Razorback Sucker Movements: River-Reservoir Exchanges and Experimental Translocations

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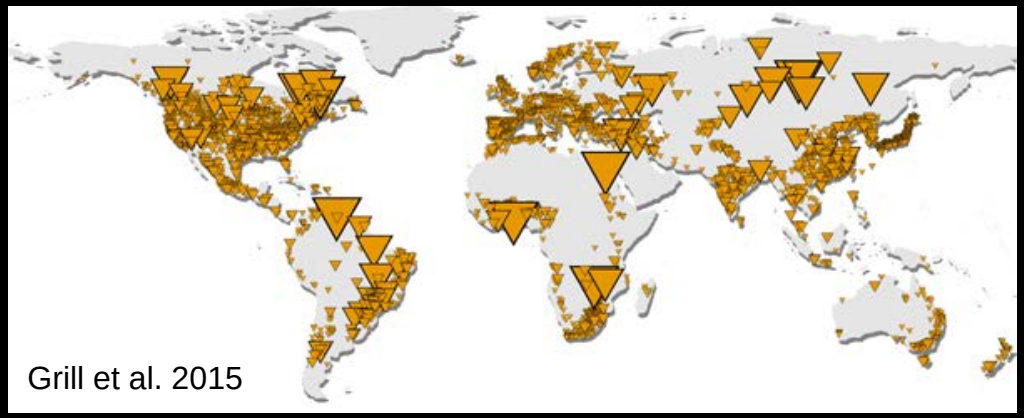
Acknowledgments

- Upper Colorado River basin researchers and crews (STReaMS)
- *USFWS*-Dale Ryden, Nate Franssen, and Scott Durst
- *KSU*-Crosby Hedden and Lindsey Bruckerhoff
- *Bio-West*-Brandon Albrecht, Ron Kegerries, and Ron Rogers
- *ASIR*-Mike Farrington, Howard Brandenburg, and Steve Platania

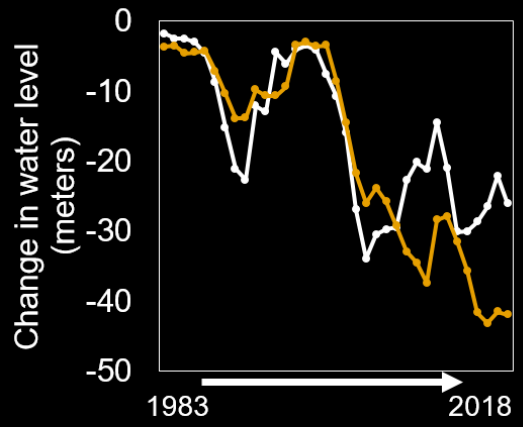
Altered riverscapes

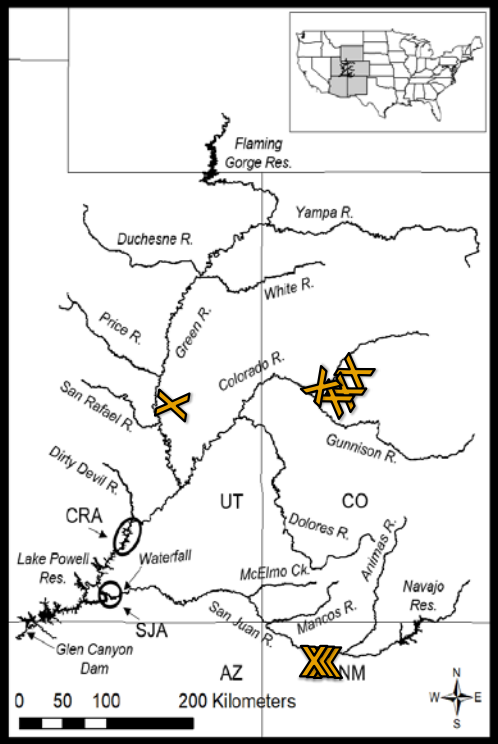
- Barriers ubiquitous across riverscapes
  - Large dams (reservoirs)
  - Small dams
  - Diversions
- Artificially restrict movement
- “novel ecosystems”
  - Hobbs et al. (2006)



A dammed river basin

- Colorado River Basin (Lake Powell)
- Colorado River Basin (Lake Powell) fragmented
- Pearce Ferry Rapid (Lake Mead)
- Many smaller diversion weirs

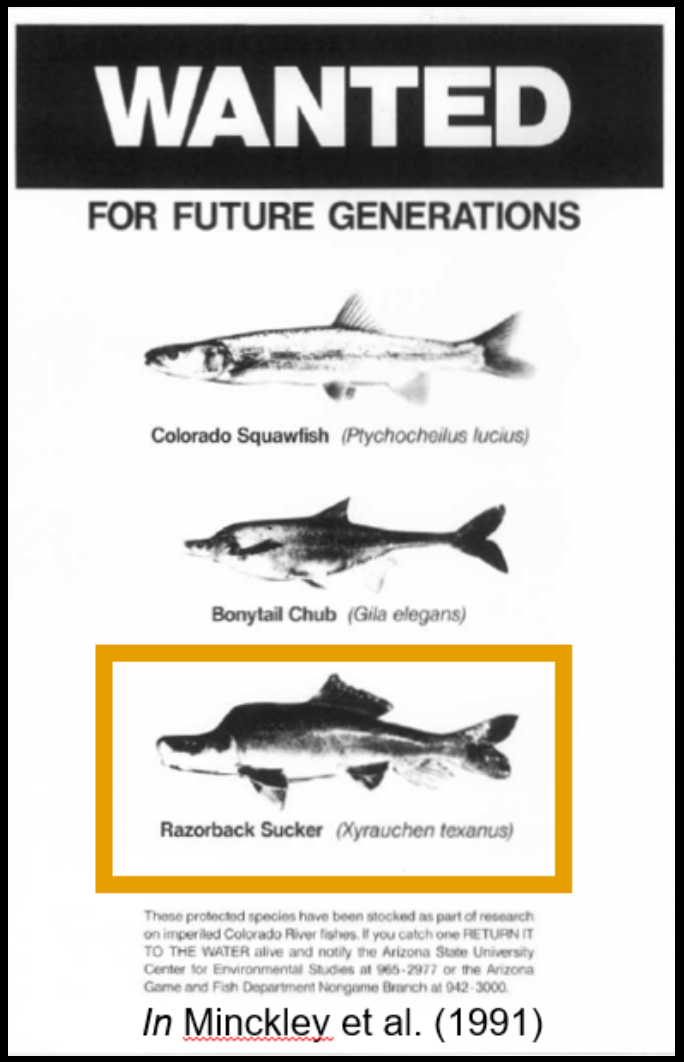




Cathcart et al. (2018)

Plight of the Razorback

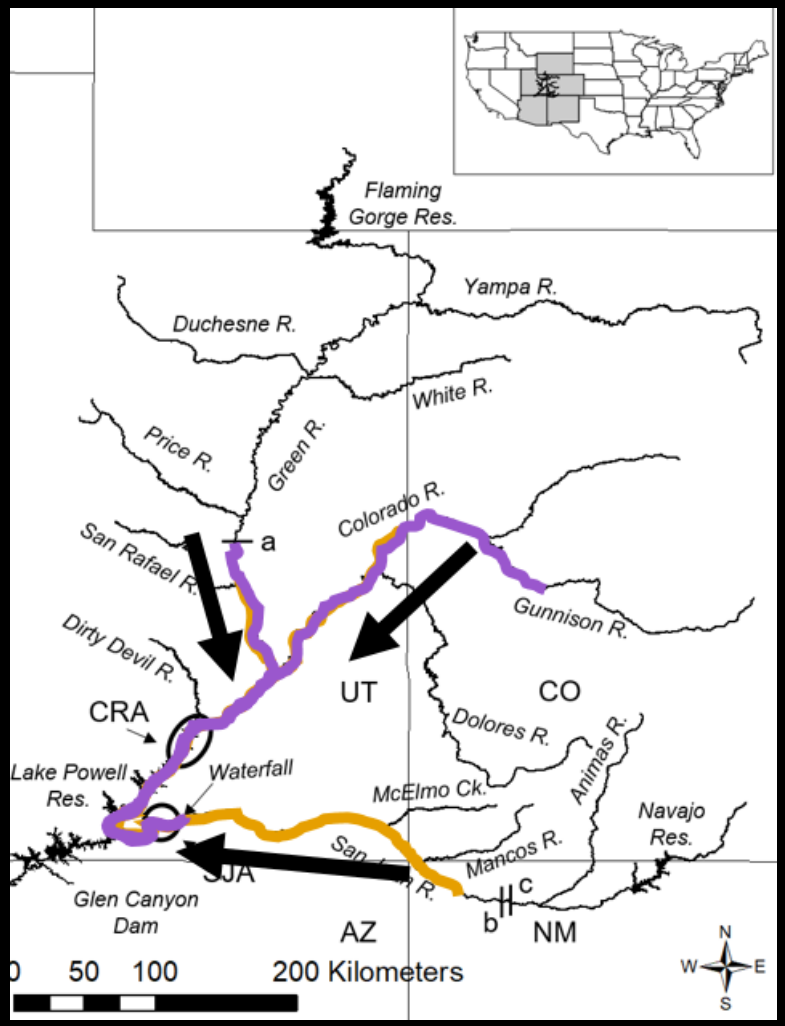
- Large bodied (~910 mm), long lived (~40 years)
- Federally listed as endangered
- Evolved in large floodplain river system



In Minckley et al. (1991)

Prior knowledge on movements

- Early studies limited by number of fish and remoteness of the area
- Measuring fish movement over broad spatial extents is difficult



Synthesizing a centralized database

- STReaMS
  - Species Tagging, Research and Monitoring System: A Centralized Database for the Upper Colorado and San Juan River Endangered Fish Recovery Programs. USFWS.

- Over 2.2 million encounter records of 1.2 million fish (as of 4/8/2019)
  - Stockings, Recaptures, PIT tag detections

Questions

1. Where do Razorback Sucker captured in the Colorado River arm of Lake Powell redistribute?

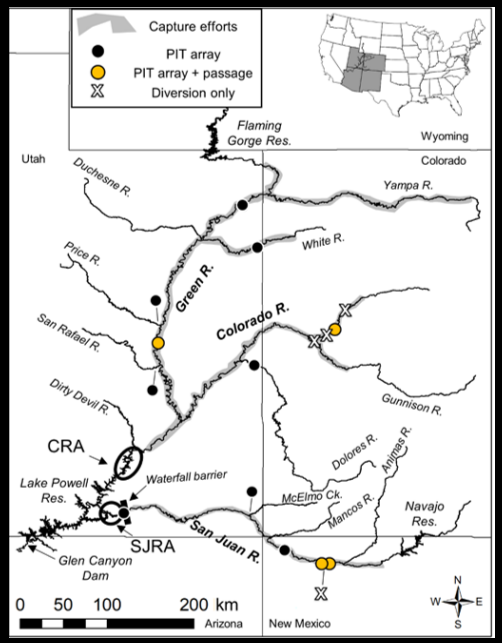
2. What is the proportion of fish in the San Juan River arm of Lake Powell moving into the river below the waterfall?

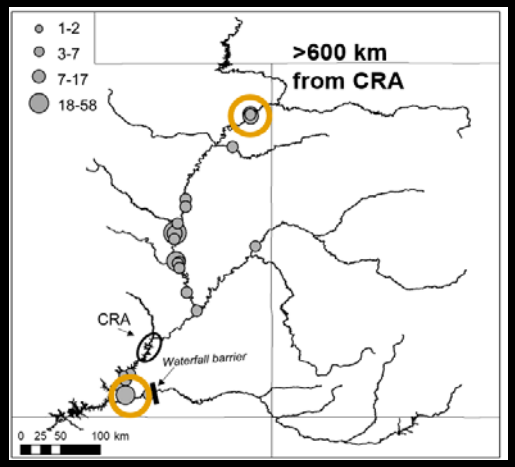
3. How do fish behave that are captured below the waterfall and translocated upstream into the San Juan River?

Dispersal from Colorado River arm of Lake Powell

- 461 never re-encountered
- 154 (59%) only re-encountered back in CRA
- 107 (41%) re-encountered outside CRA
- 39% of acoustic tagged fish detected in SJRA

- USFWS captured razorbacks in 2014-2016
- 722 individuals captured
- All fish PIT tagged, 44 fish acoustic tagged

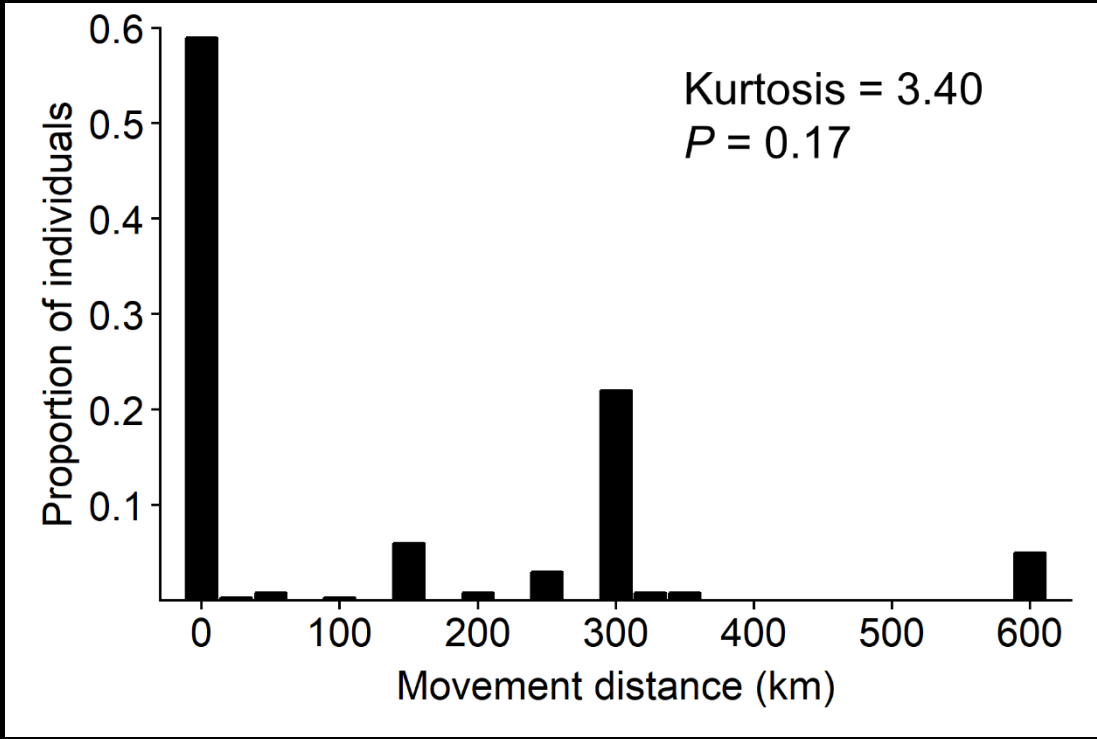




All encounters in STReaMS as of December 2018

Dispersal from Colorado River arm of Lake Powell

- More “movers” than expected under a leptokurtic distribution
- Majority of fish detected at Tusher Diversion (300 km)
- Not related to days at large or total length



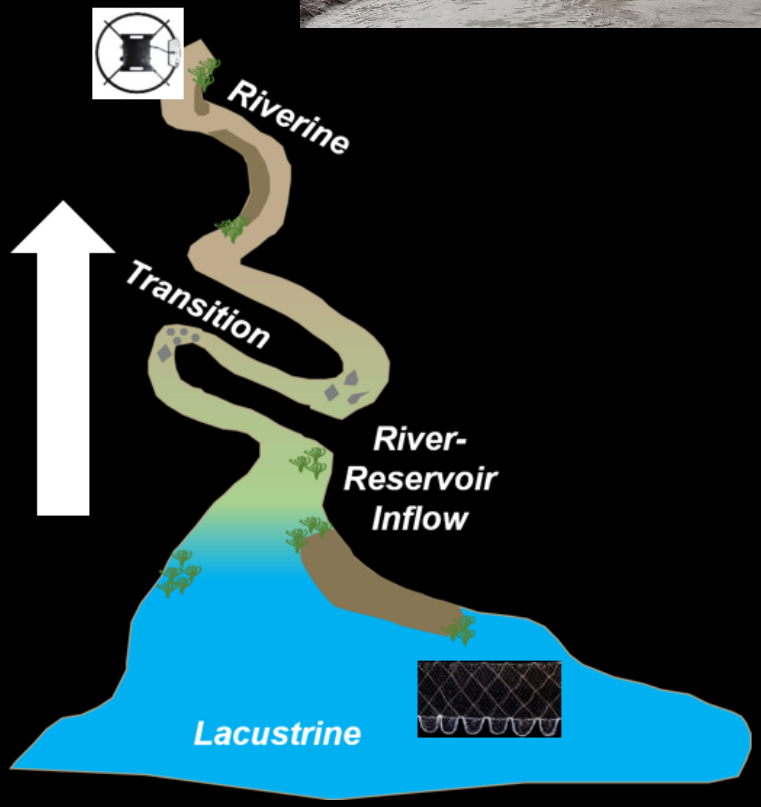
Days at large (mean, range) = **677**, 57-1439
Total length (mean, range) = **487**, 384-573

Proportion moving between Lake Powell and river tributaries?

- 147 & 74 fish captured in SJRA
  - April-June 2017 & 2018

- 2017: 29% CI = [21-36%] detected at waterfall post-capture (365 d)
- 2018: 20% [12-30%]

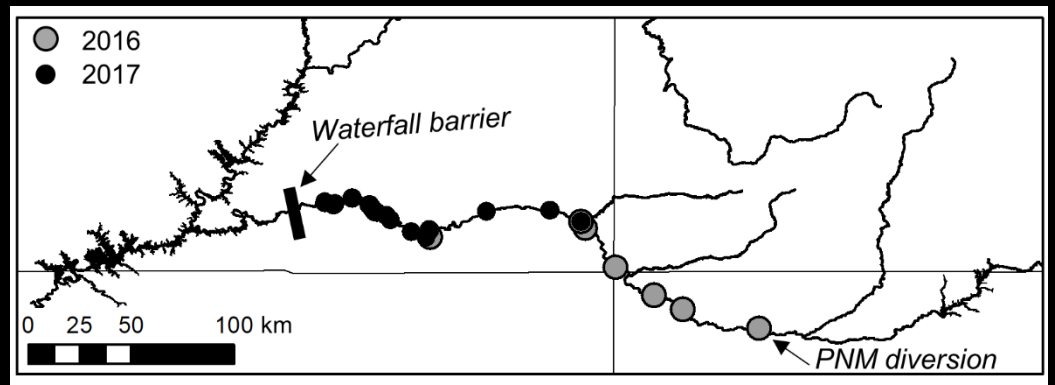
- Similar to Colorado arm [29-42%]



Translocation of Razorbacks

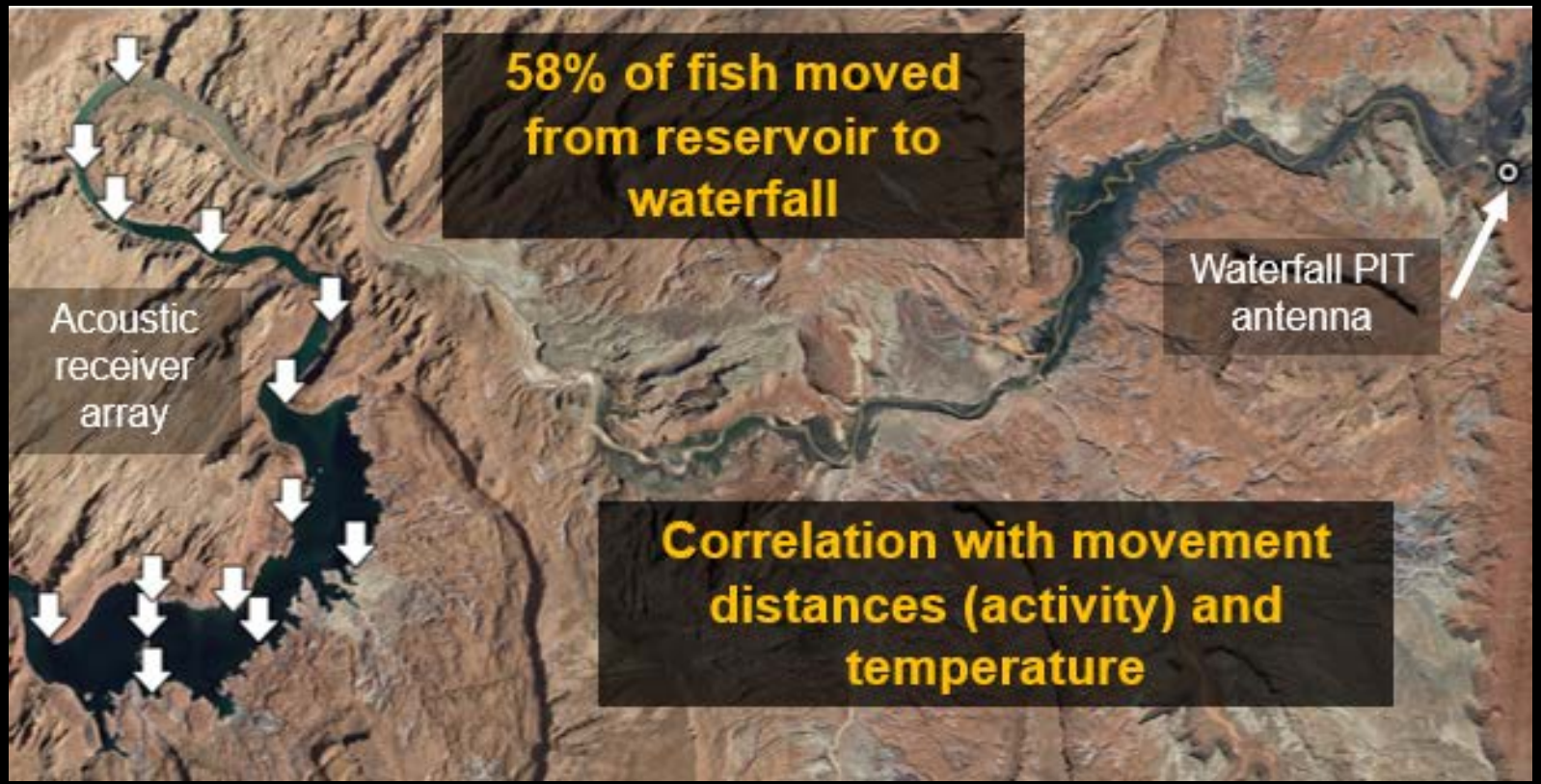
- Feb-Mar 2016 & 2017
- 303 fish translocated
- 80% encountered back below waterfall within 365 days

*PIT detections, recaptures, and active telemetry



Other efforts

- Translocation has continued in 2018, 2019, and more planned



Conclusions

- Moving throughout altered habitat, including large reservoir
  - Not limited to just a few individuals, ~30% of population
  - Observed movement distances were large even among catostomids

- Access to multi-agency database covering multiple states and river systems
  - PTAGIS-Columbia River Basin (Marvin 2012)

Thank you!