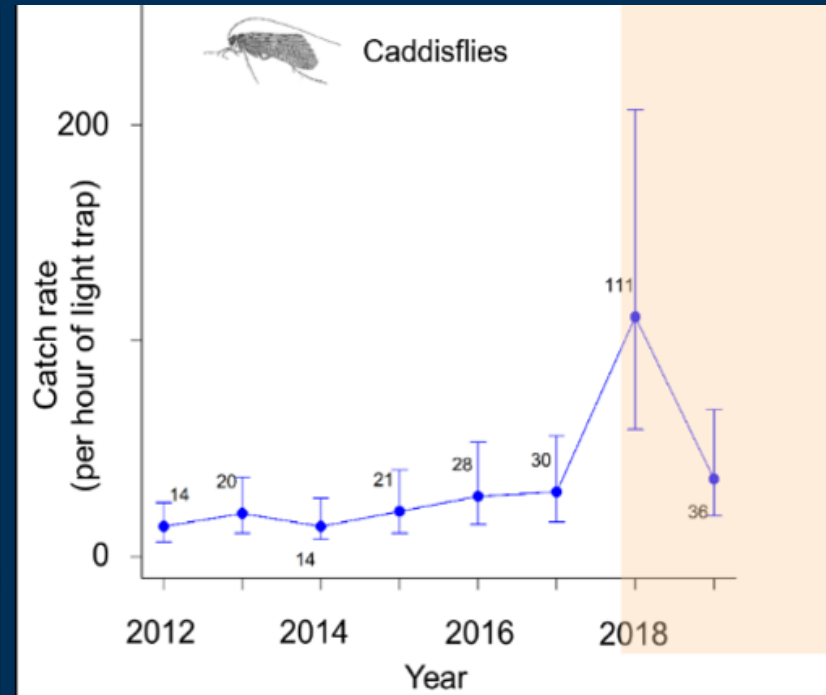
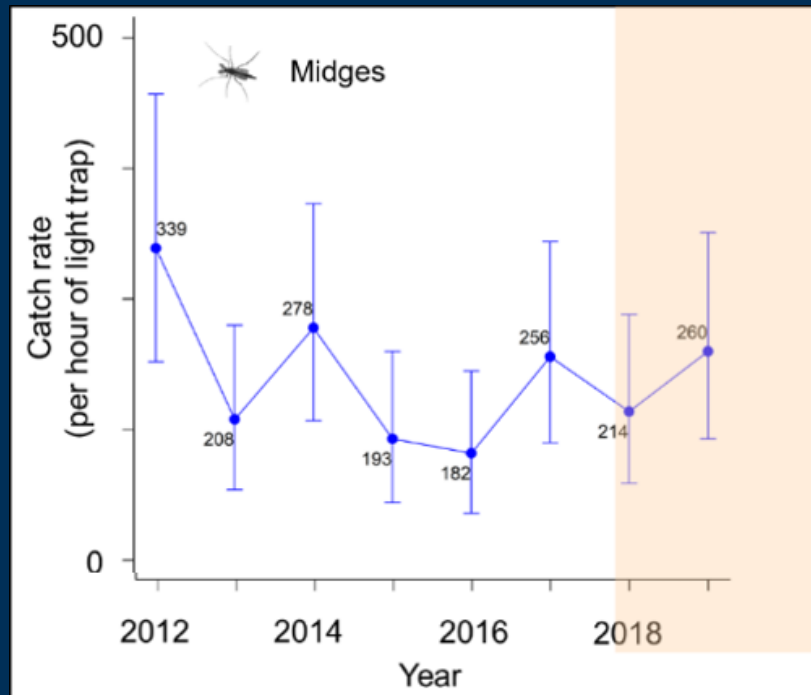
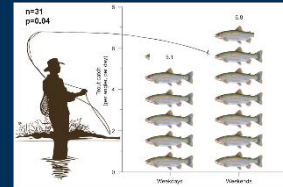
“Rind” of weekend midge eggs

Photo: Kennedy 2018.
Unpublished data, subject to change, do not cite.



Bug Flows Outcomes

- Better fishing on weekends
- Increased weekend emergence/egg-laying
- Insect population response uncertain

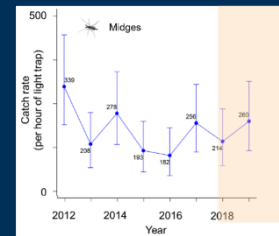
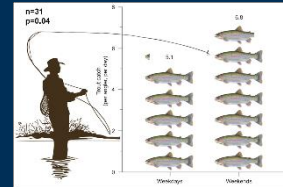


(Dec 14, 2020)

Preliminary data, do not cite

Bug Flows outcomes

- Better fishing on weekends
- Increased weekend emergence/egg-laying
- Insect population response uncertain
- **2020: lower power due to COVID-19**



	<u>2019</u>	<u>2020</u>
Samples	959	424
% from mid-June – Sept	50%	71%
% from Lees Ferry or Phantom Ranch	7%	14%

*River closure April – mid-June 2020
precluded typical citizen science collection*

(Dec 14, 2020)

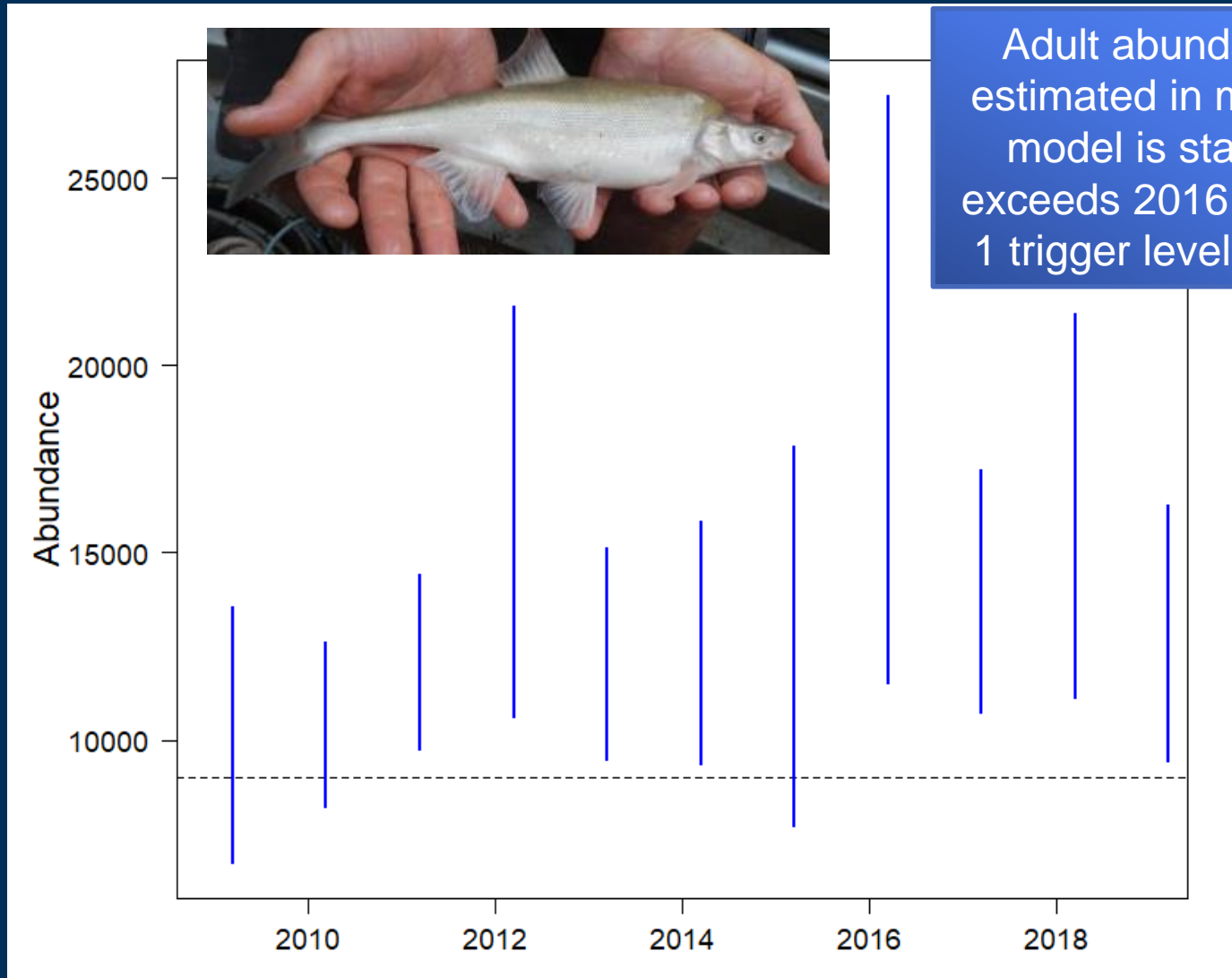
Preliminary data, do not cite

Humpback Chub Status



(Dec 14, 2020)

Fall abundances of adult humpback chub in the LCR aggregation (>199mm TL)



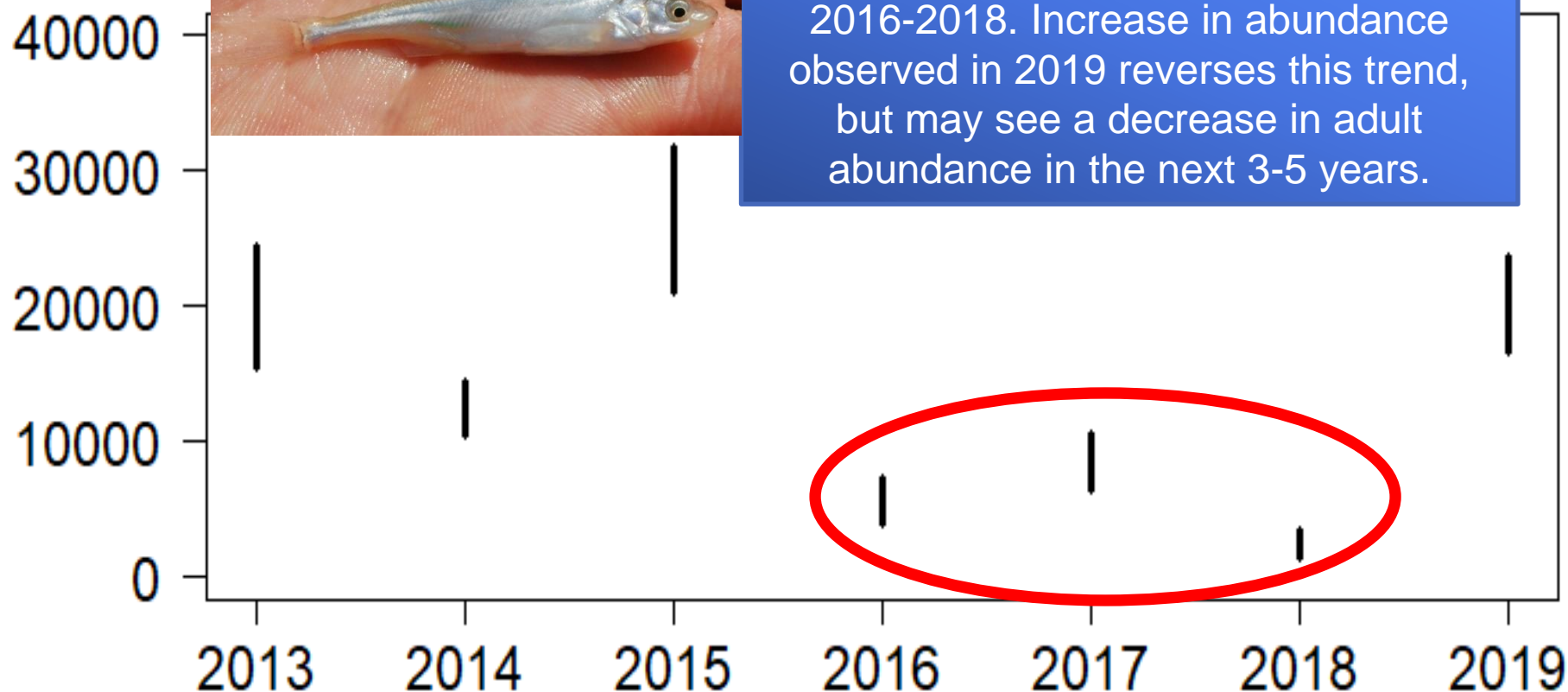
(Dec 14, 2020)

Preliminary data, do not cite

July Abundance of Age-0 Humpback Chub: Little Colorado River



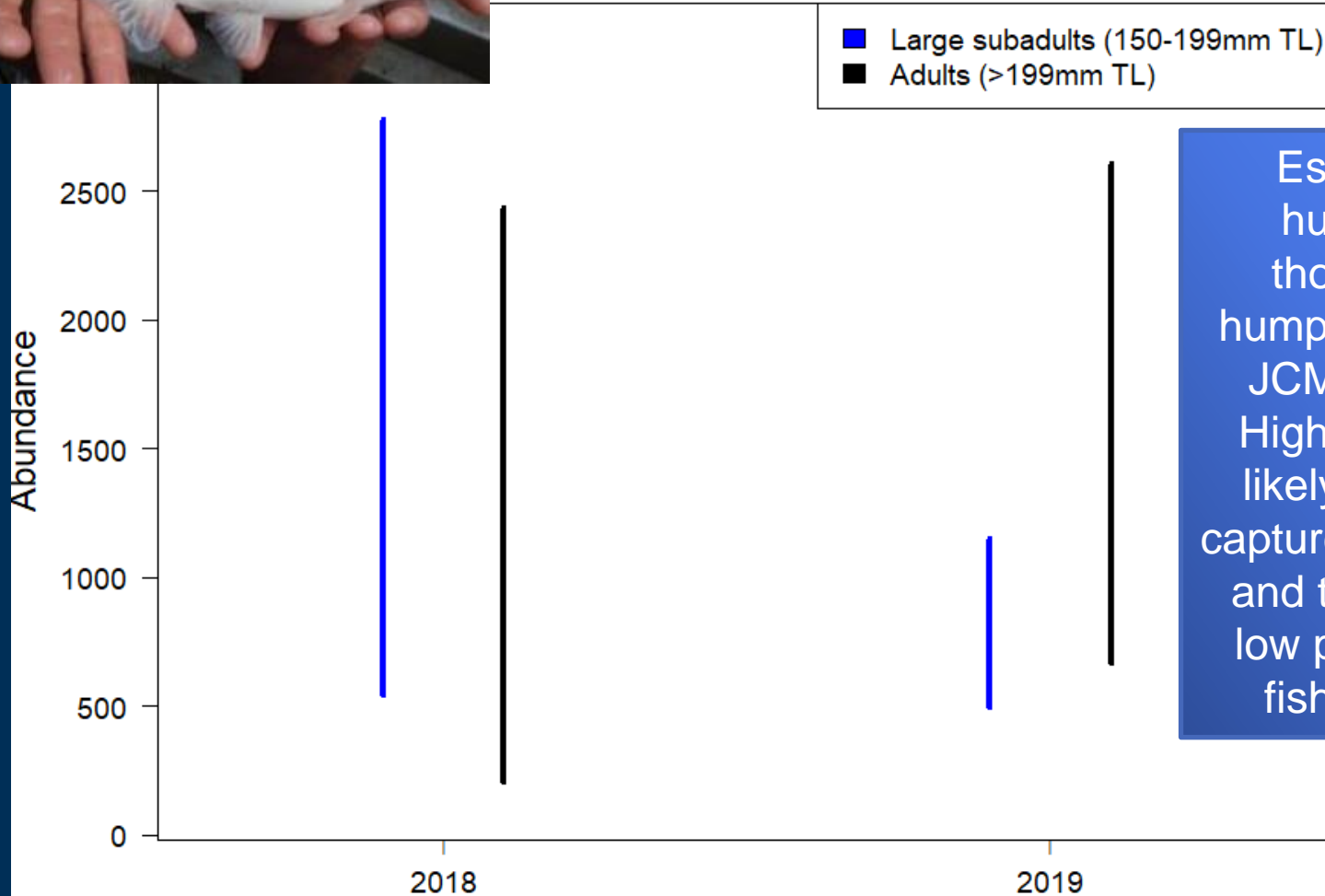
Although adult abundance is stable, little age-0 production seen in the LCR in 2016-2018. Increase in abundance observed in 2019 reverses this trend, but may see a decrease in adult abundance in the next 3-5 years.



(Dec 14, 2020)

Preliminary data, do not cite

Fall Abundance Estimates in JCM-West (Fall Canyon)

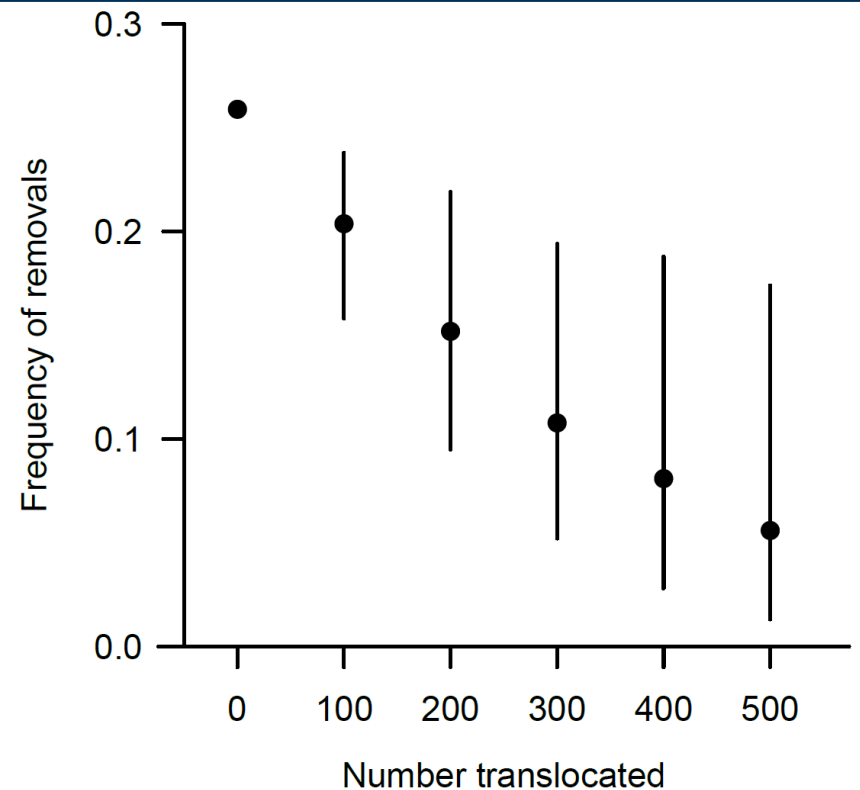
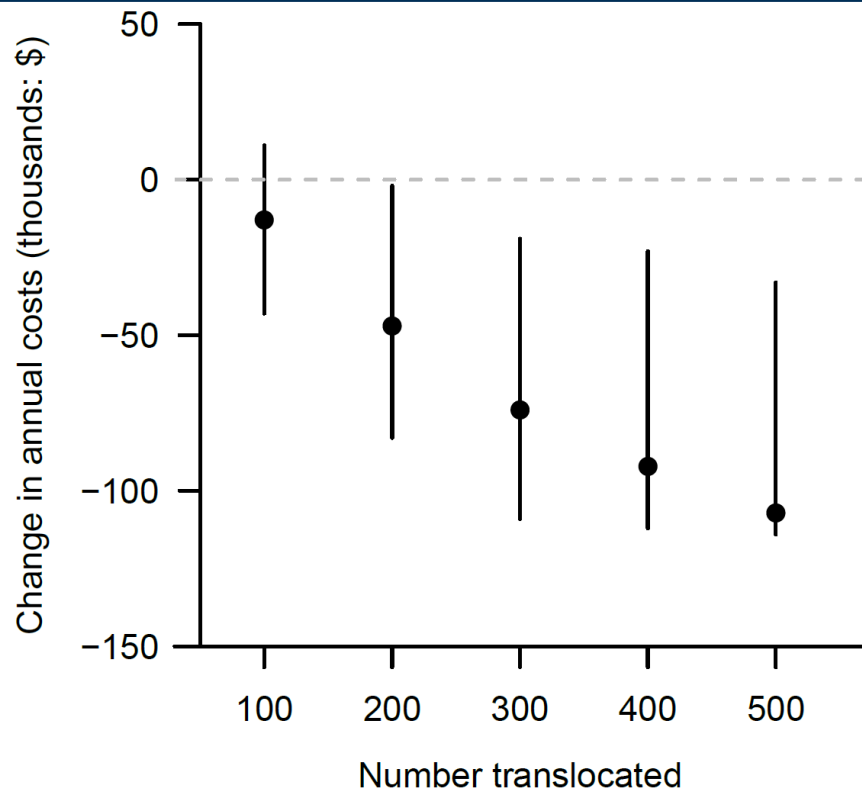


Estimates of hundreds to thousands of humpback chub in JCM-West site. High uncertainty likely due to low capture probabilities and the relatively low proportion of fish with tags.

(Dec 14, 2020)

Preliminary data, do not cite

Humpback Chub Translocations – Quantifying Effectiveness



Benefits of translocations depends on number of humpback chub moved. Increasing translocations changes the optimal non-native removal policy leading to decreased costs and lower expected frequency of removals

(Dec 14, 2020)

Preliminary data, do not cite

Rainbow Trout and Brown Trout

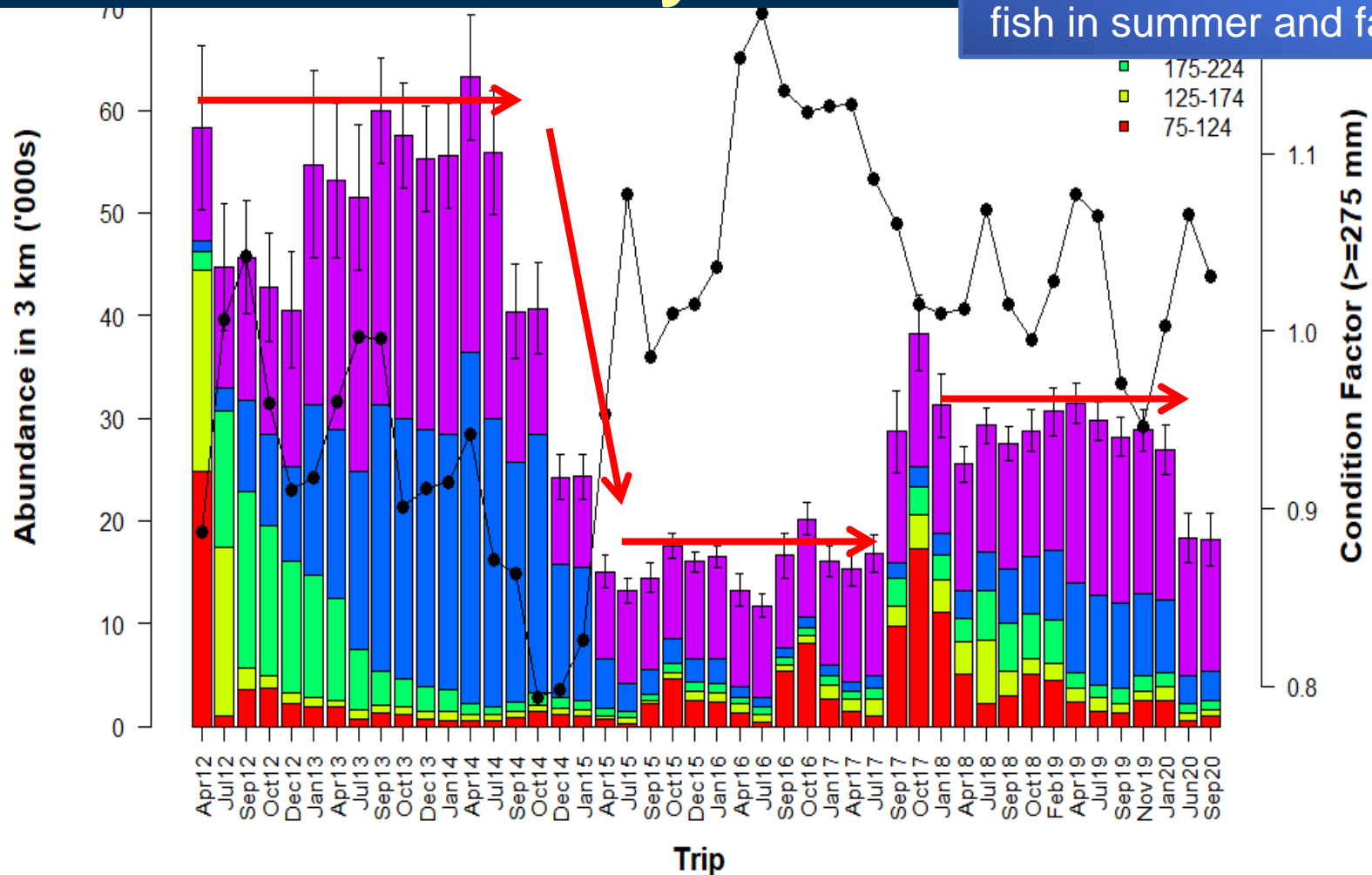


DAVID HERASIMTSCHUK

© FRESHWATERS ILLUSTRATED / USGS

Rainbow Trout Abundance: Lower Glen Canyon

Rainbow trout abundance estimates by month through Sept. 2020. Fewer smaller fish in summer and fall 2020.



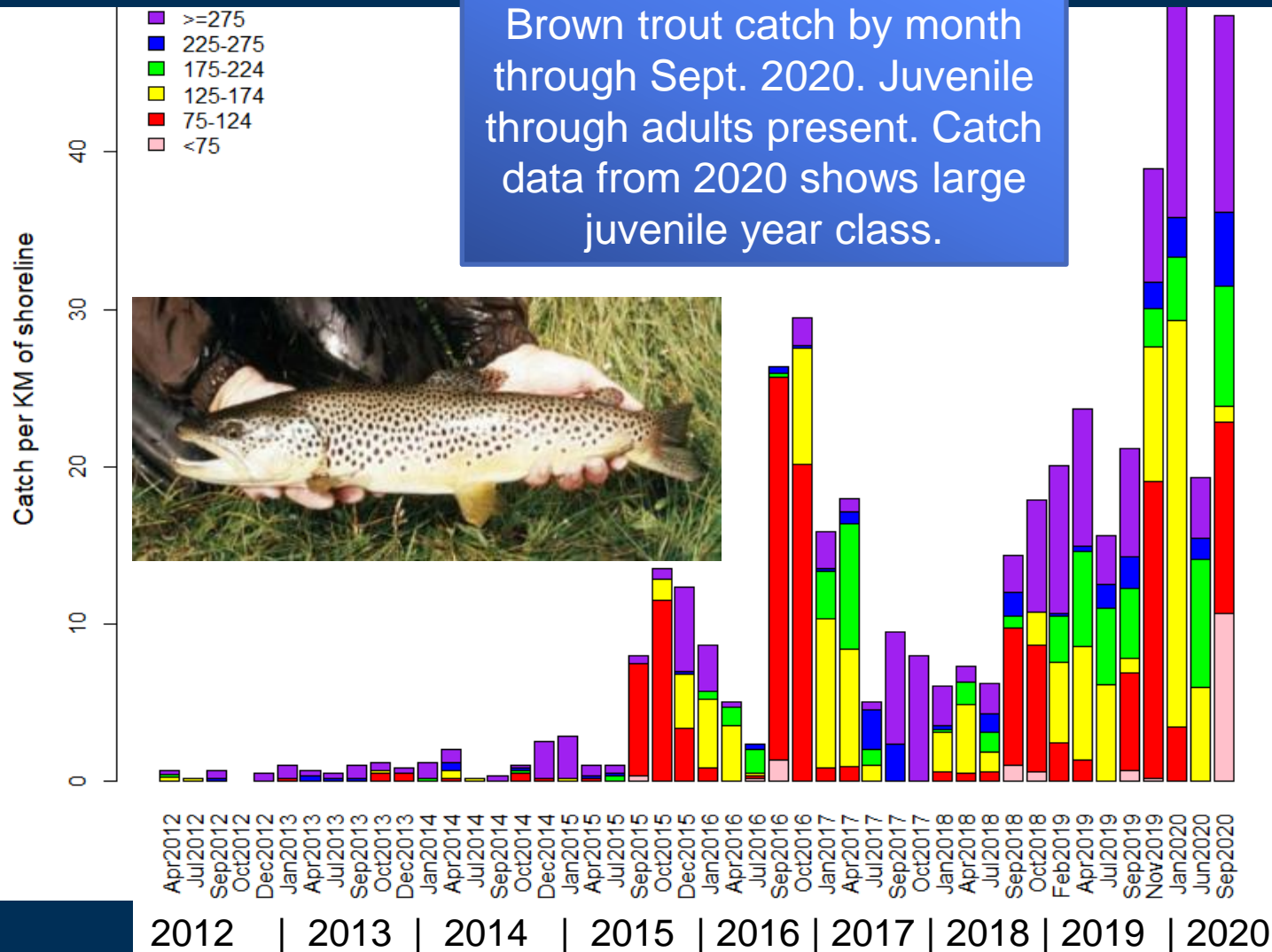
2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020

(Dec 14, 2020)

Preliminary data, do not cite

Brown Trout Catch Rates: Lower Glen Canyon

Brown trout catch by month through Sept. 2020. Juvenile through adults present. Catch data from 2020 shows large juvenile year class.



(Dec 14, 2020)

Preliminary data, do not cite

Acknowledgements

- **Bureau of Reclamation and the Glen Canyon Dam Adaptive Management Program**
- **National Park Service**
- **US Fish and Wildlife Service**
- **Arizona Game and Fish Dept.**
- **Ecometric Inc.**
- **USGS-GCMRC**

Questions?

**Sediment and discharge
data and before and after
HFE sandbar photos can
be found at:
www.gcmrc.gov**

DAVID HERASIMTSCHUK

© FRESHWATERS ILLUSTRATED / USGS